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BOOK REVIEW

Matthias Neuber: Die Grenzen des Revisionismus: Schlick, Cassirer und das Raumproblem (Moritz Schlick Studien Band 2)

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Matthias Neuber's book represents an important contribution to the relatively young discipline of the History of Philosophy of Science. Starting roughly in the 1980s, increasing attention has been devoted not only to the relationship between philosophy *and* the history of science, but to an accurate historical reconstruction of earlier projects *within* philosophy of science. One of the most outstanding results of these investigations has probably been the radical reshaping of the rather caricatural image of logical empiricism—for better or worse the core of the philosophical heritage of many philosophers of science—summarized (via the proxy of Ayer 1936) in the so-called 'standard view'. By analyzing the historical, sociological, and philosophical questions surrounding logical empiricism new light has been shed on the sense of a cultural, social, and political mission that characterized it before its emigration from Europe to North America in the 1930s and 1940s. What came to be known as the Vienna Circle and the Berlin Group turned out to be the result of a rich and complex mosaic of influences that went well beyond the 'empiricist' heritage of Hume and Mach on the one hand and Russell and Wittgenstein on the other.

In particular, although logical empiricism was intended and perceived as an anti-aprioristic and anti-Kantian theory of science, it has been shown that various forms of neo-Kantianism played a fundamental role in its emergence (Howard 1994; Friedman 1999; Coffa 1991; Ferrari 1997). Many logical empiricists started out as neo-Kantians (Hans Reichenbach, Rudolf Carnap, and even Carl Gustav Hempel) and engaged in a respectful debate with the neo-Kantian schools that dominated at that time in particular (but not only) with the so-called Marburg School (dominated by the well-known triumvirate of Hermann Cohen, Paul Natorp, and Ernst Cassirer) which was more oriented toward the philosophy of the exact sciences (cf. e.g. Dussort 1963; Holzhey 1986; Sieg 1994).

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One of the major contributions of Neuber's book is to have shown in detail that Moritz Schlick, the gray eminence behind the positivism of Vienna circle, was no exception. The young Schlick, when he wrote his major work, the *Allgemeine Erkenntnisslehre* (Schlick 1918), was not a positivist or a strict empiricist, but a neo-Kantian of a particular sort, a 'critical realist'. Neuber, concentrating on the case study of the philosophical analysis of the 'problem of space', consequently offers an innovative reconstruction of the process of the emergence of modern philosophy of science. In the 1920s philosophy of science defined itself as a separate discipline within philosophy in general, not simply through the conflict between an old guard of Kantian philosophers and a group of anti-Kantians, but through the conflict between different attempts to formulate a *revisionist* version of Kant's philosophy. Just as Cassirer tried to defend a form of 'critical idealism', which can be traced back to Cohen's idealistic interpretation epitomized in the second edition of his *Kants Theorie der Erfahrung* (Cohen 1885), Schlick attempted to formulate a *critical realism*, which can be traced back to the realistic interpretation of Kant defended by the Austrian philosopher Alois Riehl in his monumental *Der philosophische Kriticismus und seine Bedeutung für die positive Wissenschaft* (Riehl 1876–1887).

In this way, Neuber's book not only presents an original account of Schlick's early philosophy and its role in the emergence of modern philosophy of science. It also provides the opportunity to reevaluate the realistic brand of Kantianism, which, in spite of the increasing amount of literature dedicated to other neo-Kantian schools (Makkreel and Luft 2009), has mostly been neglected by historians of philosophy (Heidelberger 2007)—together with the neo-Friesian School gathered around Leonard Nelson (Peckhaus 1990). This, in my opinion, is the most important contribution of the book, which makes it obligatory reading for those interested in the emergence of the philosophy of science in Germany before the great intellectual diaspora of the thirties.

The book does not disconnect such historical investigations from contemporary issues in the philosophy of science. It intends to be more than just an example of what Dieter Henrich called 'constellation analysis' (*Konstellationsforschung*), a detailed historical analysis of the context in which Schlick and Cassirer's attitude toward 'the problem of space' emerged. Neuber also to offer an 'argumentative reconstruction', providing us with philosophical reasons to prefer Schlick's realism as a more suitable philosophical alternative in the contemporary debate than Cassirer's constructivist idealism (20). Clearly Neuber sees the history of philosophy of science as more than a repository for anecdotes or chronology, instead nurturing some hope that it can produce a decisive transformation in the philosophy of science as we know it.

The "double goal" of Neuber's investigations emerges clearly from the well-organized structure of the book: Neuber analyzes why Kant's philosophy was badly in need of revision (ch. 1); he presents Schlick's (ch. 2) and Cassirer's (ch. 3) revisionist strategy; finally, he offers a historically balanced, but philosophically committed invitation to choose Schlick's realism over Cassirer's idealism (ch. 4). Both Cassirer and Schlick finally saw the limits of their Kantian 'revisionism', which was overcome by the 'linguistic turn' that led Schlick to the positivism with which he is usually identified, with and by the 'symbolic turn' that brought Cassirer above and beyond neo-Kantianism into the wider domain of the philosophy of culture. In the final chapter (ch. 5), Neuber pleas for a 'return to the early Schlick', whose sophisticated causal realism could play a role in the recent 'renaissance of metaphysics' that characterizes contemporary philosophy of science.

1 Revising Kant

In the first chapter, Neuber offers a long-standard story of why the Kantian conception of pure intuition and the synthetic a priori could not be consistently maintained after the stormy changes that mathematics and physics underwent in 19th and early 20th centuries. In particular, Hilbert's logically rigorous axiomatization of Euclidean geometry showed conclusively that spatial intuition has no role to play in the inferences of pure geometry; and the development of non- Euclidean geometries, together with their actual application to nature by Einstein, show conclusively that our knowledge of geometry cannot be synthetic a priori in Kant's sense (24–35).

Indeed, there is much truth in Neuber's account. However, I think it would have been worthwhile to address the progress that has been made in the last decades to correct certain caricatural aspects of such an image of Kant's philosophy of space and geometry, by analyzing it from the vantage point of Kant's own historical context (Beth 1956–7; Hintikka 1969; Parsons 1983; Friedman 1992, 2002; Shabel 2004). Moreover, recent historical–philosophical literature also suggests that the great protagonists of the 19th century debate on the philosophy of geometry—Hermann von Helmholtz (DiSalle 2006), Henri Poincaré (Friedman 1995) and maybe even Hilbert (Majer 1995)—were far from embracing a 'stout' anti-Kantianism. Even more surprisingly, some of the great early 'relativists' (with the significant exception of Einstein, of course) claimed to be 'Kantians' (Max von Laue and Hilbert) or defended a position that might be broadly identified with a form of 'transcendental idealism' (Hermann Weyl, Arthur Stanley Eddington, cf. Ryckman 2005). Needless to say, many of these results have been challenged by other scholars. However, whether right or wrong, the image of a unanimous and unreserved censure of Kant's philosophy as a consequence of the evolution of science in the 19th and early 20th centuries appears today to be less straightforward than it was in the past.

However, Neuber is of course right to claim that, - - -especially after the experimental confirmation of the general theory in 1919- - -, it has become clear that it was impossible to retain, unadulterated, all of the components of Kant's epistemology, which was so heavily relying on Euclidean geometry and Newtonian physics. According to Neuber, two attitudes initially emerged from the philosophical scene: the complete *rejection* of Kant's philosophy of space and time, exemplified by the zeal of the convert of Bertrand Russell (who also started as a sort of neo-Kantian; Russell 1897) (38), or the attempt to immunize Kant's philosophy against the new developments of science (Hentschel 1990), a position that can be attributed, e.g., to Paul Natorp, Bruno Bauch and Richard Hönigswald, who attempted to distinguish between the transcendental and purely mathematical concepts of space and time. However, as Neuber points out, very quickly another revisionist strategy emerged that was more philosophically subtle and it was pushed through by the early philosophers of science (36–43).

Neuber's original point is that it is not just Cassirer who should be regarded as a representative (alongside with Reichenbach 1920 and Carnap 1922) of such revisionism, but, more surprisingly, that Schlick's early pre-Vienna philosophy should also be understood as a form of Kantian revisionism. Thus, according to Neuber, philosophy of science, in its early days, was dominated by two revisionist strategies. If Cassirer supported an 'idealistic' version of Kantian revisionism, centered on a liberalization of Kant's conception of the a priori, Schlick presented a lesser known 'realistic' alternative, insisting on the knowability of the things in themselves. These two revisionist strategies rely on two different images of Kant. The opposition between Cassirer and Schlick is, at least indirectly, the opposition between Riehl's Kant and Cohen's Kant. Both Riehl and Cohen

insisted of considering Kant as the philosopher of the natural sciences, depriving his philosophy from all its 'psychologistic' residuals. However, Riehl seems to have been one of the few neo-Kantians taking seriously Kant's concept of the thing in itself as an actually existing 'cause of the appearances' (Heidelberger 2007), somehow affecting the subject and thereby giving rise to her sensations. On the contrary, Cohen radicalized Kant's idealism, connecting Kant's conception of the thing-in-itself as a limiting concept with Kant's doctrine of regulative ideas (Poma 1997).

2 Schlick and Cassirer

The chapter on Schlick is clearly the major contribution of the book, which is not surprising given the author's authority on the subject (Neuber co-edited Schlick 1922/2006). Neuber inserts the young Schlick into a subterranean realistic tradition that traversed nearly unnoticed the history of post-Kantian philosophy, along the way connecting Johann Friedrich Herbart, the already mentioned Riehl, Oswald Külpe, Wilhlem Wundt, and Gustav Wilhelm Störring (46–58). In this way Neuber offers an unconventional, but illuminating image of the young Schlick. Some readers might be surprised by Neuber's claim that the early Schlick was basically a neo-Kantian, but the textual evidence of the relationship between Schlick and this neglected realistic brand of Kantianism makes Neuber's claim quite compelling.

Schlick's early philosophical approach was intimately intertwined with a sophisticated and abstract version of a classical 'causal realist' theory of perception (58–81). On one side are the intuitive realities of acquaintance directly given to our consciousness; on the other side are the 'transcendent' realities in objective space and time. Einstein's new view of space and time for epistemology has shown that the objective spatial structure employed by physics is not intuitively given, but is rather a 'conceptual construction', that is, a 'non-intuitive ordering', which we then call objective space and conceptually grasp through a manifold of numbers (coordinates) (82–92). In this way, Einstein's theory destroys the Kantian bridge between thought and reality (pure intuition), but it also shows us how to restore such a bridge in a radically new form. As is well known, Schlick deftly appropriates Einstein's 1916 point-coincidence argument, the claim—used to establish the requirement of general covariance—that all results of physical measurement ultimately amount to verifications of coincidences (such as the observation of the coincidence of the hand of a clock with a mark on its dial).

In Schlick's view 'coincidences' become the basis for our construction of the objective and 'transcendent' realm of nonintuitive spatiotemporal realities, representing what the intuitive experiences of the different senses and individuals agree upon—the point where I see the pen touching my finger in my visual field is the same point where it touches in my tactile field (93–123). According to Schlick, the space thus constructed becomes the 'symbol' for the order of things-in-themselves, an order which is determined before and independently of our consciousness, and is causally responsible for our sensations (124–130). This realism regarding point-coincidences implies at the same time that any features of the world-picture that are not reducible to point-coincidences are not physically objective. Thus all world-pictures that contain laws governing point-coincidences are thoroughly equivalent; the choice between them depends on a conventional choice about which of the rods and clocks we decide, for simplicity's sake, to call rigid rods and uniformly running clocks (Schlick 1917). In this way, Schlick's realism coexists with

Schlick's well-known metrical conventionalism in an equilibrium, which, as Neuber recognizes, is rather precarious (127).

Although Neuber's reconstruction of the young Schlick's thought is very clear and historically solid, in my opinion he should have emphasized that Schlick's solution of the 'problem of space'—in spite of Einstein's enthusiasm about Schlick's article and booklet on relativity—is based on quite serious misunderstandings of the very aspects of Einstein's epistemology upon which Schlick claims to rely. As we now know, Einstein introduced the point-coincidence argument for reasons that have nothing to do with Schlick's method of coincidences (Stachel 1980; Norton 1984). Schlick's (and in general logical empiricists') appropriation of the argument is simply off track (Ryckman 1992; Howard 1999). Similarly, Schlick's conventionalism can only superficially be said to rely on Einstein's insistence on the indispensability of rods and clocks as empirical indicators, which in any event was only a provisional compromise anyway (Howard 1994; Howard 2005).

Whereas the chapter on Schlick might turn out somehow be unsettling to the reader who used to viewing in Schlick as a 'positivists', the chapter on Cassirer's philosophy of science is more conventional (along the lines of Ihmig 1997), though equally accurate. The story goes roughly as follows. In analogy to Klein's Erlangen program, which defines geometry as the study of invariants under transformation groups, Cassirer describes critical philosophy as a 'universal invariant theory of experience', establishing the common elements of all possible forms of scientific experience, the ultimate 'logical invariants' that remain constant in the historical evolution of science (Cassirer 1910) (137–156). Individuating such invariants is a goal that can be progressively approximated, but never actually realized. Thus, in the spirit of the works of Cohen, Natorp, Kurt Lasswitz, etc. (136–137), Cassirer substituted the fixity of Kant's a priori with the postulate of the continuity and unity of the history of science (Cassirer 1906). Neuber gives a very readable account of Cassirer's own version of the liberalized a priori, offering an interesting overview of the question of whether it can be considered as a fully relativized a priori (a position that Friedman famously attributed to Reichenbach 1920) or whether Cassirer searched for an absolute '*a priori*', even if its specific content can never be fully determined (159–164).

I am less convinced by Neuber's reconstruction of Cassirer's interpretation of relativity theory (Cassirer 1921), and in particular of general relativity (168–181). Neuber attempts to attribute to Cassirer a position that might be labeled 'topological apriorism': In contrast to Kant, Cassirer's a priori is no longer concerned with the full Euclidean structure of space, but only with the underlying topological structure, entirely independent of metrical relations. This reading is widespread, but in my opinion the textual evidence to support it is rather weak, including that provided by Neuber (e.g., the line element ds is not a 'topological' determination cf. p. 174, but a metrical one, and Cassirer does not claim that it is). But most of all I do not think that the reference to the topological a priori—a view explicitly supported by Carnap (1922)—is adequate to grasp the spirit of Cassirer's account of relativity theory.

It is undeniable that the reader of Cassirer's booklet might be despair that such a unitary spirit exists at all. Cassirer's prose—if I may borrow Weyl's remarks about Cassirer (1923–1929)—"resembles more a suite of bourrées, sarabands, minuets and gigues than variations on a single theme" (Weyl 1954, 224). However, in my opinion, a more promising attempt to grasp Cassirer's core message has been made by Ryckman (2005). According to Cassirer, the special relativity principle or the requirement of general covariance share a feature best described by Einstein as non-constructive: they do not directly say anything about the properties of any specific physical system; rather, they put

constraints on the physical laws, so that lawlike statements won't qualify as physical laws unless they satisfy such constraints. Thus Cassirer had an easy play to identify such principles with transcendental 'conditions of the possibility of science'. In this sense, Cassirer's reading is surprisingly close to that put forward, at about the same time, by Hilbert (1921, 1923), who did not hide the Kantian overtones of this approach (Brading & Ryckman 2008; Ryckman 2008).

3 Cassirer or Schlick?

Ryckman might of course be accused of being too sympathetic towards Cassirer, downplaying some rather implausible features of his account of Einstein's theory; however, Neuber seems to have presented Cassirer's approach to relativity in a way that makes him an easy target of Schlick's quite devastating criticisms, rather than capture the spirit of his work (Schlick 1921, 182–189). But the problem perhaps lies elsewhere: If one follows Neuber's reconstruction of Schlick's and Cassirer's solutions to the 'problem of space', it is hard to avoid the ugly truth that both philosophical projects are simply untenable. If our choice is between Schlick's metrical conventionalism and Cassirer's (alleged) topological apriorism, then Neuber should have concluded his book with the statement '*neither* Schlick *nor* Cassirer'.

Both readings of general relativity are irremediably flawed and for the very same reason. As the example of the young Carnap's dissertation (Carnap 1922) shows, metrical conventionalism and topological apriorism are two sides of the same coin. They both assumed that the philosophical accomplishment of the relativity theory was to have *weakened* the physically relevant structure of space–time (reducing it to the 'topological' structure). As Neuber himself points out (211ff.), however, the core innovation of general relativity is to be found in the opposite direction, in that fact that it has transformed the physically relevant structure of space–time (the metrical structure), into a *dynamical* field (cf. e.g. Weyl 1924).

However, Neuber's book does not claim that Schlick or Cassirer can contribute to the current debate on space–time theories. Neuber rather claims that Schlick's *critical-realisitc attitude* towards the 'problem of space' has more to say to today's philosophy of science than Cassirer's *critical-idealistic one*. In this way, not only does Neuber's interpretation of Schlick offer a particularly original image of early logical empiricism, but it also opens new horizons for a fruitful dialogue between historical investigations and systematical inquires in the philosophy science. Whereas historically minded philosophers of science have usually assumed a deflationary attitude about the possibility of reading ontology off of physics, Neuber (ch. 5) is able to place his historical work in the center of the contemporary renaissance of the '*Naturphilosophie*', of a metaphysics of nature (Esfeld 2002, 2008).

This is an important achievement of the book, but it is also where I personally see, behind the solidity of the historical account, one of its philosophical limits. In my opinion, what is mostly missing in Neuber's plea for Schlick's 'realism' is an account of Cassirer's 'idealism'. Neuber is able to convince us that the young Schlick was a realist who believed that things-in-themselves exist outside of consciousness and are causally responsible for its contents; thus, in reading Neuber's book one inevitably gets the impression Cassirer supported the *opposite* position, that physical reality does not exist outside of us, but is completely produced by our conceptual tools (Neuber calls it the *Marburger Kategorienfehler*, 202ff.). However, in my opinion this is misleading. Actually, Cassirer never tried to defend an idealistic 'ontology', but invited us to abandon 'the proud name of

ontology' (A247/B304)—one of Cassirer's favorite quotes from Kant's—by embracing the Kantian equation between 'empirical reality and objective validity'. In Cassirer's idealism, 'real' is opposed to what is 'illusory' and 'deceptive' and not, as in Schlick's realism, to what is 'mental' and 'internal'.

Cassirer attributes to Cohen's *Kant-Bücher* the merit of having fully appreciated Kant's transformation of an opposition of 'things' into an opposition of 'values' (Cassirer 1912). As Neuber shows, Schlick relies on a very different image of Kant, the 'Kant' of Riehl, who connected Kantian doctrine of the thing-in-themselves with the solution of the mind–body problem as proposed by psychophysical parallelism. Neuber invites us to return to Schlick's 'critical realism' which seems to offer more adequate conceptual tools for contributing to the contemporary renaissance of naturalized metaphysics. However, it is also be possible to see in Cassirer's 'critical idealism' a plea for a 'Kantian humility' (Langton 2001), a warning against the pretense of contemporary metaphysics to tell us something about the ontological furnishings of the world's deep structure. Neuber's book teaches us that, as surprising as it may sound, it might be possible, and even useful, to recast the choice between these two fundamental philosophical attitudes as the choice between two different images of Kant. After all, as Einstein once famously put it, "every philosopher has his own Kant" (Einstein 1922).

Abbreviations

CPAE: Albert Einstein (1987-). *The Collected Papers of Albert Einstein*. Ed. by Diana Kormos Buchwald. 13 vols. Princeton: Princeton University Press.
CW: Hermann Cohen (1977-). *Werke*. Ed. by Helmut Holzhey. 14 vols. Hildesheim: Olms.
ECW: Ernst Cassirer (1998-). *Gesammelte Werke. Hamburger Ausgabe*. Ed. by Birgit Recki. 26 vols. Hamburg: Meiner.

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