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## IMMANUEL KANT'S 'EXPERIMENT OF PURE REASON'

*The paper exposes the specificity of Immanuel Kant's concept of the 'experiment of pure reason' as outlined in the preface to the second edition of his 'Critique of Pure Reason'. Kant considered the experiment of pure reason a synthetic method of metaphysics, which could be regarded as a scientific method if metaphysics were considered a genuine science of speculative pure reason. This method involves generating a conjecture that could catalyze a revolution in metaphysics and elevate it to an authentic science through which reason (Vernunft) can concisely describe the world, much like mathematics or natural science (physics). The essence of the experiment of pure reason is to distinguish between things as phenomena, that is, the objects of experience and understanding (Verstand) and things in themselves, which, although unknowable, give rise to the principle of the unconditioned that harmonises the parts of human cognition.*

**Keywords:** experiment of pure reason, heuristics, logic, mathematics, philosophy of science, physics, thought experiment.

The term 'thought experiment' was coined by the Danish scientist and philosopher Hans Christian Ørsted. The Danish philosopher and theologian Søren Kierkegaard and the Austrian physicist and philosopher Ernst Mach then adopted the term<sup>1</sup>. Mach popularised the term among philosophers, scholars, and scientists. Ørsted was inspired by Immanuel Kant's philosophy when he coined the term 'thought experiment', particularly the concept of 'experiment of pure reason', which only appears in the preface to the second edition of *The Critique of Pure Reason*. In this paper, *I will expose the specificity of Kant's concept of the 'experiment of pure reason'*.

The Preface to the second edition of *The Critique of Pure Reason* (1787), in addition to briefly summarising the main ideas of the book as a whole, actually represents Kant's philosophy of science. To some extent, in *The Critique of Pure Reason*, Kant attempts to answer the question, 'What makes science a science?', addressing the demarcation between science and non-science. *The Critique of Pure Reason* is usually considered to be either a work of epistemology or metaphysics. Here, I propose looking at *The Critique of Pure Reason* as a work on the philosophy of science. Kant's task was to establish metaphysics as a science or justify its scientific status (in fact, he failed in this endeavour).

According to Kant, one can speak of genuine science when it finds and follows its path ('the secure path of science', or 'sicheren Gang einer Wissenschaft' in German) [Kant 1967: 14; Kant 1996: 15], in fact, its method ('μέθοδος', or 'the path with (after)' in Ancient Greek). Natural science, for example, finds its way when it acquires the experimental method, according to Kant. Until science finds its secure path, it will continually reach dead ends or return and start again. Without a secure method, science is doomed to proceed by trial and error. Until science finds its method, I would argue that it must rely on so-called 'trial and error' (which

is not a real method of acquiring knowledge but a heuristic device) and other heuristics. In other words, before developing its methods, science only works with heuristics and is not genuinely scientific. The presence of a scientific method characterises genuine science.

Kant provides several examples of how science has been successfully established on the secure path. The first example is logic. According to Kant, logic is the most fortunate of all sciences because it managed to find the secure path already in the time of Aristotle: "This is evident from the fact that since Aristotle it has not needed to retrace a single step, unless perhaps removing some of its dispensable subtleties, or setting it forth in a more distinct and determinate way, were to be counted as improvements of logic, even though they pertain more to the elegance of that science than to its being secure" [Kant 1996: 15]. At the same time, Kant believed that logic had reached perfection and could not be improved upon. Kant considered all attempts by his contemporaries to extend logic in anthropological, idealistic, metaphysical, psychological, or sceptical ways not as attempts to enhance and develop logic as a science but as distortions of logic due to the ignorance of these contemporaries [Kant 1996: 15–16]. For Kant, the boundaries of logic as a science were clearly defined and could not be violated: "We do not augment sciences, but corrupt them, if we allow their boundaries to overlap. But the boundary of logic is determined quite precisely by the fact that logic is a science that provides nothing but a comprehensive exposition and strict proof of the formal rules of all thought. (Such thought may be a priori or empirical, may have any origin or object whatsoever, and may encounter in our minds obstacles that are accidental or natural)" [Kant 1996: 16]. For Kant, genuine science is characterised not only by its scientific method but also by clearly defined boundaries: "That logic has been so successful in following the secure path of a science is an advantage that it owes entirely to its limitations. They entitle it, even obligate it, to abstract from all objects of cognition and their differences; hence in logic the understanding (*Verstand*) deals with nothing more than itself and its form" [Kant 1996: 16]. It shows that Kant did not accept scientific interdisciplinarity. One can imagine how he would have approached mathematical logic, which was, at least in its early stages of development, an algebraisation of Aristotelian logic – that is, an algebraic extension of formal logic.

Kant views logic as a propaedeutic – a preliminary to science [Kant 1996: 16] – and believes it should be employed to evaluate the knowledge gained by the sciences about objects [Kant 1996: 17]. Therefore, he uses logic to justify the possibility of metaphysics as a science. Reason uses logic in the sciences of objects, such as mathematics and physics (natural science).

According to Kant, mathematics and physics (natural science) are theoretical realms of reason. The theoretical realm of reason is a theoretical cognition by reason. It supposes simple determination of an object and its concept. Theoretical cognition, which is based on reason, is opposed to practical cognition, which realises the object [Kant 1996: 16–17]. Indeed, one can discern the influence of Aristotle's categorisation of all sciences as either theoretical or practical. Aristotle

included physics as the second philosophy and the mathematical sciences (arithmetic and geometry) among the theoretical sciences.

Kant says that “two [sciences involving] theoretical cognitions by reason are to determine their objects a priori: they are mathematics and physics. In mathematics this determination is to be entirely pure; in physics it is to be at least partly pure. but to some extent also in accordance with sources of cognition other than reason” [Kant 1996: 17].

As for mathematics, Kant argues that it found its secure path in Ancient Greece. However, this was not as straightforward for mathematics as it was for logic, which also found its secure path in Ancient Greece: “Rather, I believe that for a long time (above all, it was still so among the Egyptians) mathematics did no more than grope about, and that its transformation into a science was due to a revolution brought about by the fortunate idea (*glaciate Infill*) that occurred to one man during an experiment (*Verrucae*)” [Kant 1996: 17]. According to legend, this man was Thales, who realised that his task was not to study what could be seen in a geometrical figure, but to create a geometrical figure based on his a priori (pre-experienced), by concepts that he put into the figure and demonstrated through construction [Kant 1996: 17]. In other words, the revolution in mathematics was made possible by the invention (or discovery) of the constructive method by a certain ancient Greek (traditionally Thales). Thanks to this method, mathematics evolved into a genuine science.

The natural science became a proper science thanks to Francis Bacon's cognitive programme and the experiments of naturalists such as Galileo Galilei, Evangelista Torricelli and Georg Ernst Stahl: “What all these investigators of nature comprehended was that reason has insight only into what it itself produces according to its own plan; and that reason must not allow nature by itself to keep it in leading strings, as it were, but reason must – using principles that underlie its judgments – proceed according to constant laws and compel nature to answer reason's own questions. For otherwise our observations, made without following any plan outlined in advance, are contingent, i.e., they have no coherence at all in terms of a necessary law – even though such a law is what reason seeks and requires” [Kant 1996: 19]. In other words, Kant believed that the study of nature should be approached by reason using its principles, with which consistent phenomena can be aligned to have the force of laws, and by conducting experiments in accordance with these principles. According to Kant, natural science (physics) functions as a genuine science when principles are formulated and a plan is drawn up for carrying out empirical experimentation. This is the specificity of the scientific method of natural science (physics).

It is essential to point out that Kant emphasises that natural science (physics) arrived at such a method by a fortunate idea (*blocklike pinfall*) when it moved to probe [Kant 1996: 19], i.e., by trial and error, heuristically.

These examples illustrate Kant's view of the history of science and his philosophy of science. According to Kant, researchers in a given field of study (such as natural science, mathematics or perhaps logic) would explore different

approaches to solving specific problems (i.e., applying heuristics) until, through a stroke of luck (a fortunate idea or insight or educated guess or intelligent guess), they developed a reliable scientific method for solving these problems. This fortunate idea leads to a true revolution<sup>2</sup> in this field of study, as science takes the secure path and acquires clearly defined boundaries.

This vision of the history and philosophy of science is necessary for Kant to justify the possibility of metaphysics as a science. The problem with justifying metaphysics as a science is that, according to Kant, it is an isolated, speculative form of reasoning [Kant 1996: 20] that is not directly related to sensory experience and is carried out using concepts alone. Unlike the concepts of mathematics, which apply to intuitions, or the concepts of physics, which apply to sense experience, these concepts do not apply to anything. In some ways, metaphysics is similar to logic because understanding (*Verstand*) is circuted to itself. In metaphysics, reason (*Vernunft*) is also circuted to itself; therefore, one can speak of pure reason – reason without any impurities, such as the senses. However, the ‘pure’ understanding of logic is still understanding and thus deals directly with sensuality. The object of application of logic, among other things, therefore lies beyond reason.

The specific nature of metaphysics means that it is forced to either stagnate or return to the beginning and start again. However, Kant rejects the idea that it is fundamentally impossible to find a secure path for metaphysics, as nature has endowed the human mind with the desire to seek such a path [Kant 1996: 20]. According to Kant, in order to justify metaphysics as a science, it is necessary to look to mathematics and natural science as models and try to imitate them because of their similarity to metaphysics as reason-based knowledge [Kant 1996: 20].

Kant's argument continues as follows:

1. Previously, it was thought that all human knowledge had to correspond to objects. In such a case, the a priori establishment of something about objects by means of concepts simply did not work. In other words, reason did not function as it should. However, mathematics and natural science revolutions show that reason can work with objects as if they correspond to knowledge and cognition. Kant makes the fundamental assumption that objects must be consistent with our cognition. He draws an analogy with Nicolaus Copernicus here: “Having found it difficult to make progress there when he assumed that the entire host of stars revolved around the spectator, he tried to find out by experiment (*versuchte*) whether he might not be more successful if he had the spectator revolve and the stars remain at rest” [Kant 1996: 21]<sup>3</sup>. Kant says that “now, we can try a similar experiment (*ähnliche Weise versuchen*) in metaphysics with regard to our intuition of objects”<sup>4</sup> [Kant 1996: 21].

2. Kant does not understand how it would be possible to know something a priori about the properties of objects if intuitions were consistent with those properties [Kant 1996: 22]. In other words, I first experience the properties of objects and then contemplate them. Intuition is, therefore, part of a posteriori knowledge based on experience.

3. Kant conceives of the possibility of a priori cognition by assuming that the object, as an object of the senses, is consistent with the human faculty of intuition [Kant 1996: 22].

4. According to Kant, for intuitions to become cognitions, they must be attributed to something as an object, which must be determined by means of intuition [Kant 1996: 22].

5. In order for this to work, one of two assumptions must be made. The first is that the concepts by which I determine the object must be equal to the object, which leads to the quandary, 'How can I know anything about the object a priori if the concepts are tied to experience?' [Kant 1996: 22].

6. The second assumption as it follows: "The experience in which alone they (as objects that are given to us) can be cognized, conform to those concepts" [Kant 1996: 22]. This assumption does not lead to a quandary. Kant argues that experience itself is a form of cognition requiring the involvement of understanding (*Verstand*). A person must accept the rules of understanding (*Verstand*) before encountering objects. In other words, the rules for how the understanding (*Verstand*) should process sense data are established before the understanding (*Verstand*) encounters objects of sense. Therefore, Kant concludes that the rules of understanding (*Verstand*) are a priori in nature. This means that these rules must be expressed in priori concepts and that all objects of experience must be consistent with these concepts.

7. As regards objects that are conceivable by reason but cannot be given in experience (at least as reason conceives them), Kant says that attempts to conceive such objects can serve as an excellent 'touchstone' (*Proberstein*) for the following statement: "A priori, we can only cognise what we ourselves put into things (*Dingen nur das a priori erkennen, was wir selbst in sie legen*)" [Kant 1967: 21].

Kant considered the submitted reasoning to be a method that imitated the methods of natural scientists. According to Kant, this method involves 'looking for elements of pure reason in what can be confirmed or refuted by experimentation (*die Elemente der reinen Vernunft in dem zu suchen, was sich durch ein Experiment bestätigen oder widerlegen lässt*)' (Kant 1967: 21). Unlike in natural science, no experiment can be conducted with the objects of pure reason to confirm its propositions. Therefore, Kant suggests carrying out an experiment relating only to the a priori concepts and principles that have been accepted, which he explains as follows: "In that experiment we must arrange [to use] these concepts and principles in such a way that the same objects can be contemplated from two different standpoints: on the one hand, for the sake of experience, as objects of the senses and of the understanding (*Verstand*); yet on the other hand, for the sake of isolated reason that strives to transcend all bounds of experience, as objects that we merely think" [Kant 1996: 23]. This experiment will be considered successful "if it turns out that contemplating things from that twofold point of view results in harmony with the principle of reason, but that doing so from one and the same point of view puts reason into an unavoidable conflict with itself" [Kant 1996: 23]. It is this

experiment that Kant further and once refers to as ‘the experiment of pure reason’ (*Experiment der reinen Vernunft*) [Kant 1967: 22]. In other words, the method that Kant proposes for metaphysics as a science is the method of the experiment of pure reason.

According to Kant, using the method of experiment of pure reason should provide metaphysics with a secure scientific approach, as metaphysics concerns itself with a priori concepts according to which objects of experience can be defined. Using the method of the experiment of pure reason indicates a change in the way metaphysicians think, making it possible to explain how one can know things a priori and provide satisfactory proofs of the a priori laws underlying nature as a set of objects of experience [Kant 1996: 24].

However, as Kant emphasises, it must be taken into account that a strange and adverse result can be obtained from the a priori deduction of our ability: “With this power to cognize a priori we shall never be able to go beyond the boundary of possible experience, even though doing so is precisely the most essential concern of this science” [Kant 1996: 24]. The saving grace in such a situation is that an experiment by contradiction (*das Experiment einer Gegenprobe*) is conducted here, whereby the truth is tested by evaluating human a priori rational cognition [Kant 1996: 24]. According to this cognition, we can only know things as phenomena, or how things appear to us in experience, but not things in themselves, which exist independently of our perception of them.

Kant believes that the unconditioned causes us to go beyond experience and all phenomena [Kant 1996: 24]. It is the unconditioned that reason seeks [Kant 1996: 24]. However, experience and phenomena are conditioned; they are a complete series of conditions [Kant 1996: 24]. The unconditioned are things in themselves which are not given in the experience of objects. The things in themselves unconditionally exist, and it is through this one cognises things as phenomena. Things in themselves are the realm of the supersensible. This realm is not accessible because things in themselves are unknowable. Hence, speculative reason is denied any advance in the supersensible realm. All that remains is an attempt to ascertain whether reason in its practical cognition cannot find the data for determining the transcendent concept of reason – the concept of the unconditioned (*transzendenten Vernunftbegriff des Unbedingten*) [Kant 1996: 24]. This attempt is the attempt of metaphysics to go beyond all possible experience using human practically possible a priori cognition. This means that speculative (pure) reason prepares an empty place by means of the method of pure reason’s experiment, a place which must then be filled by practical reason [Kant 1996: 24], for example, by means of ethics (the categorical imperative, for example, can be seen as an unconditional realized by practical reason). To put it another way: the pure speculative (theoretical) reason prepares a form to be fulfilled by practical reason.

Kant remarks that the experiment of pure reason is a synthetic method (*synthetische Verfahren*); that is, a method that expands and completes the data about the object: “The analysis of the metaphysician has divided pure a priori

cognition into two very heterogeneous elements, viz., such cognition of things as appearances, and of things in themselves. The [metaphysician's] dialectic recombines the two so as to yield agreement with reason's necessary idea of the unconditioned, and finds that this agreement can never be obtained except through that distinction, which is therefore [a] true one"<sup>5</sup> [Kant 1996: 25].

**In summary**, the following should be noted: the experiment of pure reason is the synthetic method of metaphysics, which can be considered a scientific method if metaphysics is regarded as a genuine science of speculative pure reason. The experiment of pure reason involves generating a conjecture – perhaps a fortunate one – that could spark a revolution in metaphysics, elevating it to the status of a genuine science through which reason (*Vernunft*) can understand the world, akin to mathematics or natural science (physics). The essence of the experiment of pure reason is to distinguish between things as phenomena – the objects of experience and understanding (*Verstand*) – and things in themselves, which are unknowable but give rise to the principle of the unconditioned that harmonises the parts of human cognition.

### Notes

<sup>1</sup> About *Tankeexperiment* and *Gedankenexperiment* of Hans Christian Ørsted and about *Gedankenexperiment* of Ernst Mach see, for example: [Helms 2022]. About *Tankeexperiment* of Søren Kierkegaard see, for example: [Helms 2018].

<sup>2</sup> Kant draws an analogy between a fortunate idea in science and a revolution. Although he does not use the term, Kant proposes his conception of a scientific revolution. According to Kant, the purpose of a scientific revolution is not to create a scientific theory that would become the core of a new scientific paradigm, as, for example, Thomas Kuhn suggested, but rather to establish a reliable scientific method that a particular field of study can employ. In other words, according to Kant, a scientific revolution is a methodological revolution.

<sup>3</sup> It is a famous 'Copernican turn'.

<sup>4</sup> "In der Metaphysik kann man nun, was die Anschauung des Gegenstands betrifft, es auf ähnliche Weise versuchen" [Kant 1967: 20].

<sup>5</sup> "Die Analysis des Metaphysikers schied die reine Erkenntnis a priori in zwei sehr ungleichartige Elemente, nämlich die der Dinge als Erscheinungen, und dann der Dinge an sich selbst. Die Dialektik verbindet beide wiederum zur Einhelligkeit mit der notwendigen Vernunftidee des Unbedingten und findet, dass diese Einhelligkeit niemals anders, als durch jene Unterscheidung herauskomme, welche also die wahre ist" [Kant 1967: 22].

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**Костянтин Райхерт**

### **«ЕКСПЕРИМЕНТ ЧИСТОГО РОЗУМУ» ІММАНУїЛА КАНТА**

Стаття присвячена розкриттю специфіки поняття «експеримент чистого розуму», запропонованого Іммануїлом Кантом у передмові до другого видання книжки «Критика чистого розуму». Кант розглядав експеримент чистого розуму як синтетичний метод метафізики, такий, що можна розглядати як науковий метод, якщо вважати метафізику справжньою наукою спекулятивного розуму. Цей метод передбачає висунення припущення, яке може привести до революції в метафізиці та зробити метафізику справжньою наукою, через яку розум зможе пізнавати світ, подібно до математики чи фізики (природознавства). Суттю експерименту чистого розуму є розрізнення між речами як явищами, тобто предметами досвіду та розсудку, та речами в собі, які, попри те, що є непізнаними, дають підґрунтя для принципу безумовного, що гармонізує частини людського пізнання.

**Ключові слова:** евристика, експеримент чистого розуму, логіка, математика, розумовий експеримент, фізика, філософія науки.

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