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DISCUSSION

The Vienna Circle's 'Anti-Foundationalism'

Thomas Oberdan

ABSTRACT

Thomas E. Uebel has recently claimed that, contrary to popular opinion, none of the philosophers of the Vienna Circle of Logical Positivists were proponents of epistemological foundationalism. According to the considerations of the current discussion, however, Uebel's conclusion is erroneous, especially with respect to the work of Moritz Schlick. The chief reason Uebel offers to support his conclusion is that current attempts to portray Schlick's epistemology as foundationalist fail to overcome its 'ultimate incoherence'. In contrast, it is argued that current interpretations, based on the unpublished as well as the published record, provide understandings of Schlick's foundationalist epistemology as not only coherent, but plausible. In closing, Uebel's own treatment of Schlick's work, which purports to show that the most feasible candidates for foundational statements are 'meaning-theoretic' clarifications of the content of expressions, itself fails to accurately represent Schlick's own characterizations, and pictures Schlick's epistemology as a confused mix of epistemic and semantic insights.

In a recent essay, Thomas Uebel claims that, contrary to popular perception, or 'the received view' of early Logical Empiricism, the members of the Vienna Circle were *not* epistemological foundationalists at all (Uebel [1996]). Uebel has maintained elsewhere that Otto Neurath's philosophical work in the heyday of the Circle can only be understood as an effort to develop a fully naturalized epistemology (Uebel [1992], esp. Ch. 10). Currently, Uebel is more concerned to show that other leading Circle members, though perhaps not devoted to a full-blown naturalized epistemology, were certainly not committed to its arch-rival, epistemological foundationalism. Though Uebel makes his argument for both Rudolf Carnap and Moritz Schlick, it is especially contentious in the case of the latter, who penned the essay 'On the Foundation of Knowledge'.[1] Despite the fact that Schlick's essay was regarded, by his

[1] In the case of Carnap, Uebel argues that epistemological foundationalism entails 'epistemological realism', the idea that 'our justificatory ascriptions and practices recapitulate an objective order of reasons, an order that exists independently of our ascriptions and practices' (Uebel [1996], p. 426). Uebel concludes that, since the constructions of Carnap's *Aufbau* significantly involve, at several junctures, the adoption of conventions, which function as constitutive determinants of objective reality, Carnap must reject epistemological realism and, *a fortiori*, epistemological foundationalism.

colleagues and critics within the Vienna Circle and without, as a model work of foundationalist epistemology, Uebel contends, to the contrary, that Schlick was no foundationalist at all (Uebel [1996], p. 420). Uebel's argument depends on two claims: firstly, none of the extant readings of Schlick's epistemology as a foundationalist enterprise is plausible, for they fail to overcome the 'ultimate incoherence' inherent in Schlick's views. Secondly, an integrated understanding of Schlick's Vienna Circle-era writings reveals that the chief candidates for foundational statements in his epistemology—his so-called 'affirmations' (*Konstatierungen*)—are *not* empirical statements at all but, rather, 'meaning-theoretic' clarifications of the semantic content of terms occurring in scientific discourse. Then, of course, Schlick's 'foundations' are themselves devoid of empirical content and, as such, cannot provide any evidential warrant for the remaining claims of science.

But the issue raised by Uebel's essay is not whether Schlick's views are imperfect, for even if they are flawed they may well possess significant merit and originality. Instead, the question posed by Uebel's discussion concerns the very type of view Schlick was proposing, regardless of whether his arguments for it ever succeeded. In what follows below, current attempts to read Schlick's epistemology as a foundationalist project will be briefly reviewed, as well as Uebel's criticisms of them. It will be shown that Uebel's criticisms miss their mark, for it is possible, even plausible, to construe Schlick's epistemology as foundationalist without threat of 'ultimate incoherence'. Then Uebel's own interpretation, and the evidence he marshals in its favour, will be considered. It will be argued that even though Schlick's view is somewhat puzzling—and certainly his contemporaries thought so—Uebel's rendering is both philosophically and historically more troubling than the original. For Uebel has conflated Schlick's treatment of the evidential basis of empirical knowledge with insights concerning the character of the philosophical enterprise. The upshot is that Uebel's view is far less salubrious than attempts to portray Schlick's theory of knowledge as a variety of foundationalism.

The context in which Schlick presented his ideas was the well-known debate, within the Vienna Circle, over the nature and role of observation in the body of scientific knowledge—cast as the question of the logical nature and epistemological function of so-called 'protocol sentences'.[2] For some time prior to the appearance of Schlick's essay, Otto Neurath and Rudolf Carnap had been aligning their notions about protocols with the prevailing theses of Physicalism and the Unity of Science (Carnap [1932a, b, d; Uebel [1992], Ch. 6). Eventually, Neurath launched—on his famous 'boat' simile—what seemed to Schlick a form of coherentism, and it appeared that Carnap fully concurred (Carnap [1932c]). Uebel has argued elsewhere that Neurath's

[2] For authoritative accounts, see both Uebel [1992] and Oberdan [1993].

view was, at bottom, a well-founded form of naturalism, rather than the simple-minded coherentism it is so often thought to have been (Uebel [1992], esp. Ch. 10). However convincing these arguments may be, it is certain Schlick never perceived the naturalism Uebel detects in Neurath's writings, but saw instead only a naïve form of coherentism. Indeed, Schlick thought that Carnap and Neurath were initially engaged in the search for epistemic certainty and, having failed to discover its source in observation, abandoned all hope of securing an epistemological foundation, concluding that protocols (concrete, singular observation statements) were on a par, epistemologically, with all other scientific claims.

Thus, as Schlick saw it, Neurath's and Carnap's discussions of protocols began as a quest for a certain observational basis which could serve as a touchstone for truth, or criterion for acceptance, of the remaining claims being considered for inclusion in the body of scientific knowledge. Once the thesis of Physicalism was applied to the question at hand, implying that protocols must be expressed physicalistically, or translatable into physicalistic language, it followed that protocols were just as fallible as any other statement. And when Popper proposed that *any* statement, however remote from observation, can be taken as the terminus of testing (and therefore, in a sense, a 'protocol'), it seemed impossible to recognize any special role, or epistemic privilege, for protocols at all (Carnap [1932d], pp. 465–9). Thus Neurath and Carnap were led to the conclusion that non-contradiction of the statements accepted into the body of scientific knowledge could be the only remaining criterion for acceptance and, indeed, truth. To counter this conclusion, Schlick argued that coherence was insufficient as a determinant of truth (Schlick [1934b], pp. 375–6).[3] Schlick and other Circle members clearly thought that not only Neurath but even the sober Carnap was flirting with coherentism, and had come precipitously close to giving it his full endorsement (Carnap [1932c], p. 180). Thus, it seemed obvious—to Schlick at least—that Carnap and Neurath, despairing of the certainty of the observational basis, abandoned any hope of a special role for protocols and embraced a coherentist conception of truth. In short, Schlick thought Neurath and Carnap had leapt out of the foundationalists' frying pan into the coherentists' fire.

Schlick granted that singular physicalistic statements containing observational terms played a key role in the body of scientific knowledge, and he followed current usage by calling them 'protocols'. But he wished to raise the further question whether protocols, so conceived, played a privileged epistemic role in our empirical knowledge or whether they were of the same epistemic status as any other claim in the scientific corpus. At the same time, he wished to explore

[3] In correspondence with Carnap, Neurath promptly denied the charge of coherentism (Neurath [1934a], p. 1). Nor did Neurath's denial surprise Schlick, who thought Neurath was simply incapable of working out the consequences of his own ideas (Schlick [1934a]).

the motivation beind the search for certainty in order to assess its epistemic validity. It was at this point that he introduced his baffling notion of 'affirmations', evoking a torrent of criticism from the 'loyal opposition' within the Circle.[4] What emerged in the ensuing discussion was that affirmations, as Schlick conceived them, were characterized by three properties: they contained indexical expressions, they were absolutely incorrigible, and they were indubitable.[5] The question at hand, then, concerns the role of affirmations in relation to protocols in particular, and accepted scientific claims more generally.

There are two quite different ways in which Schlick's epistemology may be construed as foundationalist. The first regards affirmations as the foundational elements in his system, while the second instead regards protocols as his grounds for empirical knowledge. Thus the question arises whether, for Schlick, affirmations—momentary but certain utterances lying outside the scientific system—or protocols—fallible statements falling within the system of science—are to be regarded as foundational. Both possibilities have been explored in recent examinations of Schlick's work.

Joia Lewis has made the case that Schlick's epistemology is faithfully characterized as a foundationalist system by casting affirmations—*qua* mental acts or cognitive episodes—in the role of foundations lying outside the body of scientific knowledge.[6] The chief merit Lewis claims for this view is that it provides a neat resolution of tensions that plagued Schlick's earlier philosophy, thus exhibiting the continuity of his thought throughout his philosophical career. In particular, Lewis's treatment purports to explain how Schlick successfully unified his fundamental commitments to both empiricism and scientific realism, based on the idea that affirmations are our only experiential 'contact point' with reality (Lewis [1996], pp. 293, 304–6). But to treat affirmations as the epistemic foundations in Schlick's philosophy can only be motivated by the idea that he wished to ensure the certainty of the basis. This is tantamount to interpreting Schlick as pursuing certainty—or what he called 'absolute validity'—in the foundations of knowledge, the very same motivation he found misguided (and doomed to failure) in Carnap's and

[4] First, Neurath mocked affirmations as thoroughly ambiguous, in his essay 'Radical Physicalism and the "Real World"', on the grounds that affirmations 'can sometimes be treated as statements, sometimes as non-statements' (Neurath [1934b], p. 159). Carnap, however, thought one could make sense of affirmations by simply regarding them as statements outside the system-language (Carnap [1935], p. 2). Even so, Carnap thought problems remained (cf. fn. 5 below). Hempel continued Neurath's line of criticism and, in his response as well as a later note 'On Affirmations', Schlick made it clear that he regarded affirmations as present tense indexical statements, the kind that would be uttered by a subject in response to questioning by an experimenter (cf. Hempel [1934–35a, 1934–35b; Schlick [1935], pp. 409–10).

[5] Indeed, Carnap's biggest worry was that the logic of indexicals was *terra incognita* lying beyond the limits he had explored in his *Logical Syntax of Language* (Carnap, [1937], p. 168).

[6] The differences between Lewis's construal of Schlick's epistemology and Carnap's should be carefully noted. Though both place affirmations outside the system, Carnap understands them as statements, disregarding Schlick's remarks about their status as perceptual events, while Lewis focuses solely on their mental character (Carnap [1935], p. 2; Lewis [1996], pp. 304–5).

Neurath's earliest efforts. If so, then he clearly failed to achieve his goal, for his arguments for the certainty (viz. incorrigibility and indubitability) of affirmations are wholly unconvincing (Oberdan [1993], pp. 52–5, [1996], pp. 286–9).

Some might also carp that Lewis has rendered Schlick's epistemology highly implausible. Despite Lewis's focus on the episodic character of affirmations, it cannot be denied that Schlick characterized affirmations primarily in terms of their linguistic properties, properties which simply cannot be ignored. In linguistic terms, the most salient feature of affirmations is their indexicality, their dependence on the immediate environment of utterance for the successful reference of their constituent terms. But the indexicality of affirmations also implies that their significance in turn depends on the context of utterance, and is therefore momentary and fleeting. So the epistemic warrant with which an affirmation might provide other statements evaporates once the affirmation is uttered (Oberdan [1993], pp. 52–6, [1996], p. 286). Then it would seem that except for an occasional *now* and *then*, or *here* and *there*, the body of scientific knowledge is, on Lewis's construal, wholly unsupported. Schlick himself recognized that affirmations could never provide an enduring foundation, nor could they provide the basis for the construction of any 'logically tenable' structure (Schlick [1934b], pp. 381–2, 385). The obvious conclusion, then, is that—despite the attractions of Lewis's contentions—Schlick never regarded affirmations as the foundations of empirical knowledge at all. Rather, what he regarded as foundational were just what he had identified as 'protocols'—singular physicalistic observational statements that belong to the language of the system of science.

This supposition is further confirmed by Schlick's express denial that affirmations and protocols are logically related in any way. If, as Lewis proposes, affirmations lie outside the system of scientific knowledge yet provide its foundations, then rules must be provided for translating affirmations, as foundational statements outside the scientific system, into system statements (e.g. protocols) (Carnap [1932d], pp. 458–63). But translatability is a logical relation which Schlick dismissed by emphasizing that affirmations are no more than 'psychologically and biologically' related to protocols; affirmations are at most 'the origin and incentive' for forming proper protocols; affirmations merely provide the occasion for framing protocols, and thus bear no logical relationship whatsoever to protocols (Schlick [1934b], pp. 381–2). Since Lewis's view requires just such a logical relationship between the body of scientific knowledge and affirmations, Schlick's scientific epistemology and his account of affirmations would then be inextricably intertwined. Accordingly, the plausibility of Schlick's treatment of the evidential structure of scientific knowledge stands or falls with the tenability of his account of affirmations. To the extent that his remarks about the certainty of affirmations

are indefensible, Schlick's entire epistemology fails. So Lewis's view is subject to criticism on the grounds that it does not accurately represent Schlick's remarks about the relations between affirmations and protocols, and ties his account of affirmations to his general epistemological scheme, rendering his foundationalism dependent on his account of the certainty of affirmations. At most, one can criticize Lewis's representation on the grounds that it is not a faithful reflection of Schlick's thought and, if it were, the result would be a highly implausible epistemological scheme.

But the shortcomings in Lewis's construal may be readily avoided by regarding protocols, rather than affirmations, as the foundational elements in Schlick's epistemological scheme. This approach accommodates Schlick's remarks about the relations of protocols to affirmations, thus acknowledging that affirmations are 'the origins and incentive' of protocols, though not in a strict logical or epistemic sense but only 'psychologically' and 'biologically' (Schlick [1934b], pp. 381–2). Then affirmations are not foundational elements in the body of scientific knowledge, nor are they related to protocols either logically or epistemologically. It is none the less in virtue of their aetiology—initiated with affirmations—that protocols themselves function as foundational elements and consequently play a distinctive epistemic role. After all, the credibility of a protocol is due entirely to its origins, and Schlick's treatment of protocols thus overcomes the '*essential* defect' (Schlick's emphasis) of Neurath's and Carnap's critical theory of protocols, to wit, its failure 'to recognize the differing status of propositions' (Schlick [1934b], pp. 378–9). So protocols play a privileged role within the body of empirical knowledge, and accordingly differ in epistemic status from other propositions, because of their intimate connection to observation (via affirmations). Although protocols, like other physicalistic statements, are fallible, they are not *simply* on a par with the other statements of science. This feature of protocols halts the slide to coherentism, a consequence of regarding protocols as if they were just as hypothetical as all other scientific claims. Because of their epistemic privilege, protocols constituted Schlick's foundations, and his account of affirmations should be understood as an attempt, however flawed, to account for the special status of protocols by rooting them in observation.

So Schlick's introduction of affirmations into the epistemological scheme of things is offered as an account of the observational sources of protocols, a story about how protocols come to possess their epistemic privilege, which is strictly independent of his foundationalism. Thus, the most salient feature of the interpretation under consideration is its separation of Schlick's treatment of affirmations from his claims for the epistemic privilege of protocols. So construed, Schlick's view divides neatly into two components. The first is his foundationalist account of the evidential structure of the body of scientific knowledge and the privileged role of protocols in the provision of warrant for

other claims. The second is his treatment of the relations of protocols to observation, which he attempted to explain by means of the ill-fated notion of an affirmation. Given the implausibility of Schlick's arguments for the certainty of affirmations, the latter component may be readily dismissed without affecting the first. What then remains is the idea that all warrant derives from dubitable, corrigible protocols which are epistemically privileged by virtue of their relations to observation. Protocols constitute the foundation of empirical knowledge.

But this is not to imply that Schlick's account of affirmations is entirely pointless, for it guarantees some role for observation in the acceptance of foundational claims. Apparently, Neurath and Carnap were content to leave the relationship of protocols to observation as a matter to be explained by empirical psychology. But nowhere in their discussions of protocols does either of them require that observation must be essentially involved in an acceptable psychological account of the acceptance of protocols. This opens the door for all kinds of true psychological treatments that fail to assign observation an indispensable role in the warranting of scientific claims. In contrast, Schlick's account of affirmations, however much its details may be flawed, at least respects the requirement that, in any adequate account of the acceptance of protocols, observation must play a fundamental role. Schlick's commitment to empiricism is thus far more deeply rooted than Carnap's or Neurath's (Oberdan [1996], pp. 286–9). At the same time, Schlick's account of affirmations attempts to explain the feelings of certainty attendant upon successful observation, through the immediacy of the relation of an affirmation to its referents, and its consequently diminished fallibility (Oberdan [1993], pp. 54–5, [1996], p. 291, fn. 14). None the less, it follows that Schlick's treatment of affirmations is logically independent of his commitment to foundationalism. The introduction of affirmations serves the primary purpose of characterizing the aetiology of protocols in order to account for their sources in observation and their consequent epistemic privilege. The salient point is that protocols possess such privilege in virtue of their relations to observation, regardless of whether Schlick's account of affirmations aptly characterizes this connection (Oberdan [1996], pp. 286–7). In any case, Schlick's account of the evidential structure of the body of scientific knowledge is distinctly at odds with the Physicalists' view that, since all beliefs are on a par epistemically, only coherence can serve as a criterion of acceptability.

Uebel's chief complaint against this view is simply that the indexicality of affirmations fails to guarantee their incorrigibility, as Schlick argued (Uebel [1996], p. 420). While the interpretation at hand recognizes that Schlick built indexicality into his notion of affirmations in order to guarantee the requisite epistemic properties, it concurs with Uebel's assessment that Schlick's efforts fall short of their goal (Schlick [1935], p. 409; Oberdan [1993], pp. 52–5). But

the failure of Schlick's argument hardly constitutes grounds for regarding his overall view as unintelligible, especially when the failure concerns a minor aspect that is logically independent of the leading epistemological themes under discussion. Rather, the failure of Schlick's attempted demonstration only shows that he was mistaken about the epistemic properties of indexical statements. To establish that the interpretation he criticizes fails to save Schlick's epistemology from its 'ultimate incoherence', Uebel must demonstrate that Schlick's failed argument (from the indexicality of affirmations to their certainty) is more than a *non sequitur* that only affects a logically independent and relatively insignificant appendix to his epistemological foundationalism.

In his own analysis of Schlick's epistemology, Uebel curiously identifies the locus of its 'ultimate incoherence' not in the failed argument for certainty, as he had in his consideration of alternative interpretations, but elsewhere. Indeed, Uebel argues that, while affirmations are the obvious candidates for a foundational role in Schlick's scheme of things, they cannot fulfil this function because they are empirically empty, 'meaning-theoretic' attempts to fix the content of expressions occurring in scientific discourse. To argue his point, Uebel capitalizes on Schlick's idea that philosophical activity is entirely clarificatory: genuinely philosophical work does not issue in a body of truths, or a series of pronouncements, but merely clarifies or elucidates what we mean by various expressions when we adopt a certain usage. Schlick recognized that philosophical clarifications cannot proceed indefinitely by relating terms to other terms, but must ultimately reach expressions whose meanings can only be displayed in the immediate environment (Schlick [1930], pp. 157–8; [1936], p. 458). These acts of displaying meaning are what Uebel identifies as affirmations. If this is correct, then the result Uebel seeks immediately follows: affirmations cannot be foundational, they cannot provide the source of evidential warrant for other scientific claims, because they possess neither epistemic function nor empirical content. It would then follow that Schlick's epistemology is not a foundationalist enterprise at all.

Uebel's view is a curious conflation of Schlick's discussions of philosophical activity with his views on the structure of empirical knowledge, a point revealed by the fact that Uebel's understanding of the function of affirmations is based entirely on another of Schlick's essays, 'The Turning Point in Philosophy', published several years before his article 'On the Foundation of Knowledge'.[7] In the earlier essay Schlick first introduced his idea that philosophy is an activity, directed at the explication and clarification of meaning. Key to Schlick's understanding is the idea that, although the clarification of meaning

[7] 'The Turning Point in Philosophy' is a polemical piece, as evidenced by the fact that it appeared as the first article in the first issue of the first volume of *Erkenntnis*, the 'house organ' for the Vienna Circle and the Berlin Society for Empirical Philosophy, jointly edited by Rudolf Carnap and Hans Reichenbach.

typically proceeds by translation into more familiar words and expressions, a complete explication of meaning must, of necessity, ultimately rely on the exhibition, indication, or demonstration of what is meant by key terms or expressions (Schlick [1930], pp. 157–8). Because the significance of statements consists in their truth-conditions, the situations that would obtain were the statement true and the contrary ones that would be the case if it were false, these truth-conditions (or the conditions of applicability of a statement's chief expressions) must be displayed in experience (Schlick [1932], p. 264). Schlick regarded the necessity of such demonstrations of meaning as the key requirement of the Positivist's understanding of meaning, an understanding which he regarded as no 'theory' at all, but simply the result of reflection on the very concept of meaning itself. Demonstrations of meaning, as Schlick understood them, succeeded only by reference to the possibility of verification and, of necessity, preceded actual verifications (Schlick [1936], p. 458, [1938], pp. 349–50). Thus, Schlick regarded meaning-theoretic demonstrations of the significance of expressions as a necessary antecedent to the actual verification of any statements containing them. After all, how can a statement be confirmed or confuted unless its meaning is already understood?

Affirmations, on the other hand, function only in the verification of statements, playing no role whatsoever in the philosophical activity of clarifying meanings or elucidating the possibilities of verification (Schlick [1934b], pp. 382–3, 386). Since the significance of the indexical expressions occurring in affirmations can only be fixed by means of reference to items of the present context, the exact significance of an affirmation is determined at the same time it is verified (Schlick [1934b], p. 385). In general, an indexical statement—whether used to make a substantive claim or to illuminate the meaning of one of its constituent expressions—can be fully grasped only in the context of its use. But there the similarity ends, for the function of affirmations is *toto coeli* different from indexical statements used to elucidate meanings. This is readily evident from the fact that, in an affirmation, it is only the *indexical* expressions that are meaningless outside the context of use. In the typical case of an indexical statement used to explain the meaning of an expression, the expression to be elucidated is *not* indexical. These latter statements thus figure exclusively in the elucidation of the meanings of their non-indexical expressions or the meanings of wholly distinct statements, determining their possibilities of verification. In contrast, the meanings of the non-indexical expressions occurring in affirmations must be understood before the affirmation is uttered. For, of necessity, affirmations could never contribute to the verification of protocols unless the meanings of those protocols were already clear. Thus the functions of affirmations and of the indexical statements serving as the termini of the meaning-theoretic activities of philosophers are wholly distinct.

Significantly, Schlick always referred to these terminal activities as

'ostensive definitions' (*hinweisende Erklärungen*), a topic of some concern in his conversations with Wittgeinstein (cf. McGuinness [1967], pp. 209–10, 246; Wittgenstein [1932–33]; Schlick [1936], p. 458). Surely, affirmations and ostensive definitions share a common feature in their indexicality, but to conclude that their similarity of structure entails a corresponding identity of function is simply a non-starter. Yet when Uebel describes Schlick's affirmations as 'meaning-theoretic' combinations of locutions and gestures which 'fix' the meanings of terms, he implies that affirmations are nothing but ostensive definitions. Then why did Schlick introduce a wholly new term to designate what he had always called 'ostensive definitions'? The answer is obvious: he never did.

It can only be concluded that Uebel has failed to provide sufficient considerations to show Schlick was no foundationalist; nor has he presented insuperable objections to interpretations of Schlick's epistemology as a foundationalist enterprise. Uebel is absolutely correct to point out that Schlick's contribution to the protocol-sentence controversy, and to Logical Positivism more generally, is a complex constellation of ideas about matters of an epistemological nature, as well as logical issues. But if Uebel is right in suggesting that Schlick thought empirical knowledge rested on a semantic rather than empirical basis, the protocol-sentence controversy would have been no debate at all. While Neurath and Carnap would have been addressing the grounds of empirical knowledge, their chief antagonist, Moritz Schlick, would have been restricting his remarks to the semantics of empirical discourse. In short, the two 'camps' in the Vienna Circle would have been talking wholly at cross-purposes. It certainly cannot be denied that the protocol-sentence controversy ranged over a broad array of issues, with respect to which the Circle members disagreed or thought they did; nor can it be denied that they frequently misconstrued their opponents' (and sometimes even their allies') positions. But one central topic concerned Neurath's and Carnap's apparent coherentism, and Schlick thought it might be corrected by recognizing the epistemic privilege of protocols. Yet, if Uebel is right, this issue played no role at all in the Circle's discussions of protocols. And that would indeed be very surprising.

Department of Philosophy and Religion
101 Hardin Hall
Clemson University
Clemson, SC 29634-1508
U.S.A.

References

Carnap, R. [1932a]: 'Die Physikalische Sprache als Universalsprache der Wissenschaft', *Erkenntnis*, **II**, pp. 432–65.

Carnap, R. [1932b]: 'Psychologie im Physikalische Sprache', *Erkenntnis*, **III**, pp. 165–98.

Carnap, R. [1932c]: 'Erwiderung auf die vorstehenden Aufsätze von E. Zilsel und K. Duncker', *Erkenntnis*, **III**, pp. 177–88.

Carnap, R. [1932d]: 'On Protocol Sentences', trans. by R. Creath and R. Nollan in *Noûs*, **XXI**, pp. 457–75.

Carnap, R. [1934]: Letter to Moritz Schlick, 17 May 1934. Rudolf Carnap Collection, item 029-28-14, Archives for Scientific Philosophy, University of Pittsburgh. All rights reserved.

Carnap, R. [1935]: Letter to Otto Neurath, 2 June 1935. Rudolf Carnap Collection, item 029-09-049, Archives for Scientific Philosophy, University of Pittsburgh. All rights reserved.

Carnap, R. [1937]: *The Logical Syntax of Language*, A. Smeaton, trans., London, Routledge & Kegan Paul.

Hempel, C. G. [1934–35a]: 'On the Logical Positivists' Theory of Truth', *Analysis*, **II**, pp. 49–59.

Hempel, C. G. [1934–35b]: 'Some Remarks on "Facts" and Propositions', *Analysis*, **II**, pp. 93–6.

Lewis, J. [1996]: 'Conceptual Knowledge and Intuitive Experience: Schlick's Dilemma', in A. Richardson and R. Giere (*eds*), *Origins of Logical Empiricism: Minnesota Studies in the Philosophy of Science, Vol. XVI*, Minneapolis, University of Minnesota Press, pp. 292–308.

McGuinness, B. (*ed.*) [1967]: *Wittgenstein und der Wiener Kreis*, Frankfurt, Suhrkamp Verlag.

Neurath, O. [1934a]: Letter to Rudolf Carnap, 22 May 1934. Rudolf Carnap Collection, item 029-10-63, Archives for Scientific Philosophy, University of Pittsburgh. All rights reserved.

Neurath, O. [1934b]: 'Radical Physicalism and the "Real World" ', *Erkenntnis*, **IV**, pp. 346–62. Trans. in Otto Neurath [1983], *Philosophical Papers*, R. Cohen and M. Neurath (*eds*), Dordrecht, Kluwer, pp. 100–14.

Oberdan, T. [1993]: *Protocols, Truth and Convention*, Amsterdam and Atlanta, Editions Rodopi.

Oberdan, T. [1996]: 'Postscript to Protocols: Reflections on Empiricism', in R. Giere and A. Richardson (*eds*), *Origins of Logical Empiricism: Minnesota Studies in the Philosophy of Science, Vol. XVI*, Minneapolis, University of Minnesota Press, pp. 269–91.

Schlick, M. [1930]: 'The Turning Point in Philosophy', trans. in Schlick [1979], pp. 154–60.

Schlick, M. [1932]: 'Postivism and Realism', trans. in Schlick [1979], pp. 259–84.

Schlick, M. [1934a]: Letter to Rudolf Carnap, 5 June 1934. Rudolf Carnap Collection, item 029-28-10. Archives for Scientific Philosophy, University of Pittsburgh. All rights reserved.

Schlick, M. [1934b], 'On the Foundation of Knowledge', trans. in Schlick [1979], pp. 370–87.

Schlick, M. [1935]: 'On "Affirmations" ', trans. in Schlick [1979], pp. 405–13.

Schlick, M. [1936]: 'Meaning and Verification', trans. in Schlick [1979], pp. 456–81.

Schlick, M. [1938]: 'Form and Content: An Introduction to Philosophical Thinking', repr. in Schlick [1979], pp. 285–369.

Schlick, M. [1979]: *Philosophical Papers, Vol. II*, H. Mulder and B. van de Velde–Schlick (*eds*), Dordrecht, Kluwer.

Uebel, T. [1992]: *Overcoming Logical Positivism from Within: The Emergence of Neurath's Naturalism in the Vienna Circle's Protocol Sentence Debate*, Amsterdam and Atlanta, Editions Rodopi.

Uebel, T. [1996]: 'Anti-Foundationalism and the Vienna Circle's Revolution in Philosophy', *British Journal for the Philosophy of Science*, **47**, pp. 415–40.

Wittgenstein, L. [1932–33]: 'Diktat für Schlick', *The Wittgenstein Papers*, Cornell University Library Microfilms, Item 302.