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Metaphysics and Contemporary Science: Why the question of the synthetic a priori shouldn't not be abandoned prematurely (2019, unpublished)

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Keywords

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Abstract

The problem of synthetic judgements touches on the question of whether philosophy can draw independent statements about reality in the first place. For Kant, the synthetic judgements a priori formulate the conditions of the possibility for objectively valid knowledge. Despite the principle fallibility of its statements, modern science aims for objective knowledge. This gives the topic of synthetic a priori unbroken currency.

This paper aims to show that a modernized version of transcendental philosophy, if it is to be feasible at all, must “bid farewell” to the concept of being “free of empiricism” or the “purity” of the a priori. Approaches to this end can already been found in Kant’s reflections on *non-pure synthetic knowledge*. Moreover, the *a priori validity* of knowledge does not exclude the possibility that it can be discovered empirically. In keeping with Kant, Fries and Nelson anticipated this separation (usually first attributed to Reichenbach) between the validity and discovery context of knowledge and pointed out that the a priori could be discovered empirically, but never proven.

There are currently still good reasons why transcendental philosophical concepts are of fundamental importance for modern science, although it must not be overlooked that even within the framework of a modernized transcendental philosophy, several unsolved problems remain or are raised. For example, the irredeemability of the universal validity and necessary

claims of the a priori, the problem of a clear demarcation between the phenomenal and noumenal world. Moreover, the “beautiful structure” or the Kantian system, which constituted its persuasive power, is lost.

1 On the question of the objective validity of scientific knowledge

Certainly the question that must be posed today is whether it is at all still appropriate to ask about a priori concepts in the sciences. Today the classical ideal of science, at the center of which is the search for an unshakeable foundation, has long been replaced by an essentially hypothetical-deductive concept of science, which no longer regards science as a system of secured propositions. Instead, it assumes that all knowledge is provisional. Of course, anyone who attempts to describe reality in an objectifying manner can be mistaken. However, to assume the fallibility of knowledge is not tantamount to renouncing an objectifying description of reality (i.e. a description that is at least principally unambiguously verifiable and comprehensible by anyone and at any time). Though admitting the fallibility of any empirical knowledge, Popper, for example, does not deny that science is based on objective knowledge, “Wir werden also sagen: Die *Objektivität* der wissenschaftlichen Sätze liegt darin, daß sie *intersubjektiv nachprüfbar* sein müssen.” (Popper, *Logik der Forschung* p. 51)¹

Those who acknowledge the possibility of *objectivity* of scientific knowledge are confronted with the question of the *conditions of the possibility of objective knowledge* and thus also with the question of *synthetic knowledge a priori*, whereas synthetic a priori concerns precisely the conditions that make objective knowledge possible in the first place.

Wolfgang Stegmüller addresses another topic that is brought up in conjunction with the question of synthetic knowledge a priori: ultimately it is a question of whether philosophy can make independent statements about reality at all or whether all statements about reality are a matter of empirical sciences (cf. Stegmüller, 1989 p. XXVII). Therefore the identity of philosophy as an independent discipline is up for debate.

2 Synthetic judgements a priori

Philosophy has a long tradition of distinguishing between “a priori” and “a posteriori.” This tradition can be traced back to Aristoteles, who divided things into “earlier” and “later.” (Cf. Aristoteles, *Metaphysics*, V. 11, 1018b. in: Schwarz, 1970 p. 131). In the 14th century, Albert von Sachsen differentiated between evidence that deduces (*demonstratio a priori*) from causes

¹ “I shall therefore say that the *objectivity* of scientific statements lies in the fact that they can be *intersubjectively tested*.”

(reasons) effects (consequences), and justifications (*demonstratio a posteriori*) that move from effects (consequences) to the causes (reasons).

In his *Critique of Pure Reason (B)*, Kant initially defines the concept of “a priori” as “negative”: “Wir werden also im Verfolg unter Erkenntnissen a priori nicht solche verstehen, die von dieser oder jener, sondern die schlechterdings von aller Erfahrung unabhängig stattfinden.” (KrV 2 f.)² Kant later states a criterion for distinguishing between “a priori” and “a posteriori”: for him, “necessity” and (strict or limited) “generality” are the two (only) “positive” determinants of the a priori.

One specific characteristic of the second edition of the *Critique of Pure Reason (B)* is Kant’s distinguishing between *pure* and *non-pure knowledge a priori*: “Von den Erkenntnissen a priori heißen aber diejenigen rein, denen gar nichts Empirisches beigemischt ist.” (KrV 3)³ Accordingly, knowledge is *pure* if “nothing empirical is intermixed,” otherwise it is non-pure. In other words, a judgement is not pure if it contains terms that are “drawn from experience.” If, on the other hand, it only contains terms that are not “drawn from experience,” one can speak of a pure judgement. Kant emphasizes that a priori knowledge does not always have to be “pure.” Since this comment happens to be an addition to the second edition to the *Critique of Pure Reason (B)*, and no identical passage can be found in the first edition of the *Critique of Pure Reason (A)*, it can be assumed that such a distinction was not insignificant for Kant (cf. Cramer, 1985, p. 27). Kant regards the principle of causality as an example of “non-pure judgement a priori” (KrV 3).

3 Reinterpretations of the a priori

In the context of modern reinterpretations, a priori is used in definitions such as the following: what is presupposed in the formation of theory; presuppositions that enable certain explanations, derivations, knowledge and experiences in the first place, what is not based upon experience, what cannot be refuted by experience.

² “In the sequel therefore we will understand by a priori cognitions not those that occur independently of this or that experience, but rather those that occur absolutely independently of all experience.” (Kant 137) All English language quotes from Immanuel Kant are taken from the 1998 edition published by Cambridge University press.

³ “Among a priori cognitions, however, those are called pure with which nothing empirical is intermixed.” (Kant 137)

Sometimes the a priori is also understood in the sense of the following reinterpretations.

a) Genetic a priori

Konrad Lorenz interprets a priori realistically in the sense of a phylogenetically originated organ function, which (seen from a Darwinist perspective) developed in adaptation to environmental factors. Today, this approach is continued in evolutionary epistemology.

b) Relative a priori

This can be understood to mean older theories, principles from theories (frequently older, e.g. Galileo's principle of relativity) – which are of methodological value for establishing the theory that follows – or relatively stable components of a theory (e.g. in the sense of the theoretical center within the framework of the structuralist theoretical concept of J. D. Sneed and Wolfgang Stegmüller). (cf. Herrmann, 2012)

c) Pre-scientific a priori

This includes everyday experiences, the linguistic context, social and cultural framework conditions of a theory, but also instrumental (e.g. the bodies considered should be regarded as firm), (cf. Hübner, 1973 p. 120) judicial (e.g. criteria for the acceptance or the rejection of theories) (cf. Hübner, 1973 p. 120) or normative (e.g. simplicity, high degree of falsification) (cf. Hübner, 1973 p. 120) determinations.

Such empirical reinterpretations of the a priori (e.g. in the sense of evolutionary epistemology), however, leave open the Kantian problem of where scientific knowledge might receive its objective validity from if all rules were only empirically proven. The criticism of any empirical theory of knowledge can hardly be formulated better and more succinctly than by Kant himself:

“Denn wo wollte selbst Erfahrung ihre Gewißheit hernehmen, wenn alle Regeln, nach denen sie fortgeht, immer wieder empirisch, mithin zufällig wären; daher man diese schwerlich für erste Grundsätze gelten lassen kann.” (KrV 5)⁴

This also applies to attempts to interpret the a priori in the sense of norms of actions. Such attempts are confronted with the problem from which I take the certainty that corresponding

⁴ “For where would experience itself get its certainty if all rules in accordance with which it proceeds were themselves in turn always empirical, thus contingent?; a hence one could hardly allow these to count as first principles.” (Kant 138)

prescriptions (i.e. norms or instructions for actions) are suitable for producing functional measuring instruments with the desired properties, if I do not presuppose the principle of causality (e.g. in the form of “Whenever A is fulfilled, then I can also cause B).

4. The Fries-Nelson thesis

Jakob Friedrich Fries and the associated schools closely followed Kant’s apriorism. Leonard Nelson, the founder of the New Friesian School, stresses that a natural science free of metaphysics is a relapse into an lawless natural science (cf. Nelson, *Ist metaphysikfreie Naturwissenschaft möglich?* p. 273f.).

However, Nelson criticized Kant for having tried to prove the synthetic a priori principles for knowledge (cf. Nelson, *Über das sogenannte Erkenntnisproblem* p. 229). Such proof must have first premises whose certainty cannot again be based on a proof (cf. Nelson, *Über das sogenannte Erkenntnisproblem* p. 230).

Jakob Friedrich Fries had been able to show that reason was not empty, but contained a general and necessary regularity which was only repeated in the reflection (cf. Nelson, *Die philosophischen Grundlagen des Liberalismus* p. 34) Thus there could definitely be a knowledge a posteriori through which the knowledge would a priori only be discovered (cf. Nelson, *Typische Denkfehler* p. 214). This discovery procedure is the “dissecting method of critique” from Fries (cf. Nelson, *Über das sogenannte Erkenntnisproblem*, p. 329), in which the metaphysical principles (cf. Nelson, *Über das sogenannte Erkenntnisproblem*, p. 327) are to be made conscious.

Fries was accused of psychologism because of the assertion that the a priori can be recognized via a posteriori. Influence by Hegel, the philosopher Kuno Fischer compresses this accusation in his address as Prorector in Jena on *The Two Kantian Schools in Jena* (1862) with his well-known verdict: “What is a priori, can never be known a posteriori.” Leonard Nelson countered Fischer by claiming that the empirical character of the critique of reason does not contradict the “Apriorität der durch sie zu begründenden metaphysischen Erkenntnis” (Nelson, *Typische Denkfehler* p. 214).⁵ He reformulates Fischer’s dictum as follows: “Eine Erkenntnis a priori – denn nur Erkenntnisse können dieses Merkmal haben – kann nicht a posteriori erkannt werden” (Nelson, *Typische Denkfehler* p. 214).⁶ (Nelson, *Typische Denkfehler* p. 215) He emphasizes that the appearance of evidence is produced when “a

⁵ “ a priority of the metaphysical knowledge to be justified by it”

⁶ “An insight a priori – because only insights can have this characteristic – cannot be recognized a posteriori.”

priori” and “a posteriori” are thought of as exclusive characteristics. Admittedly, “knowledge a priori” could not be “knowledge a posteriori,” from which, however, it did not follow that knowledge a priori could not be recognized a posteriori – there could certainly be *knowledge a posteriori*, through which *knowledge a priori* was only discovered (cf. Nelson, *Typische Denkfehler* p. 215)

Fries and Nelson divide two different aspects of knowledge: the *question of validity* and the *question of discovery*. Later Hans Reichenbach drew the distinction between a context of discovery and a context of justification of scientific knowledge. The context of discovery is about empirical conditions under which scientific knowledge or scientific theories emerge or are found, whereas the context of justification focuses on questions of validity (presumably true, empirically proven, etc.).

If we translate the talk of a synthetic a priori into the language of today’s theory of science, one could say that it is about *minimal conditions of (not just inevitably human) knowledge par excellence*, i.e. a minimal set of conditions in order to be able to speak of knowledge at all. With regard to such minimal conditions for knowledge, the summary of the considerations of Fries and Nelson can be formulated in this way:

For the possibility of objective knowledge, a minimum set of general conditions (independent of the nature of the subject of knowledge) is necessary, which can be found by the analysis of the real processes of knowledge. (Fries-Nelson Thesis)

What belongs to these conditions? For example, this includes: the ability to distinguish a *world-for-myself (phaenomena)* from an independent *world-for-itself (noumena)*, the *ability to form invariants*, the ability to establish *causal connections* and *anticipate* the future, the notion of space and temporality, the *ego-consciousness*, etc.

5 Perspectives of a modern apriorism

Kant named essential minimal conditions for objective knowledge. However, the claim, of wanting to generate these with evidence can no longer be maintained today. This is the important significance of the Fries and Nelson Kant critique. The following considerations should illustrate that such conditions can be found in experience.

Kant's differentiation of all objects into *phenomena* and noumena remains fundamentally significant. This distinction can already be found in everyday thought in the separation between an "inner" and an "outer" world, a distinction that is problematic to the extent that the spatial itself is a subjective constructive principle belonging to the "inner" world (cf. Roth, *Das realen Gehirn und seine Wirklichkeit* p. 239).

Kant's central insight that, for example, a sensation called "red" can never be compared with noumenal objects in order to see that they have the same property, had a decisive influence on the development of internal realism (cf. Putnam, 1981 p. 63).

Another approach can be found with the Kantian concept of object. Kant's discussion of the concept of object is so general that it still applies to quantum theory itself (cf. Strohmeyer, 2014 p. 81). Correspondingly, Kant defines the concept of object as follows:

"Object aber ist das, in dessen Begriff das Mannigfaltige einer gegebenen Anschauung vereinigt ist. Nun erfordert aber alle Vereinigung der Vorstellungen Einheit des Bewußtseins in der Synthesis derselben. Folglich ist die Einheit des Bewußtseins dasjenige, was allein die Beziehung der Vorstellungen auf einen Gegenstand, mithin ihre objective Gültigkeit, folglich daß sie Erkenntnisse werden, ausmacht, und worauf folglich selbst die Möglichkeit des Verstandes beruht." (KrV 137)⁷

If one wants to follow this determination of an object *as a valid union of the multiplicity of given ideas for all subjects by a uniform rule*, then this interpretation even applies to a quantum-mechanical object (electron, atom, crystal, photon), which can be understood analogously as a uniform and objective rule for uniting different data observed.

One can argue in the same way in regard to Kant's concept of substance. According to the first analogy of experience, the *persistence of substance* means the *numerical preservation over time* (or *temporal invariance*). Apparently not even the simple forms of perception can manage without the formation of invariants: no animal could survive without recognizing certain objects or animals of the same species. In the formation of physical theory, the transcendental concept of substance returns in the form of conservation quantities (energy, momentum, angular momentum, etc.).

⁷ "An object, however, is that in the concept of which the manifold of a given intuition is united. Now, however, all unification of representations requires unity of consciousness in the synthesis of them. Consequently the unity of consciousness is that which alone constitutes the relation of representations to an object, thus their objective validity, and consequently is that which makes them into cognitions and on which even the possibility of the understanding rests." (Kant 249)

In chemistry, for example, the number of atoms in a chemical element that do not change during a chemical reaction can be thought of as the substantial, since the numerical value of this number remains unchanged.

As with the concepts of substance and objects, the principle of causality already plays an important role in everyday experience. If I burn myself with a flame, I causally connect the experience of pain with the flame. Moreover, when a flame is perceived, this provokes the *expectation of a new experience of pain occurs*. However, this does not yet fully explain the *expectation of a renewed pain experience*, since only the moment of the *identical and persistent* makes it possible for memory to produce the *expectation of the same* (the pain experience). (cf. Nelson, *Critical Philosophy of Nature*, p. 137.)

Without the concept of causality, it could be quite difficult to speak of a difference between *stable regularities* and an arbitrary (albeit expedient and economic) summary of facts of experience. Causal connections are ultimately descriptions of stable regularities in the behavior of real systems. Even empiricists such as Carnap, Popper and Quine simply cannot avoid assuming the existence of “regularities of nature.” (cf. Drieschner, 2000 p. 401) But precisely the prerequisite that “there must be regularities in nature” is a general and necessary condition for the possibility of knowledge; that is, what is rejected by modern empiricists, namely a *synthetic judgment a priori* (cf. Herrmann, 2012 p. 162).

According to Kant’s definition of causality, everything that happens presupposes something that is followed by a rule. For instance, (to take an example from classical physics), one can think of the movement of a billiard ball as the result of a ball striking it. But also in quantum mechanics a process, which is determined by the Schrödinger equation, is causal in the sense that a state $\Phi(r, t_2)$ always presupposes an earlier state $\Phi(r, t_1)$, which it follows according to a rule. The reaction processes in chemistry, in which chemical compounds are converted into others according to fixed rules, also correspond to this causal understanding.

However, Kant’s principle of causality is regarded as a prime example of a so-called non-pure synthetic judgement a priori, since the concept of “change” contained in it is empirical, i.e. stemming from experience.

This opens up the possibility of regarding natural laws, which ultimately formulate correlations between earlier and later states, as knowledge that belong a priori to the class of *non-pure synthetic judgements*. For laws of nature formulate precisely general and necessary conditions of the possibility of knowledge, and in doing so they fall back on empirical

concepts or have been abstracted from experience. Naturally, the claim to *general and necessary validity* of a natural law is *empirically not redeemable*, but this would not have to speak against it.

The quintessence of all these considerations can be formulated as follows: In order to be able to lay claim to the objective validity of knowledge, certain general and necessary premises have to be taken into account. Only in this way can knowledge be comprehensible for everyone, everywhere, and at all times. Such conditions are precisely the *synthetic judgements a priori*. According to the perspective represented here, they cannot be located in the realm of Platonic entities (for instance, in the context of Frege's logicism) nor are they relative truths (as for instance in the sense of Reichenbach, Heisenberg or Stegmüller), nor can they be equated with certain organ functions (as for instance in evolutionary epistemology); they must certainly be regarded as absolute, but they are closely connected with empiricism, cause it without being conditioned by it, are contained in it "all along" and can be discovered empirically.

With its modernization, however, Kant's transcendental philosophy undergoes a far-reaching change with which the beautiful "architectonics" of the Kantian system, which constituted its persuasiveness, are also lost. Moreover, the claim to unlimited generality and the necessity of synthetic judgements a priori remains an irredeemable postulate. Moreover, even a modern a priori has not yet found a sufficient answer to the question of where at all the border between phenomenal and noumenal world can be drawn.

However, even for today's philosophy there still remains the Kantian task, which Putnam suggests in the following words: "giving a sane and human description of the scope of reason." (cf. Putnam, 1981 p. 126)

Abbreviations

- KrV In this paper this refers to the 2nd edition of Critique of Pure Reason
- GS Leonard Nelson. Gesammelte Schriften. Ed. Paul Bernays et al. (Hamburg 1970–1977), Vols. I– IX.

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