

THE TRANSCENDENTAL METHOD AND (POST-)EMPIRICIST PHILOSOPHY OF SCIENCE

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SUMMARY. This paper reconsiders the relation between Kantian transcendental reflection (including transcendental idealism) and 20th century philosophy of science. As has been pointed out by Michael Friedman and others, the notion of a “relativized *a priori*” played a central role in Rudolf Carnap’s, Hans Reichenbach’s and other logical empiricists’ thought. Thus, even though the logical empiricists dispensed with Kantian synthetic *a priori* judgments, they did maintain a crucial Kantian doctrine, viz., a distinction between the (transcendental) level of establishing norms for empirical inquiry and the (empirical) level of norm-governed inquiry itself. Even though Thomas Kuhn’s theory of scientific revolutions is often taken to be diametrically opposed to the received view of science inherited from logical empiricism, a version of this basically Kantian distinction is preserved in Kuhn’s thought. In this respect, as Friedman has argued, Kuhn is closer to Carnap’s theory of linguistic frameworks than, say, W.V. Quine’s holistic naturalism. Kuhn, indeed, might be described as a “new Kant” in post-empiricist philosophy of science. This article examines, first, the relativization of the Kantian *a priori* in Reichenbach’s work, arguing that while Reichenbach (after having given up his original Kantianism) criticized “transcendentalism”, he nevertheless retained, in a reinterpreted form, a Kantian-like transcendental method, claiming that the task of philosophy (of science) is to discover and analyze the presuppositions underlying the applicability of conceptual systems. Then, some reflections on Kuhn’s views on realism are offered, and it is suggested that Kuhn (as well as some other influential contributors to the realism debate, such as Hilary Putnam) can be reinterpreted as a (relativized, naturalized) Kantian transcendental idealist. Given the central importance of Kuhnian themes in contemporary philosophy of science, it is no exaggeration to claim that Kantian transcendental inquiry into the constitutive principles of empirical knowledge, and even transcendental idealism (as the framework for such inquiry), still have a crucial role to play in this field and deserve further scrutiny.

Key words: transcendental method, transcendental idealism, Kant, Reichenbach, Kuhn, realism, *a priori* principles

1. INTRODUCTION

As is well known to all undergraduate students who have taken an introductory course in the philosophy of science, the Vienna Circle logical empiricists rejected Immanuel Kant’s conception of synthetic judgments *a*

priori, arguing that all meaningful statements, and thus all pieces of genuine human knowledge, are either analytic *a priori* or synthetic *a posteriori*. A number of philosophers who cannot be unambiguously described as logical positivists but who stood close to the logical empiricist camp did not, however, entirely abandon the Kantian approach. For instance, both Hans Reichenbach and the slightly less well-known Finnish logical empiricist Eino Kaila appreciated the Kantian task of seeking and discovering transcendental principles (or at least transcendental hypotheses) constraining science, although they considered such principles revisable and historically changing, and thus in a sense “relativized” or “naturalized”. It was in his early writings in the 1920s, in particular, that Kaila spoke about (changing) transcendental hypotheses required as the grounds of scientific inquiry (cf. Kaila 1923, 1926, pp. 145 ff.; Manninen 2002a, and Section 3). As Juha Manninen (2002a) interestingly shows, Kaila maintained an ambivalent attitude to the Kantian idea of synthetic *a priori* knowledge constitutive of empirical science. Such knowledge remained something like a philosophical dream, even after the official views of logical empiricism had been endorsed by Kaila (and Reichenbach).

Indeed, in the 1920s and 1930s Kaila expressed his doubts about the “new Humeanism”, as represented, in his view, by Rudolf Carnap and other “pre-Kantian” logical positivists. As he put it in a letter to the Swedish philosopher Åke Petzäll, sent from Vienna in 1932, he waited for “the new Kant” whom the Humeanism of the positivists would have waken up from a dogmatic slumber (cited by Manninen, *ibid.*, p. 47). Kaila, who actively corresponded with Carnap, Schlick and other members of the Vienna Circle, and visited Vienna several times in the late 1920s and early 1930s, usually described himself as a logical empiricist, always resisting the label “logical positivism” and distinguishing his views from the “neopositivist” ones of the actual Vienna Circle members.¹

While Carnap was, in Kaila’s (and perhaps Reichenbach’s) eyes, one of the pre-critical Humeans,² not only Reichenbach’s but also Carnap’s logical empiricism has been interpreted as a basically Kantian approach which maintains – *contra* more recent holistic naturalism(s) *à la* Quine and his many followers – the key Kantian division between the transcendental and the empirical levels of inquiry (cf. Friedman 1997, 1999, 2000a,b, 2001, 2002). It is still an open question how seriously Carnap’s and other logical empiricists’ project of offering a rational reconstruction of scientific language, and of empirical knowledge in general, was wounded by Quine’s (1951) well-known attack on the very idea of analyticity and by the subsequent post-Quinean developments of holistic naturalism. It is also an open question whether the difference between Carnap’s and Schlick’s Humean-like empiricism,³ on the one hand, and Kaila’s and Reichenbach’s equally empiricist but nonetheless more Kantian orientation, on the other,

was a genuine philosophical difference or merely a terminological one. Instead of reviewing these debates in any scholarly detail, this paper will be concerned with another line of development in 20th century philosophy of science which bears important similarities to both Quinean and Carnapian programs.

Who, we may ask, might “the new Kant” be? Obviously, neo-Kantian alternatives have been offered in more recent philosophy of science (and general philosophy) by several contributors to the realism discussion, in particular (cf. Pihlström 1998, 2003). Largely in the light of that debate, the purpose of the rest of this paper is to consider two influential contributors to 20th century philosophy of science, namely, Hans Reichenbach and Thomas Kuhn – though not primarily Kuhn’s most famous incarnation in the bestselling *Structure of Scientific Revolutions* (1962, 2nd ed. 1970) but rather his later, post-*Structure* essays on the philosophy of science that are now available in a posthumously published collection (Kuhn 2000). It is, of course, by no means novel to stress Kuhn’s importance – neither the neo-Kantian aspects of his view (cf. Hoyningen-Huene 1993) nor his importance for the recently influential pragmatist and historicist trends in the philosophy of science (cf. Margolis 1995). Yet, reviewing some of his pronouncements on key Kantian issues in the realism debate may be helpful in a reappraisal of our post-empiricist situation in the philosophy of science today. We shall, however, begin from Reichenbach’s relation to the Kantian transcendental tradition; our treatment of Kuhn will emerge against the background of Reichenbach’s neo-Kantian commitments.

2. REICHENBACH ON THE TRANSCENDENTAL METHOD

Kant, as is well known, introduced the concept of the transcendental method in order to characterize a procedure by which he thought to be able to reveal the basic conditions of human knowledge. His method was applied by his successors and followers for various purposes. It was criticized by some philosophers, among them Reichenbach. Reichenbach first thought that he could apply the transcendental method to clarify the achievements of modern science, but then he gradually emancipated from Kant and suggested that this method is better replaced by what he called the “analysis of science”. Later he used the concept “transcendental” in a non-Kantian sense: he drew a distinction between “the transcendental conception of knowledge” and “the functional conception”. He presumed that the former is characteristic to speculative, the latter to scientific philosophy.

However, there remained some connecting links between Kant’s rationalistic and Reichenbach’s empiricistic view of the method of analyzing and justifying knowledge. Reichenbach owes gratitude to Kant by his search

for the constitutive principles of scientific theories and human knowledge. Also, his views that problems have a firm autonomy and that philosophy is to concentrate on the methods of formulating and clarifying questions are indebted to Kant.

Concepts which closely remind each other get easily confused. Kant, who adopted the word “transzendental” from the scholastic tradition, gave it a new definition and distinguished it from “transzendent.”⁴ Kant’s definition of the concept of transcendental knowledge is as follows:

I call transcendental all knowledge which is occupied not so much with objects as with the mode of our knowledge of objects, in so far as this mode is to be possible *a priori*. (Kant, 1965, A 11 / B 25.)

As this definition indicates, “transcendental” is closely connected to apriority, and thus to rationalism. However, it is in principle possible to take independence of experience, i.e. the *a priori*, in a *relative* sense. In the Kantian sense, what is *a priori* is prior to any experience whatsoever and thus timeless, immutable. In the relative sense, a conceptual structure may be thought to have been condensed from prior experiences but nevertheless to constrain any later experience. What Kuhn called “paradigms” are presumably such structures. In the light of this example, one may speak of “relativized *a priori*.”⁵ Correspondingly, it is possible to introduce a “scaled-down” conception of the transcendental as follows:

All knowledge which is not so much concerned with objects than with the mode of our knowledge of objects, in so far as this mode is possible *a priori*, i.e., possible with respect to a given conceptual framework, is transcendental.

Reichenbach was in his dissertation (1916) committed to the original Kantian conception of transcendental knowledge and method. In his *Habilitationsschrift* (1920) he can be said to adhere to the relativized conception. After that he began to develop his probabilistic empiricism, in the context of which the very idea of a transcendental procedure becomes problematic.

The theme of Reichenbach’s dissertation was “the concept of probability for mathematical presentation of reality”. In this work, Reichenbach is adding to the 12 Kantian categories one more, viz. probability. It is the category of causality that he studies more closely and to which he compares probability. He introduces the following problem: how to justify a principle of research which is not empirically justifiable? According to him, there is an asymmetry between the principles of causality and probability, because the former has been proven but the latter still needs to be proven. “The correctness of the application of the causality principle has been shown by Kant in the transcendental deduction of the *Critique* . . .” (Reichenbach 1916, p. 11).⁶ This is not enough for the purposes of the philosophical justification of science. “If there is to be physical knowledge, still another principle must be added to that of causality. We have to search for a second

synthetic a priori judgment.” (ibid., p. 61.)⁷ The principle of lawful *connection* of all occurrences – causality – is not enough for the purposes of mathematical presentation of reality. Another principle has to complete it, that of lawful *distribution*. (Cf. ibid., p. 62.) The desired probability principle contains the following idea: a probability function exists for a series of repetitions of the same factor. In chapter III of his dissertation, “Deduction of the Probability Principle”, Reichenbach gives a transcendental justification for the law of frequency. In accordance to his reasoning, this law stays in organic connection to the whole knowledge of nature in general and is a necessary condition of all physical knowledge. (Cf. ibid., p. 65.)

Thereby the existence of a probability function has been deduced in the sense in which KANT uses the word deduction for the transcendental philosophy. The necessity of such a lawfulness can after all only be grasped, and therefore it has been called a synthetic judgment a priori; it is not logically deducible from other principles of knowledge. (ibid., p. 65.)⁸

The law of probability is “a metaphysical principle of knowledge of nature” (ibid., p. 66). Analogically to the principle of causality, the principle of distribution presents only the general form into which special experiences add special contents. Therefore, every effort to establish the principle through experience must appear to a philosopher as ridiculous as a corresponding trial to prove the causality principle empirically. (Cf. ibid.)

One may see here how thoroughly the young Reichenbach was committed to Kantianism and to the idea of transcendental method and transcendental proofs. It was to be his participation in Einstein’s first course on the theory of relativity at the University of Berlin in 1919 that led him first to a kind of semi-Kantianism and then later to a more and more vigorous criticism of Kant’s ideas of transcendental method and transcendental proof. In his books on the axiomatization of the theory of relativity (1924) and on the philosophy of space and time (1928), Reichenbach headed toward a consistent empiricism. He called his standpoint “probabilistic empiricism” in his book *Experience and Prediction* (1938).

3. THE TRANSCENDENTAL METHOD: REVEALING THE CONSTITUTIVE PRINCIPLES OF KNOWLEDGE AND FORMULATING QUESTIONS

Due to his studies of the theory of relativity, Reichenbach saw himself compelled to relativize the concept of the *a priori*. In his (1920) book, he considers that in the acceptable sense, “a priori” means the same as “constituting the concept of object”. He rejects the interpretation “valid for all time”. With good reasons, his standpoint in this book can be characterized

as “semi-Kantianism”. In an article from the same period (1921), Reichenbach says that there are conditions of experience different from the Kantian ones (p. 23).

Although Reichenbach later gave up this compromise and rejected Kantianism altogether, he can be said to share with Kant a research program. This program is that of revealing and analyzing the constitutive principles of human knowledge, especially science. For Reichenbach, the task of philosophy is to discover and analyze the presuppositions underlying the applicability of conceptual systems. He often uses the word “admissible”. Accordingly, one may characterize his view of the task to be that of revealing the admissible combinations of the principles of knowledge. In developing this program, Reichenbach gave up Kantianism. Therefore, the characterization “transcendental” becomes inapplicable to his efforts. In the spirit of Reichenbach’s remark in his (1931) article, the program becomes in fact a ramified series of tasks: “. . . there are no general presuppositions of knowledge, only presuppositions of particular hypotheses” (p. 82).

Some further remarks concerning this program can be made.⁹ In his dissertation of 1916, Reichenbach raised the question: “What does thinking add to perception?” He considered that knowledge is the result of adding conception to perception. In the spirit of Kant’s *Critique of Pure Reason*, we may rely on the objective validity of the results of science and raise the question: which are the necessary elements of this knowledge which we signify as true? The results of scientific research receive their final transcendental proof when they are displayed as necessary requirements of the unity of knowledge. Experience in the scientific sense is such a presentation of reality which connects the given contents of perception in the sense of stable *a priori* forms of order. Causality and probability are such forms; the laws of probability are objectively valid. (Cf. Reichenbach, 1916, chs. 1, 3, 4).

In his (1920) book, Reichenbach distinguishes two main classes of constitutive principles: (i) the principles of coordination, and (ii) specific physical laws. The former ones “ultimately define real objects and real events”; “We may call them constitutive principles of experience. Kant’s schemata are space, time, and the categories.” (Reichenbach 1965; a translation of Reichenbach 1920, p. 49.) Also the principle of probability is a coordinating principle, according to Reichenbach: “. . . it defines when a class of measured values is to be regarded as pertaining to the same constants. (Imagine, for instance, a distribution according to the Gaussian law of errors.)” (ibid., p. 53.) Here Reichenbach is referring to his dissertation and other writings in which “this principle is justified” (ibid., p. 111). Except for the probability principle, Reichenbach also mentions as examples of coordinative principles the principle of genidentity, time and space, and the metric.

... the principles of coordination are much more significant for the cognitive process than for any other coordination. By determining the coordination, they define the individual elements of reality and in this sense constitute the real object. In Kant's words: "because only through them can an object of experience be thought." (ibid., p. 53.)

Constitution according to the above-mentioned principles is not "necessarily true" or "true for all time", as Kant's concept of the *a priori* suggests, says Reichenbach. This is the connotation of the Kantian concept which Reichenbach rejects. However, he accepts the Kantian idea that "a priori" means "constituting the concept of object." (Ibid., p. 48.) The main chapter of Reichenbach's (1920, 1965) book is the fourth, "Cognition as Coordination". In it, Reichenbach says that whereas the mathematical object of knowledge is uniquely determined by the axioms and definitions of mathematics, the physical object cannot be determined by axioms and definitions. The latter becomes determined only after physical things and occurrences are coordinated to equations. As to the epistemological position of the principles of coordination, Reichenbach claims that they "are equivalent to Kant's synthetic a priori judgments" (ibid., p. 47). Herein lies Reichenbach's Kantian commitment in 1920, four years after his dissertation. A transcendental proof of "the necessary validity" of the principle of probability as well as other coordinating principles is no more possible, because Reichenbach interprets the concept of the *a priori* only in a half-Kantian way. Actually, Reichenbach only uses the word "transcendental" to designate Kant's theory of forms of perception and Kant's justification of the categories. His own method Reichenbach does not call "transcendental" but "the method of logical analysis" (ibid., p. 5).

In a later article (1925), Reichenbach speaks of unprovable but fundamental presuppositions of knowledge; to these belong (1) the uniformity of the world and (2) the existence of physical objects (p. 291 f). Moreover, he characterizes the law of probability as a "transcendental assumption" (ibid., p. 293) and "a synthetic *a priori* judgment – if there is any such thing" (ibid., p. 291). Although Reichenbach's evolving empiricism makes it problematic to call his search of constitutive principles "transcendental", the connecting thread between his and Kant's endeavors lies in the very idea of components of knowledge and their constitution. The figure should capture the common elements in Kant's method of transcendental reasoning and Reichenbach's analysis of science (Figure 1).

In his (1921) article, Reichenbach characterizes the transcendental method of Kant as "the method of formulating questions" (p. 25). This is a reinterpretation of Kant's concept of the transcendental, not its relativization.¹⁰ Reichenbach was not actually a Kant scholar, but his suggestion must have its roots in the way in which he was reading Kant. As to the systematic dimension of the questioning method, it certainly played an important role in the way in which Reichenbach practised philosophical

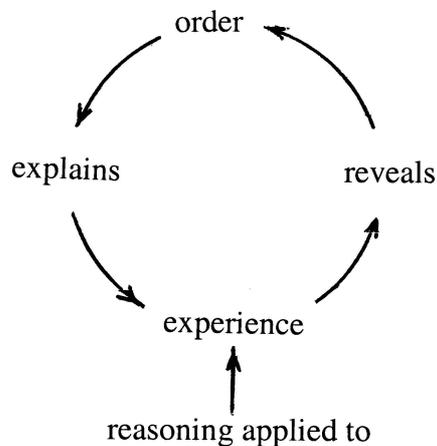


Fig. 1. Common elements in Kant's, method of transcendental reasoning and Reichenbach's analysis of science.

research. The first chapter of his dissertation bears the title "Das Problem". This problem is due to the discrepancy between the exact concept of probability in mathematics, on the one hand, and the quite unclear and vaguely applied idea of probability in the daily life, on the other hand. Philosophy has not delivered a precise formulation of this problem, let alone a solution, Reichenbach claims. (Reichenbach 1916, p. 2.)

In his 1920, 1924 and 1928 books, Reichenbach dedicated his energies to tackling with problems of space and time in the light of a philosophical analysis of the theory of relativity. He returned to the probability problem in various articles and in his book *Wahrscheinlichkeitslehre* (1935). The problem played an important role also in *Experience and Prediction* (1938), which argues in favor of probabilistic empiricism. It was actually the key problem of Reichenbach's philosophy.

In his paper (1925), Reichenbach studies the problem of existence, or "the riddle of transcendence", which is due to the fact that reality transcends our perceptions. The other problems mentioned in this article are the problem of the freedom of the will and the question of life (ibid., p. 285). "In these three categories of problems, which naturally enough are not independent of one another, I see genuinely metaphysical problems of present-day knowledge of nature." (ibid.) In respect to the significance of problem-stating and -solving, Reichenbach says: "Mankind evidently has a greater ability to develop the method through solving concrete problems than to figure it out by means of abstract hypotheses. Philosophers ought to have far more regard for this fact." (ibid., p. 284.) Furthermore, in his (1931), Reichenbach discusses various problems connected with biology, psychology, physics, mathematics, logic, and epistemology. He underlines

his conviction that problems are autonomous entities and that this “must be recognized as basic in science and epistemology” (ibid., p. 83).

Both in the sense of tracing the constitutive principles of science and in the sense of adhering to questioning, Reichenbach was committed to the spirit of Kant’s transcendental method, as he conceived it. He was against Kant’s transcendental idealism in favor of epistemic realism, and against Kant’s rationalism in favor of empiricism. In spite of his emancipation from Kant, there remained a connecting thread between his and Kant’s method, as the following citation indicates:

In Kant’s critique of knowledge, one must distinguish the method of formulating questions, the ‘transcendental method’, from the specific answers that Kant gives to particular questions; it is possible to reject the particular answers without abandoning the critical method itself. (Reichenbach, 1921, p. 25.)

In his 1951 book, *The Rise of Scientific Philosophy*, Reichenbach argues in favor of a “functional conception of knowledge” and against the “transcendental conception” or “transcendentalism” (cf. ch. 16, “The Functional Conception of Knowledge”, pp. 252–275). The former he considers to be characteristic to scientific philosophy, the latter to speculative philosophy. The functional conception had been elaborated by him as a conception of meaning in the paragraph 18 of *Experience and Prediction* (1938). Transcendentalism has not much to do with the methodology of transcendental reasoning, as conceived by Kant; however, there is in *The Rise of Scientific Philosophy* an explicit criticism of Kant’s method, too. Reichenbach claims: “Had Kant been accustomed to explain his ideas in the plain and simple language of the scientist he would perhaps have discovered that his transcendental deduction is of questionable value.” (Reichenbach 1951, p. 46.) In fact, Reichenbach argues against the possibility of transcendental proofs (cf. ibid., p. 47 f). Thus, he went a long way in his philosophy from first using transcendental reasoning in his dissertation (1916), then beginning to doubt its validity (1920), and ending up with the claim of its impossibility (1951). On the other hand, he never *entirely* abandoned the transcendental approach; perhaps one might say that he *naturalized* it, blurring the distinction between the transcendental and the empirical (though these are not his own terms).¹¹

4. KUHN AS ‘‘THE NEW KANT’’?

Reichenbach might, primarily because of his rearticulation of (a relativized version of) the *a priori* and in his interest in the preconditions of knowledge, be seen as a promising candidate for the position of “the new Kant” in 20th century philosophy of science. However, as we have seen, he does

not quite fulfill the qualifications for such a position. In his realism and scientific philosophy, no traces of Kant's *transcendental idealism* remain. T.S. Kuhn, another leading philosopher of science of the last century, might, therefore, be a better candidate – but the tour through Reichenbach's views has been important for us, because we will need the notion of a relativized *a priori* in our discussion of the Kuhnian position. Hopefully, our Kantian interpretation and the comparison to Reichenbach will be relevant for the continuing discussion and re-evaluation of Kuhn's legacy.¹²

Just like another important recent philosopher, Hilary Putnam (a pupil of Reichenbach's in the 1950s), whose "internal realist" or "pragmatic realist" views have often been characterized as yielding a combination of pragmatism and Kantian idealism, Kuhn can be interpreted as a naturalistically relaxed, post-Darwinian and historically concerned Kantian transcendental idealist – with as firm a commitment to an empirical realism as in Kant himself, or indeed in Reichenbach.¹³ In this respect, Kuhn and Putnam stand very close to each other, in spite of their disagreements over the nature of reference and meaning (in)variance in science, as well as the related (alleged) threat of relativism that Putnam, like many others, has perceived in Kuhn's views. They have also been treated as equally dangerous ontological relativists, constructivists or idealists by scientific realists who favor a correspondence theory of truth.¹⁴

It will be useful for our purposes to adopt a *comparative* method, that is, to see how Putnam and Kuhn refer to each other, especially in relation to Kant. Putnam's references – from his early scientifically realistic phase through his first (1981, 1983) substantial defenses of internal realism up to, and including, his more recent treatments of the realism issue (Putnam 1994) – have been rather critical: together with Paul Feyerabend and "French postmodernists", Kuhn seems to be, for Putnam, one of those irrationalist relativists or incommensurabilists who sacrifice the objectivity of science. According to Putnam, that objectivity must be maintained, even if metaphysically realist interpretations of it have led philosophers astray.¹⁵ Hence, in brief, Putnam's reading of Kuhn does not significantly differ from the standard line of criticism which pictures Kuhn as a relativist turning science into a subjective, irrational conversation – even though Putnam's own views have frequently been subjected to similar anti-relativist attacks (cf. Davidson 1984; Norris 2000).

Kuhn's tone of voice is somewhat different from Putnam's. His fundamental *agreement* with Putnam comes out nicely in his 1991 essay, "The Road since *Structure*", where he says that "the relationship between the lexicon – the shared taxonomy of a speech community¹⁶ – and the world the members of that community jointly inhabit" cannot be "the one Putnam has called metaphysical realism", because "[i]nsofar as the structure of the world can be experienced and the experience communicated, it is

constrained by the structure of the lexicon of the community which inhabits it" (Kuhn 2000, p. 101; see also *ibid.*, pp. 218–221, 247). Kuhn holds on to the view that insofar as the notion of truth has something to do with scientific development, it cannot be extra-theoretical correspondence truth but must be "intra-theoretically" applied (*ibid.*, pp. 115, 160–162, 251) – a view to some extent (though not entirely) shared by Putnam. "No more in the natural than in the human sciences is there some neutral, culture-independent, set of categories within which the population – whether of objects or of actions – can be described." (*ibid.*, p. 220.) Even so, Kuhn (as much as Putnam) resists any naive anti-realistic use of the metaphors of construction or invention. The world is "experientially given" and "solid" (*ibid.*, p. 101), not anything we simply make up. Still, he speaks about the "world-constitutive role" of intentionality and mental representations (*ibid.*, p. 103), thus returning, with qualifications, to his much-attacked view that different paradigms constitute "different worlds" and that the world "changes" when a new paradigm is adopted in a scientific revolution (cf. Kuhn 1970, p. 111; see also *ibid.*, p. 206).¹⁷ Kuhn thereby replaces "the one big mind-independent world about which scientists were once said to discover the truth" by "the variety of niches within which the practitioners of these various specialities practice their trade" (Kuhn 2000, p. 120). He thus insists on adopting a strongly *pluralistic* view of science (*ibid.*, pp. 119, 249), just as Putnam (e.g., 1994) has repeatedly done, *contra* many recent physicalists and scientific realists who (still) subscribe to the "unity of science" program (though in a manner different from the logical positivists').

The plausibility of the above-quoted phrases turns on their being open to a Kantian construal: "By now it may be clear that the position I'm developing is a sort of post-Darwinian Kantianism", Kuhn tells us. "Like the Kantian categories, the lexicon supplies preconditions of possible experience. But lexical categories, unlike their Kantian forebears, can and do change, both with time and with the passage from one community to another." (Kuhn 2000, p. 104.) Both Kuhn's "structured lexicon" and Kant's "a priori" (in a relativized sense) are "constitutive of *possible experience* of the world" without dictating what that experience must be (*ibid.*, p. 245), i.e., *which* experiential objects and events we in fact encounter in the world. Thus, in an interview in 1995, shortly before his death, Kuhn perceptively described himself as a Kantian with "movable categories" (*ibid.*, p. 264).¹⁸ What Kuhn rejects in Kant is, unsurprisingly, the *Ding an sich* (see *ibid.*, p. 207; cf. also Conant and Haugeland 2000, p. 8), although he admits that underlying the processes of change (of lexical categories) there must be "something permanent, fixed, and stable" which is as ineffable as the thing in itself (Kuhn 2000, p. 104; cf. Andersen 2001, p. 85). This comes close to Putnam's admission that "perhaps Kant was right" in postulating

a noumenal ground of experience, after all (see Putnam 1983, p. 226) – even though Putnam, no less than Kuhn, has always been suspicious of the very intelligibility of the notion of a thing in itself (cf. further Pihlström 1996, chs. 4.6–4.7). Indeed, while Kuhn’s position is often described as “non-realist” (e.g., by Andersen 2001, p. 60), Kuhn seems to think that we should somehow be able to combine realism and Kantianism (see Sharrock and Read 2002, p. 178). As Kant himself was an empirical realist, this should not be an impossible task – and, as we saw, something not entirely unrelated was attempted by Reichenbach, too.

As Hoyningen-Huene (1993, especially pp. 35 ff., 267–271) lucidly explains, the notion of a world-in-itself does play a significant role in Kuhn’s conception of scientific inquiry. Science is concerned with a Kantian-like humanly constituted “phenomenal world”, whereas the world-in-itself remains unknowable (cf. also Sharrock and Read 2002, pp. 52 ff., 173, 179). Our phenomenal worlds are, however, “reshapings” of the world-in-itself, “substantial” and independent of human subjectivity (Hoyningen-Huene, 1993, p. 268), and the world is, thus, resistant to our activities. This is inevitable, given Kuhn’s account of anomalies as formative factors of scientific crises and revolutions (ibid., pp. 269–270). If anomalies are to occur, the structure of the world cannot be simply up to us.

It is not easy to interpret these notions in any strictly non-metaphorical manner. It remains unclear what Kuhn’s – or Putnam’s – commitment to a Kantian noumenal reality in effect amounts to. But his views, as interpreted by Hoyningen-Huene in particular, indicate how difficult it is to avoid employing the traditional Kantian vocabulary, as soon as one takes a step on the transcendental path, admitting that the world as we know it is in some sense a human (transcendental) construction, or dependent on the constitutive activities of our subjectivity (e.g., our scientific paradigms or lexicons), instead of being anything objectively ready-made and simply given.

Kuhn’s attachment to something like a thing in itself has also led to the rather non-standard charge that he preserves, in an *a priori* manner, an invariant ultimate structure of nature (viz., something like the mind- and lexicon-independent world of the metaphysical realist) and thus precludes any epistemically realist (or, for that matter, idealist) view of the *availability* of that structure, given his historicist conception of science (Margolis 1993, pp. 72–80, especially p. 74). There may be a correct insight in this argument, but on the other hand it is an open issue whether any even partially Kantian approach in the realism issue can avoid *some* commitment to the *Ding(e) an sich*.¹⁹ Among Kuhn’s interpreters, Wes Sharrock and Rupert Read have perceived the central problem most clearly: while Kuhn admits that something (some sort of a “fixed nature” or “the world out there”) can be said to retain “a certain constancy” in scientific revolutions, “there is no way

of saying *what it is that remains constant* throughout” (Sharrock and Read, 2002, p. 57). That is to say, there is no paradigm- or lexicon-independent, neutral point of reference that could be appealed to in saying something more specific about the constancy at issue.

The problems underlying the interpretation of phrases like “world changes” are, then, semantic rather than metaphysical, problems concerning what we can meaningfully say in our language and what we cannot. But this does not lead us out of the Kantian predicament; it merely transforms the Kantian concern with the *limits of knowledge* (and thus with the unknowability of the *Ding an sich*) into a concern with the *limits of language*, of the sayable – and thus we are brought, through Kuhnian philosophy of science, to a largely Wittgensteinian territory (cf. *ibid.*, pp. 165, 169–170, 200 ff.).²⁰ Semantically speaking, it is also possible to explicate the constitutive role that paradigms and/or lexicons play in making scientific knowledge and its objects possible by saying that it is only against the background provided by a paradigm or a lexicon that scientific statements can receive a truth-value, or are possible candidates for truth (and falsity) (cf. Friedman 2001, pp. 74–75). Functioning as such constitutive presuppositions, paradigms are necessary for the empirical *possibilities* postulated in a given scientific field (see *ibid.*, pp. 94, 114), i.e., not just presuppositions of the truth of certain statements. They create a “logical space” for such possibilities to be taken seriously in scientific investigations (*ibid.*, p. 95).

Using phrases like this, we are, obviously, embedded in deeply Kantian commitments. Returning to Reichenbach’s above-described rearticulation of the transcendental method as a method of formulating questions (see section 3), we may see paradigms as contexts rendering certain (kinds of) questions meaningful (and others meaningless), enabling us to engage in the project of scientific questioning. Insofar as the philosopher of science tries to understand the ways in which scientific problems and theories are rooted in more or less stable, yet changing, paradigms in a Kuhnian manner, s/he can be said to be using a transcendental method in her/his philosophical reflections.²¹

5. THE RELATIVIZED *A PRIORI* REVISITED

This view of the experience- and object-constituting function of paradigms or lexicons again leads us to the Kantian topic of the *a priori*. Insofar as Friedman (1993, 1997, 2000b, 2001, 2002, 2003) is correct in his claim that Kuhn, with his changing but constitutive categories, is in fact closer to Carnap than to Quine (cf. here also Kuhn 2000, pp. 305–306; Andersen 2001, p. 12, with further references), elements of Kant’s project of transcendental

philosophy can, it seems, be preserved in a naturalized, historicized and relativized manner even in our post-empiricist and post-Kuhnian discussions of scientific realism and relativism. The Reichenbachian idea of the “relativized *a priori*”, defended by Friedman and explicitly approved of by Kuhn (2000, p. 245), thus still has an important role to play in these discussions.²² While Friedman’s own sympathies seem to lie with Ernst Cassirer, in particular, characterized as a mediator between Carnap’s and Heidegger’s philosophical approaches (see Friedman 2000a),²³ he has defended Carnap’s (1950) conception of linguistic frameworks as a relativization of the Kantian *a priori* conditions for the possibility of empirical science, rendering those conditions less rigid and foundationalistically fixed than the “received view” sees them, yet without abandoning the idea that they are constitutive of knowledge (or indeed of the empirical world). Similarly, Reichenbach’s relativized conception of *a priori* (e.g., mathematical-physical) principles is a conception in which those principles “retain the characteristically Kantian constitutive function of making the empirical natural knowledge [. . .] structured and framed by such principles first possible” (Friedman 2003, p. 25). For both Reichenbach and Friedman, it is essential to distinguish the original Kantian requirements of the unrevisability and apodictic certainty of transcendental principles from the constitutive function of these principles, a function taken to be much more important than the former ideas (cf. Friedman 2001, p. 73). Transcendental, constitutive principles are not fixed or unrevisable but are nonetheless “constitutive of the concept of the object of [scientific] knowledge” (ibid., p. 30). They are, then, necessary presuppositions of the properly empirical claims of a given theory, even though they are not universally or ahistorically valid but can and do change from one theory to another (Friedman 2003, p. 24).

Friedman reminds us that Carnap and many other pre-Quinean philosophers of science were also holists and that holism need not lead to an uncompromising naturalism according to which there is no division at all to be drawn between the empirical statements formulated within a scientific discipline and the constitutive normative (linguistic) framework that makes the formulation of such statements possible. As Friedman (1997, p. 14) puts it, Kuhn’s distinction between normal science and revolutionary changes of paradigms can be seen as an “informal counterpart” of Kant’s and Carnap’s more carefully formalized distinctions between “rule-governed operations” within a (constitutive, *a priori*) linguistic framework, on the one hand, and the change of a framework, on the other (see also Friedman 2001, pp. xii, 41–42; 2002, p. 181; 2003, pp. 20–21). Nevertheless, there is a difference between Kuhn and the logical empiricists: while both adopt a relativized picture of *a priori* principles, Kuhn’s perspective differs from the logical empiricists’ one in being “essentially historical”: the *a priori* is not merely relativized to a theory or a linguistic framework but to a “time, place, or

culture”, which raises the central post-Kuhnian problem concerning the socio-cultural relativity of scientific knowledge (Friedman 2003, p. 28).²⁴

The possibility of assimilating Carnapian and Kuhnian themes has been further defended by Kelly Becker (2002). She argues (p. 219) that Quine can be seen as the winner of the debate on analyticity only if the debate is construed as one about necessity and indubitable *a priori* knowledge, and that insofar as it is seen as a debate over the viability of the distinction between norm-governed inquiry and the establishment of norms, Kuhn’s work on paradigms and scientific revolutions emerges as a vindication of Carnap’s (1950) distinction between internal and external questions of existence, instead of providing any additional support for Quine’s repudiation of analyticity. Moreover, Becker says, it is precisely in the latter sense – in the sense of the distinction between norm-governed practices and their establishment – that Carnap intended his theory of analyticity to function in the first place; it was above all meant to be a rational reconstruction of science, and its status as a (failed) theory of necessity or of truth in virtue of meaning was secondary to this purpose (Becker 2002, pp. 219, 222–223, 228).

Whether or not this is a correct reading of Carnap, we are again led to appreciate Kuhn’s work: just as Friedman, Becker sets out to show that Carnap’s distinction between norm-governed and norm-establishing inquiry finds expression in Kuhn’s conception of science. While joining Quine’s attack on a general criterion of analyticity (and while, famously, questioning the theory-independence of scientific observations), Kuhn maintains, *with* the logical empiricists, a distinction between presuppositional meaning-bestowing statements and empirical, factual statements, thus endorsing a version of Carnap’s external vs. internal distinction, or, analogously, of Kant’s transcendental vs. empirical distinction. He does, as we have seen, preserve a legitimate role for “transcendental hypotheses”, or relativized – and in principle challengeable – transcendental principles normatively constitutive of scientific research.²⁵ Most importantly, this way of retaining the distinction between the internal and external investigations does not require us to commit ourselves to the much more suspect idea that external “framework statements” would be entirely independent of experience (which they are not, given Quine’s and Kuhn’s arguments) or that they would somehow be invulnerable to historical contingency.

Understandably, Becker avoids the transcendental terminology, thus failing to characterize Kuhn’s and Carnap’s agreement in explicitly Kantian terms. This is something that Friedman has fortunately done, however. The key idea, in any case, is that once we are prepared to relativize the Kantian conditions for the possibility of knowledge, we can see Kuhn as vindicating crucial parts of Carnapian (or, again, Reichenbachian) logical empiricism, precisely because of his profoundly Kantian approach. This relativization

is, in fact, a common theme in the early history of 20th century philosophy (of science): in addition to Carnap and Reichenbach, a relativized notion of the *a priori* was defended by C.I. Lewis, among others (cf. Lewis 1923). Through Lewis, we could here also build a bridge to the pragmatist tradition, whose encounters with the European-originated logical empiricism in pre-World War II America is an interesting chapter in the history of modern philosophy – and something that is almost entirely neglected by Friedman, although his defense of the relativized *a priori* is readily applicable, *mutatis mutandis*, in pragmatism, too. This is not, however, the right place to examine to what extent pragmatism can accommodate insights drawn from Kantian transcendental philosophy and transcendental idealism, or how a pragmatically established form of (scientific) empirical realism can be reconciled with transcendental idealism (see Pihlström 2003). The topic is important, nevertheless, because Kuhn and Putnam can both be interpreted as leading neopragmatists in the philosophy of science and in the general realism discussion.²⁶

6. CONCLUDING REMARKS

For Eino Kaila, as we saw in the beginning, Carnap's empiricism was not sufficiently Kantian but remained essentially Humean. It is hard to see, however, how Carnap's key distinction, employed above, essentially differs from, say, Reichenbach's relativized *a priori*. If Carnap's project is not sufficiently Kantian, then one may also ask why Kaila's (1926, p. 146) reinterpretation of "transcendental hypotheses" as either practical postulates or probability statements would be. The differences between these two logical empiricists come out in questions of detail (as reflected in Kaila's essays collected in his 1979) and in their basic orientation: instead of being a logician or a detailed linguistic analyst, Kaila was primarily a synthetic "philosopher of nature", and the same description likewise applies to Reichenbach. But the crucial point here is that these differences hardly touch these philosophers' relations to Kant. We cannot here engage in any close evaluation of the various interpretations of Carnap – either Kaila's, Quine's, Friedman's, or Becker's – but it seems clear that Carnap's and Reichenbach's views can be vindicated (or at least rationally reconstructed) through the transcendental resources of Kuhn's post-empiricist philosophy of science. Logical empiricism is not, then, even nearly as misguided as the received view has it; it is much closer to the apparently much more modern Kuhnian (or Putnamian) ideas which have been hotly debated over the past few decades. This is hardly surprising, after all, given the common Kantian background of all these ways of thinking – and given Reichenbach's influence on key 20th-century philosophers like Putnam.

One might in fact go as far as claiming that Kant's transcendental idealism is a key to the Kuhnian and Putnamian worries about realism: we can adopt a reasonable form of (empirical, intra-theoretical) realism only by holding on to a transcendently idealistic picture of human practices, paradigms or lexicons as constitutive of the world as it is for us – although this, certainly, would not be Reichenbach's way of describing his preferred form of realism. Like many other analytic or post-analytic thinkers, Kuhn and Putnam have hesitated to title their views transcendently idealistic (cf. Hanna 2001), but this old Kantian notion does in fact picture them fairly accurately, quite as accurately as it pictures Carnap's early project of construction in the *Aufbau*.²⁷ Again, one might here examine the presence of transcendently idealistic elements in pragmatism, especially in neopragmatists like Putnam and Kuhn, but this is a topic to which some space has been devoted elsewhere (Pihlström 2003).²⁸ Friedman (2001, p. 118) also hesitates to speak about transcendental idealism, but he does view his conception of science (and scientific rationality) as a species of Kantian "empirical realism", to be distinguished from "transcendental realism" which confuses the empirically cognizable world with the world as it is in itself. Thus, according to Friedman (and, presumably, Kant and Kuhn), science aims at, and also reaches, empirical truth, but there is no sense in speaking about inter-paradigmatic convergence to the truth about an entirely paradigm- or lexicon-independent world *an sich*.²⁹

We may conclude by taking up the metaphilosophical question of the role of philosophical reflection in the kind of conceptual change that takes place in (Kuhnian) scientific revolutions. Through his qualified defense of Carnap and Kuhn, Friedman (2001, pp. 45–46; 2002, p. 189) distinguishes not just two but three levels in the system of (scientific) knowledge: (1) the level of empirical natural science itself; (2) the level of (changing, relativized) constitutive *a priori* principles, viz., paradigms (or, in Kuhn's more recent jargon, lexicons; or, in a more pragmatist jargon, scientific practices); and (3) the level of (even more changing and less universally accepted) philosophical "meta-paradigms", meta-frameworks orientating inter-paradigmatic transitions and enabling inter-paradigmatic rational communication (cf. also Friedman 1997, 1999; DiSalle 2002). Level (3) is transcendental even more strongly than level (2), though it is no less relativized and revisable through the dynamics of our philosophical inquiry. Insofar as this reconceptualization of the place of transcendental principles and arguments in the development of science is plausible, detranscendentalizing, resolutely non-normative, "dissolutionist" or "negative" readings of Kuhn such as Sharrock's and Read's (2002) lose some of their appeal (see especially pp. 205–206, 210–211). One can retain a thoroughgoing fallibilism and anti-foundationalism in one's philosophy of science and nevertheless admit that transcendental reflection, on levels (2) and especially (3), may play an

important role.³⁰ Level (3) also partly thematizes and problematizes *itself*; thus, we have to acknowledge here the circular, reflexive structure typical of virtually any transcendental philosophy (cf. Pihlström 2003, 2004). The transcendental method as a method of formulating questions (in a Reichenbachian rearticulation) may also question its own status as a philosophical method, its own key principles – and it commits us to this kind of questioning continuously.

Another closely related metaphilosophical moral that Friedman draws here is that naturalist-cum-holist (Quinean) attempts to assimilate philosophy to science must fail. The status of philosophy, on level (3) in Friedman's scheme, is fundamentally distinct from science, precisely because of the level structure itself. (Cf. Friedman 2001, pp. 24, 45–46.) The levels, according to Friedman, have their own “radically different” roles or functions (ibid., p. 46). We may safely leave it as an open issue here whether Friedman in the end arrives at too sharp a demarcation between philosophical and scientific inquiries. In any case, it seems to be clear that, on a Kuhnian conception of the dynamics of scientific knowledge, science is by no means a threat to distinctively philosophical inquiries. The relations between Friedmanian levels (1), (2) and (3) may pose us philosophical challenges, to be sure, but philosophers (of science) will still have plenty of things to do. Philosophy need not be subordinated to science in a radically naturalist manner.³¹ Yet, philosophy can aspire to be scientific (cf. Reichenbach 1951) at least in the sense of a firm commitment to conceptual and argumentative rigor, both in the posing of questions and (especially) in the search for answers.

Kuhn – or Putnam, for that matter – can surely be seen as a “new Kant” in 20th century philosophy of science.³² But it goes without saying that there are many “new” things for us to discover in Kant himself, too, still to be taken into account in discussions of scientific realism and its alternatives (as Friedman and others have shown). Given the undeniable “Humeanism” of logical empiricism, one of these new things that still need to be addressed both historically and systematically might be the sense in which Kant and Hume are not as clearly incompatible figures as they are usually taken to be. Developing that historical point, either in relation to logical empiricism or independently of it, would, however, require a much longer story – a story whose plausibility might be partly grounded in the possibility of reading and re-reading 20th century philosophers through Kantian spectacles.³³

NOTES

¹ Kaila's most important writings on logical empiricism are available in English in Kaila (1979). In these papers from the 1930s, Kaila did not stick to the notion of a transcendental

hypothesis any longer; apparently he used it only in the 1920s. Manninen's (2002a, b) recent works (which are at the moment available only in Finnish) offer detailed new information, based upon archives and correspondence that have up to now been little used in scholarship, on the emergence of the Vienna Circle and on the role played by individual thinkers within and close to the Circle, including Kaila. See Stadler (1997) for the most comprehensive historical study of logical empiricism hitherto produced.

² It is undeniable that Carnap's program in the *Aufbau* (1928) contains significant Humean elements, particularly the reduction of all (scientific) concepts to elementary sensory experiences, even though his program of constitution is also (neo-)Kantian.

³ Schlick, arguably, was much closer to Wittgenstein than to Carnap (cf. Manninen, 2002b). We are not here concerned with the differences between the views propounded by the individual Vienna Circle thinkers.

⁴ However, he occasionally employed the former when he should have used the latter. It has become a vital part of the Kant philology to trace such passages of his texts in which this happens.

⁵ We will get back to this notion and to the comparison with Kuhn in due course.

⁶ The German original (1916) reads: "Die Rechtmässigkeit der Anwendung des Kausalprinzips ist von KANT in der transzendentalen Deduktion der Kritik dargetan worden; wäre dies nicht möglich gewesen, so hätten wir nicht das Recht, aus diesem Prinzip eine subjektive Gewissheit zu entnehmen."

⁷ Original: "Es muss, wenn es physikalische Erkenntnis geben soll, noch ein anderes Prinzip zu dem der Kausalität hinzukommen. Wir muessen nach einem zweiten synthetischen Urteil a priori suchen."

⁸ Original: "Es ist damit die Existenz einer Wahrscheinlichkeitsfunktion deduziert worden in dem Sinne, wie KANT das Wort Deduktion fuer die Transzendentalphilosophie gebraucht. Die Notwendigkeit einer solchen Gesetzmässigkeit lässt sich letzten Endes nur einsehen, und sie ist deshalb ein synthetisches Urteil a priori genannt worden; sie lässt sich nicht logisch aus anderen Grundsätzen der Erkenntnis ableiten."

⁹ Cf. Kamlah (1989) for more details.

¹⁰ It could lead to Kantian scholarship in which it would be closely studied how Kant speaks of problems and questions and how these condition the conduct of inquiry.

¹¹ It remains to add a short remark on the concept of *admissibility*. It is often employed by Reichenbach in various contexts, but he does not analyze it. For the reasons of consistency, one may suppose that what is admissible in Reichenbach's sense, is something to be determined by experience and not by reason.

¹² One important connecting link between Reichenbach and Kuhn is the book by Ludwik Fleck (1935), which both knew and which has been taken to provide a precursor of Kuhn's paradigms in the notion of *Denkstile*. This is how Reichenbach (1938, p. 224) finds Fleck relevant to his concerns: "Our modern eyes, familiar with rectangular houses and steel constructions, see the richer forms of nature within the frame of our architectural style; modern drawings, in comparison with ancient drawings, betray this influence." After this sentence, note 6 follows: "Fleck shows antique and modern drawings of the human skeleton taken from medical textbooks; he makes clear that in ancient drawings the skeleton is always a symbol of death, whereas in the modern it is a symbol of mechanical-technical constructions." For Kuhn's acknowledgment of Fleck, see Kuhn (1970), pp. vi–vii.

¹³ For a recent reading of Kant in which his advocacy of robust empirical realism, within the general position of transcendental idealism, is taken seriously, see Abela (2002); for a rigorous "internal" critique of Kant's idealism, and for an argument to the effect that transcendental idealism fails to accommodate any kind of realism, see, however, Westphal (2004). For a number of different perspectives on the meaning of "transcendental" in modern

philosophy (though not in Kuhn or in the logical empiricists), see the essays collected in Malpas (2003); cf. further Pihlström (2003).

¹⁴ See, e.g., Niiniluoto (1999) and Norris (2000); cf. also the well-known attack on conceptual relativism, as represented by Kuhn, Quine, and others, in Davidson (1984).

¹⁵ On Putnam's views on realism and relativism, see Pihlström (1996) and (1998). We need not return to the complex task of interpreting Putnam's changing positions here; Putnam is merely introduced as a suitable point of comparison. For a brief account of Kuhn's and Putnam's controversy over realism and the reference of scientific terms, see Andersen (2001), pp. 56–60; see also Gupta (2002), ch. 6, for the suggestion that Putnam's internal realism is a synthesis of Karl Popper's scientific realism and Kuhn's "relativism". Putnam's accusations that Kuhn is a relativist are, of course, standard; this has been the usual charge among Kuhn's critics from early on (see, e.g., Scheffler 1967; for a more recent version of the same line of argument, with a link to today's "science wars", see Sokal and Bricmont, 2003, pp. 67–73).

¹⁶ This can be regarded as a successor notion to Kuhn's (1970) famous (or notorious) concept of a paradigm. We shall, however, rather freely speak about both paradigms and lexicons in the following, without attempting any careful definition of these notions.

¹⁷ See several essays addressing this theme in Horwich (1993), and see especially Sharrock's and Read's (2002, pp. 50–58) illuminating discussion. Sharrock and Read set out to show that Kuhn is, in using phrases like "world changes", much less radical than both his friends and foes have thought he is. Friedman (2003, p. 34) suggests that the problem of theoretical convergence over time might be interpreted, together with the neo-Kantians of the Marburg School, mathematically instead of being interpreted (as Kuhn does) ontologically, concerning the "truth" about an independent reality (which Kuhn rejects). See also Friedman (2001), pp. 67–68.

¹⁸ Nickles (2003, p. 5), in his "Introduction" to a volume of essays on Kuhn, also describes Kuhn's view as a "'historical Kantian' relativism" and employs a Kantian expression when claiming that, for Kuhn, (shifting) scientific traditions "constitute the basis for intelligibility" (*ibid.*, p. 7).

¹⁹ This broader issue must obviously be set aside here; we are not engaging in Kant scholarship in this paper. For an attempt to develop a pragmatic interpretation of the significance of the *Ding an sich*, see Pihlström (1996), ch. 4.7.

²⁰ While no detailed treatment of Kuhn's Wittgensteinianism is possible here, a few words about this topic will be said below.

²¹ See also Kuhn's (1970, p. viii) remarks on "model problems and solutions". On questions and answers, cf. *ibid.*, pp. 139–140: "By crediting to Galileo the answer to a question that Galileo's paradigms did not permit to be asked, Newton's account hides the effect of a small but revolutionary reformulation in the questions that scientists asked about motion as well as in the answers they felt able to accept. But it is just this sort of change in the formulation of questions and answers that accounts, far more than novel empirical discoveries, for the transition from Aristotelian to Galilean and from Galilean to Newtonian dynamics." We may note here the transcendental-sounding idea of certain questions being permitted to be asked within a paradigm, and certain answers being able to be accepted; our intended comparison to Reichenbach's view of the transcendental method as a method of formulating questions should be obvious.

²² See the discussion in section 2 above. Cf. Reichenbach (1920, 1965), ch. 5; this work is cited in Friedman (2001), pp. 30, 72; (2002), p. 174; and (2003), p. 24; and elsewhere. See also the discussion in Coffa (1991), ch. 10, especially pp. 190–193. We are not saying that Friedman's highly critical reading of Quine is altogether accurate: see Pihlström and Koskinen (2001), as well as Koskinen (2004). It may not be impossible to maintain, within

Quinean naturalism, something analogous to Friedman's three-level structure of human knowledge (cf. Friedman, 1997, 2001, pp. 44–46); we shall get back to this aspect of Friedman's view toward the end of this paper.

²³ Friedman (2001, pp. 64–68) proposes that we combine the logical empiricists' relativized conception of the *a priori* with Cassirer's (and the Marburg School's) regulative view of the *a priori*, thus arriving at a Peircean-like picture of the constitutive principles of scientific knowledge being dynamically evolving, with an ideal limit of maximal communicative rationality never to be achieved but regulatively guiding inquiry, including the conceptual transformations that lead to new paradigms and meta-paradigms. This, roughly, is Friedman's solution to the relativism issue. I think one of the great merits of Friedman's approach is that he takes relativism seriously. Indeed, relativism inevitably haunts us post-Kuhnians, given that universal Kantian rationality has broken down (cf. *ibid.*, pp. 48, 95; see also Pihlström, 2003, ch. 1).

²⁴ Moreover, Kuhn's notion of a paradigm can be compared to Reichenbach's later (1938, pp. 221–222) notion of a "conceptual frame", as Siitonen (2002, p. 166) proposes.

²⁵ Indeed, as Becker (2002) notes, the notion of a paradigm is very close to the notion of a linguistic framework that Carnap employed (pp. 223–224). In summary: "Carnap wanted to explain the critical difference between the establishment of norms and the scientific activity that is made possible within a normative framework. Quine criticizes this Carnapian project as well, but [...] if Kuhn's account of science is viable – and many Quineans would probably agree that it is – then it can be used to illuminate the distinction that provides the cornerstone of Carnap's philosophy of science." (*ibid.*, p. 228.) Becker only considers Kuhn's *Structure*, but this impression would only have been strengthened, had she also discussed the later essays.

²⁶ Also, the pragmatist aspects of Reichenbach's *Experience and Prediction* have been emphasized (see Siitonen, 1997). A side remark on Kuhn's relation to pragmatism should be added at this point. Kuhn's true novelty in the philosophy of science has been claimed to lie in his emphasis on science as a *practice*, giving up the traditional epistemological questions of justifying scientific beliefs (see Rouse 2003). The interpretation of Kuhn as a kind of a Kantian thinker (or even a transcendental idealist) as developed in this paper is compatible with this suggestion, provided that (1) the view of "science as a practice" amounts to a form of pragmatism and (2) pragmatism can receive a Kantian (or even a transcendently idealistic) reinterpretation (as proposed in Pihlström 2003). Rouse's reading of Kuhn is helpful in bringing out nicely what a truly pragmatist reading should *not* look like: after correctly noting that Kuhn leads us to a shift toward a description of science as an activity (rather than as a product of such activity), Rouse says that paradigms should be understood as "exemplary ways of conceptualizing and intervening in particular situations", instead of being understood "as beliefs (even tacit beliefs) agreed upon by community members" (Rouse 2003, p. 107). Now, a pragmatist should construe beliefs themselves as habits of action (as famously done by Charles S. Peirce and other classical pragmatists); it is precisely in virtue of being ways of conceptualizing and intervening that paradigms are also, *eo ipso*, beliefs or networks (or Quinean "webs") of beliefs. It is in our activities and practices themselves that our ontological construals of the way(s) the world is are to be found. Thus, Rouse's dichotomies between "practitioners" and "believers" (*ibid.*, p. 109) and between beliefs and forms of life (*ibid.*, p. 112) are too unpragmatic to be helpful in what might be labeled a "transcendentally pragmatist" rereading of Kuhn as a philosopher of scientific practice. Rouse comes close to a transcendental interpretation when proposing that Kuhn should be seen as a critic of scientific realism, as someone who denies that science aims at correct representations of a concept- and practice-independent world (*ibid.*, p. 117), and especially when he points out that "[t]he realist can posit a world 'beyond' language

and culture only by mistakenly thinking that we can have a definite language and culture distinct from how we engage the world" (ibid.); what he misses is that a form of scientific realism (like Kantian empirical realism) can be maintained within the overall position of transcendental idealism (or, perhaps rather, transcendental pragmatism; cf. again Pihlström 2003 for a much more comprehensive elaboration on this idea). Of course, Rouse is free to offer a non-pragmatist account of Kuhn as a "philosopher of scientific practice"; it just needs to be pointed out that a pragmatist way of putting the matter is also available and might strengthen Rouse's point by connecting it with the transcendental concerns raised by Friedman and others.

²⁷ Cf. Friedman (1999), pp. 131 ff.; on Carnap's and other positivists' neo-Kantian background, see also Richardson (1998), as well as several papers in Giere and Richardson (1996). For useful broader discussions of the logical empiricists' accounts of the (relativized) *a priori* and of their "transcendental method" in the philosophy of science, see Coffa (1991), especially chs. 10, 14, and 18. Seibt (2000) argues, however, that Carnap's chief concern was metaphysical neutrality (instead of the elimination of metaphysics) and that, despite his undeniable neo-Kantian starting-point, it is a mistake to read any idealist or anti-realist "metaphysical dependence" into his project of constitution: the constitutional derivation of concepts is metaphysically neutral (see especially pp. 166–169; Seibt's critique is directed at Coffa, in particular). We make no strong claims about Carnap here, though.

²⁸ It is worth noting that Sharrock and Read (2002, pp. 157–161) oppose the interpretation of Kuhn as a "linguistic idealist". They construe idealism as the absurd thesis that human thought or culture decides what is the case, or what is real (p. 157). No such construal is necessary, if one is familiar with Kant's transcendental idealism as a doctrine entirely compatible with empirical realism (cf. Abela 2002). Thus, although we may follow Sharrock and Read in saving Kuhn (and some other closely related thinkers, such as Peter Winch) from naively idealistic interpretations, we need not fear idealism, when understood transcendently. We may resist the claim that "Kuhn does not come remotely close to advising us that natural reality is constituted by and transformed with our scientific categories" (Sharrock and Read, 2002, p. 175), if we are Kantian-minded enough to allow the notion of constitution to have a transcendental sense here. For a quite different comparison between Kuhn and early 20th century French philosophers of science, taking up the realism vs. idealism issue as it arises in Gaston Bachelard's work in particular, see Gutting (2003), especially pp. 57–59. Exactly as Bachelard was able to accommodate scientific realism within a form of idealism emphasizing the constitutive activity of the mind, Kuhn might, Gutting suggests, preserve a realism about scientific objects while remaining "metaphysically skeptical" about the correspondence theory of truth (ibid., p. 59). Again, the explicitly Kantian vocabulary of "transcendental idealism" would be helpful in making sense of this view. Another French thinker sometimes compared to Kuhn is, unsurprisingly, Foucault, whose notion of a "historical *a priori*" is close to Kuhn's conception of paradigms as changing, yet constitutive, epistemic frameworks. See Foucault (1966), especially pp. 347 ff.; Andersen (2001), p. 13; for an explicitly transcendental reading of Foucault, cf. Oksala (2002).

²⁹ Friedman (2001, pp. 117–119) reminds us, however, that his main concern is (the evolving of) scientific rationality (and the related issue of relativism), rather than scientific truth or realism.

³⁰ Sharrock and Read criticize Kuhn for having (at least occasionally) taken metaphysical issues (such as realism) more seriously than he would have had to, given the "therapeutic possibilities" of his philosophy, and they criticize Hoyningen-Huene (1993) for having read too much of a "relativistic" (pluralized 'Kantian') metaphysical view" into Kuhn, thus

failing to appreciate Kuhn's Wittgensteinianism (Sharrock and Read 2002, p. 201). Philosophy leaves everything as it is (cf. Wittgenstein 1953, I, §124), including – Kuhn shows us – science (Sharrock and Read 2002, p. 211). Sharrock and Read argue, accordingly, that we should, following Kuhn, give up “the idea of the philosopher of science as the transcendental adjudicator of different scientific schemes” (ibid., p. 204) and that we should take to heart Kuhn's Wittgensteinian lesson that “the questions as to whether science represents reality or makes progress *are not philosophical questions about science*” (ibid., p. 205). These arguments – although they do have a sound basis in the authors' careful Kuhn scholarship – entirely miss the compatibility of a transcendental and a Wittgensteinian orientation, misleadingly characterizing the “transcendental” perspective as a science-transcendent, quasi-divine authority. Even Sharrock and Read themselves come close to a qualified transcendental account when they characterize ontologies as “what one works with” or “what make claims [about reality] possible” (ibid., p. 166). In brief, it is overhasty to declare that someone inspired by Wittgensteinian (or Kuhnian) “therapy” as a way of getting rid of misleadingly described philosophical problems cannot engage in constructive, normative philosophy (of science) at all. For a defense of a transcendental reinterpretation of Wittgensteinian philosophy of language in relation to pragmatism, see Pihlström (2003), ch. 2. On Kuhn's Wittgensteinianism, particularly on his endorsement of the notion of a family resemblance, see also Barker *et al.* (2003), especially pp. 212–214.

³¹ Cf. here, however, the critical discussion of Friedman's reading of Quine's naturalism in Pihlström and Koskinen (2001) and in Koskinen (2004).

³² As we have seen, this label might also be applicable, with some reservations, to earlier figures like Reichenbach or Carnap, though in Kuhn's case it would be much more appropriate.

³³ Arto Siitonen is primarily responsible for Sections 2 and 3, and Sami Pihlström for the other sections. Siitonen's part was presented in the 12th International Congress of Logic, Methodology and Philosophy of Science in Oviedo, Spain, in August 2003; Pihlström's part was presented at Fudan University, Shanghai, China, in October 2003. We are grateful for all comments we received on these occasions.

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