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Rereading Léon Brunschvicg.
Critical idealism and Russell's method of analysis

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Summary. The aim of this article is to re-read Brunschvicg's critical discussion of Russell's philosophy. We attempt to highlight the philosophical reasons behind Brunschvicg's distrust of logic, showing that in the final analysis his criticisms of Russell's logicism relate to the difficulties Russell faces in thinking about the application of mathematics to the sciences of nature.

Keywords. Brunschvicg, Russell, Duhem, neo-Kantianism.

§ — Introduction.

Léon Brunschvicg is one of those philosophers who gave Russell's philosophy and logic a critical reception in France. Les *Étapes de la philosophie mathématiques*, as we shall see, thus regard the Principles as the latest avatar of the fundamental philosophical error of pursuing a " 'false ideal' of universal and absolute deduction"[(1)]. In contrast, les *Étapes* and *Human Experience and Physical Causality* set out a philosophy of the history of science, its progress and the renewal of its methods. However, judging by the posterity of the two men, it would seem that history has largely decided in favour of Russell over Brunschvicg. Even in France, Brunschvicg's position is not glorious, and Vincent Descombes's investigation in *Le même et l'autre* opens with the younger generation's rejection of the old master's teaching[(2)].

The point of studying Léon Brunschvicg would therefore seem to be essentially historical. A recent book on the subject presents him as one of the key figures in the history of twentieth-century French philosophy[(3)]. A glance at the list of philosophers who attended his lectures at la Sorbonne, or who defined their philosophical project in relation to his, suffices to give one an idea of his general influence: Bachelard, Cavaillès, Gueroult, Merleau-Ponty, Gusdorf, Hyppolite and others. As far as French philosophy's relationship with so-called analytic philosophy is concerned, Brunschvicg's disdain for "logistics" may have been responsible for a certain reticence[(4)].

The idea that it is possible to reread with profit someone who has earned himself a veritable reputation as a mandarin — for example by attributing a mental age of seven to Aristotle or by judging Lévinas's accent incompatible with the agrégation de philosophie[(5)] — immediately comes up against a number of objections. First of all, as far as the history of logic is concerned, Alonzo Church notes in his review of the 2^{e} edition of Les *Étapes de la philosophie mathématique*

[(1)] Brunschvicg, Léon. *The Stages of Mathematical Philosophy*. A. Blanchard. Paris, 1972, p. 411.

[(2)] Descombes, Vincent. *Le même et l'autre*. Minuit. Paris, 1979, p. 17.

[(3)] See the introduction by Terzi, Pietro. *Rediscovering Léon Brunscvhicg's critical idealism. Philosophy, History and Science in the Third Republic*. London-New York: Bloomsbury, 2022.

[(4)] Soulez, Antonia. "La réception du Cercle de Vienne aux congrès de 1935 et 1937 à Paris ou le 'style Neurath"'. In *L'épistémologie française 1830-1970*, Michel Bitbol and Jean Gayon (eds), pp. 31-66. Science & Philosophie. Paris: Éditions matériologiques, 2015, p. 47.

[(5)] Terzi, *op. cit.* pp. 210 and 128.

that, as the author's documentation stops in 1912, the book is only of historical interest[6]. Clearly, a century later, the scientific informations on which Les *Étapes* or *L'expérience humaine et la causalité physique* rely are no longer as up-to-date as they might have been at the time. It should also be added that Brunschvicg's method in the history of science may seem too monumental and teleological today in many respects — although it should be remembered that he rejected the title of historian of science. Worse still, a large part of his philosophical work is devoted to discussions of several philosophers who, it would be no exaggeration to say, have not established themselves as key figures in contemporary philosophical thought: Hamelin, Rauh, Milhaud, le Roy, Meyerson, Boutroux and so on. Finally, his idealism seems to border on the absurd when he asserts that "the history of Egypt [...] presupposes before it the history of Egyptology"[7].

Having recalled these elements, there are at least two — closely related — reasons for thinking that it is still possible to read Brunschvicg with profit today. The first is that Brunschvicg's criticism of Russell does not simply amount to an unmotivated rejection of logic — the value of which, as we shall see, he acknowledges. His criticisms are philosophical and concern the method of analysis, which is why, in essence, Brunschvicg's objections to the *Principles* go beyond the scope of Russell's work, and thus acquire a more general scope. Fundamentally, the latter would necessarily lead to a form of scepticism incapable of understanding the workings of the natural sciences and, surprisingly, Brunschvicg detects an "analogous inspiration"[8] in Russell's method of analysis and in the famous thesis defended by Duhem. However, given the popularity of the theses of the author of *Physical Theory,* particularly since their recovery by Quine, we have a second reason to believe that Brunschvicg's texts are not solely oriented towards the nineteenth century.

Finally, before getting to the heart of the matter, let us make it clear that Brunschvicg's radical idealism is not necessarily as absurd as it might first appear. In fact, a number of texts lay claim to a genuine empirical realism and castigate pragmatism or philosophers that are inclined to drive a wedge between reality and our

[6] Church, Alonzo. Les *Étapes de la Philosophie Mathématique* by Léon Brunschvicg. *The Journal of Symbolic Logic* 13, nº 4, 1948, p. 216.

[7] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 520.

[8] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 85.

knowledge of it. The aim is to understand the real significance of Brunschvicg's critical idealism when his realist claims are taken seriously[9].

In order to carry out this programme, we will start from the criticisms that Brunschvicg and Russell exchanged in order to determine their exact scope (I). It will then be possible to trace the real disagreement back to Russell's approach to mathematics through the method of analysis (II). We will then examine the nature of the link that Brunschvicg establishes between Russell and Duhem to identify the erroneous conception of experience that constitutes, in the eyes of the French philosopher, the heart of the problem (III).

§ 1. — Brunschvicg's critique of logistics.

Brunschvicg was never interested in Russell's intellectual development and always stuck to the philosophy of the *Principles*. It is therefore necessary to identify the theses of this text that he criticizes, to determine whether these criticisms reach their target in 1903, and in the rest of the work. In order to pinpoint the disagreement between Brunschvicg and Russell, we need to list the principles on which Russell's first philosophy is based. There are five of them[10]. The principle of external relations asserts that a logic of relations is necessary for the logicist project of reconstructing the totality of mathematics on the basis of strictly logical notions. In metaphysical terms, this amounts to saying that relations have an existence in their own right, irreducible to their foundation in the terms they link. The second principle is that of analysis, which aims to reconstruct knowledge on the basis of the fundamental notions that make it possible to account for it. The third principle, which Russell attributes to Moore, is that of realism, which asserts the independence of the cognitive content of propositions from the mind in which they are thought. The principle of logico-grammatical parallelism, which Russell soon abandoned, asserts that each term in a sentence — with the exception of the denotative terms *a*, *every*, *any*, *all* and *some* — has a corresponding meaning.

[9] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. VII.

[10] We borrow this reconstruction from Vuillemin, Jules. "Can a Frenchman still understand philosophers from across the Channel?", Baptiste Mélès (ed). *Les Études philosophiques* 1, n° 112, 2015, pp. 9-30.

Finally, the principle of parsimony states that we should not multiply entities unnecessarily. When it is possible to reconstruct an entity from more fundamental notions, it is then possible to dispense with the entity thus reconstructed. The aim is then to apply the method of analysis to determine the ultimate constituents of reality.

In the new logic, Brunschvicg made a clear distinction between its philosophical uses and its purely technical interests. Peano's work — which was so important to Russell — came at the end of a process of increasing rigor in mathematics throughout the 19th century. Thus, les *Étapes de la philosophie mathématique* agree that when Peano "rewrites mathematics in this way" he is "rethinking" them[(11)] and the reason why this rewriting is necessary is internal to the field of mathematics. It is therefore a logical reflection motivated by a technical problem that does not bother Brunschvicg. On the other hand, this strictly mathematical motivation seems to be overshadowed in Russell by other considerations. As Dufumier pointed out to Brunschvicg, "Russell's dogmatism lies above all in doctrinal exposition" and since he is content "to record results" the reader is kept far from the "research" which, in fact, makes them so valuable [(12)]. Brunschvicg replies that the problem with logicism lies in the fact that it "places its point of departure in the highest generality"[(13)], which prevents it from understanding what is going on inside mathematics. Solving a problem has nothing to do with stating *a posteriori* the notions from which the notions involved could be formulated. "Symbolic logic, intervening like poetic art after the spontaneous works of genius, can only consecrate victory or record defeat"[(14)]. The attempt to reduce the totality of mathematics to logic would therefore seem to be only philosophical, or at least not mathematical in the strictest sense of the term. This is how the "transition from the method of logistics to its system"[(15)] takes place. The materials used by both are identical, but the objectives are different. Brunschvicg's rejection of one does not necessarily include a rejection of the other.

[(11)] Brunschvicg, Léon. *The Stages of Mathematical Philosophy*. A. Blanchard. Paris, 1972, p. 381.

[(12)] Brunschvicg, Léon. *Écrits philosophiques, tome III : Science-religion*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1958, p. 91.

[(13)] *Ibid*, p. 102.

[(14)] Brunschvicg, Léon. *The Stages of Mathematical Philosophy*. A. Blanchard. Paris, 1972, p. 426.

[(15)] *Ibid*, p. 381.

> I believe, however, that if Mr. Russell had not begun by "swallowing whole" Moore's realism, if he had not transformed specific and generic ideas into self-sufficient entities, he would never have considered the advent of Cantor's theories, or the identification of logic and mathematics, as the great events of the century. [...] It is only fair to add that these observations are not aimed at Mr Russell's work in the strict sense of logic: I apologized, when I finished my book on logistics, for not having had the opportunity to say enough about the admiration I felt for this work. You have given me the opportunity to repeat this apology, and I take it with alacrity[16].

Moore's realism is the natural complement to Russell's logicism. It allows him to conceive of the primitive notions of logic in a realistic way and then, through analysis, to extend this realism to the whole of mathematics — if not even mechanics in the last part of the *Principles*. For Brunschvicg, this is the philosophical error par excellence. It consists in constructing a philosophical system on the basis of the state of knowledge of a given epoch and granting this construction an eternal value. In his historical works, which aim to determine the metaphysics of each philosophers on the basis of their conception of science, Brunschvicg associates Aristotle's doctrine of the incommunicability of *genus* with the distinction maintained by the Greeks between geometry and arithmetic, the Cartesian doctrine of clear and distinct ideas with his algebra, and Kant's critical philosophy with Newtonian mechanics. Then there is the question of sorting the wheat from the chaff within each of these works. To the philosophical tendency to build systems, les *Étapes* oppose a philosophy grounded on the insight that the methods of science are constantly being renewed, so that the very idea of ultimate categories of reality must be abandoned. Philosophy must become "immanente to science, with the aim of becoming aware of what intelligence and truth have been incorporated into it"[17]. It is therefore easy to understand the distinction between logistics taken as a method and logistics considered as a system, and the rejection of Moore's realism. In Brunschvicg's strictly historical perspective, there is little point in trying to fix the meaning of certain

[16] Brunschvicg, Léon. *Écrits philosophiques, tome III : Science-religion*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1958, pp. 93-94.

[17] Brunschvicg, Léon. *The Stages of Mathematical Philosophy*. A. Blanchard. Paris, 1972, p. 426.

terms definitively. It would then be possible to oppose a dynamic philosophy of history to a dogmatic and fixed logicism.

With regard to the definitive nature of the analysis and the possibility that the philosopher could go back to primitive notions, it should be noted that this is a thesis that Russell quickly abandoned in the course of his philosophical career, as Brunschvicg knew[18]. Thus, when he defended logical atomism, there was no longer any question of logical atoms, which should necessarily be located at the most fundamental level of reality, as the biological metaphor shows:

> What are taken as unanalysed units in one stage are themselves exhibited as complex structures in the next stage. The skeleton is composed of bones, the bones of cells, the cells of molecules, the molecules of atoms, the atoms of electrons, positrons, and neutrons; further analysis is as yet conjectural. Bones, molecules, atoms, and electrons may each be treated, for certain purposes, as if they were unanalysable units devoid of structure, but at no stage is there any positive reason to suppose that this is in fact the case[19].

In short, Russell's method of analysis does not necessarily go hand in hand with the project of a complete and definitive analysis. Consequently, of the five principles identified by Vuillemin, it is the principles of analysis and parsimony that will have the greatest importance in the Russellian corpus, to the detriment of the others. Brunschvicg's criticism therefore seems to miss its target, if not to affect only the *Principles*. Once the non-definitive nature of the analysis has been accepted, Russell seems, *a priori,* to be in a better position to take charge of the renewal of scientific methods that history manifests. On the other hand, he interprets analysis realistically, and nothing is more alien to him than the Kantianism advocated by Brunschvicg. For Russell, realism was the only way of taking science seriously and escaping scepticism, and Kantianism, which he always considered as some form of psychologism, never found favour with him. The first step is to examine the way in which the question of realism pits the two philosophers against each other, and then to ask whether admitting the provisional nature of analysis allows Russell to escape Brunschvicg's criticisms, or whether the latters have simply lost any relevance.

[18] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 152.

[19] Russell, Bertrand. *My Philosophical Development*. London: Unwin Books, 1975, p. 165.

§ 2. — Areas of disagreement: analysis and empiricism.

If it is not possible to oppose Brunschvicg's dynamic philosophy to Russell's static approach, then it seems that the reference to Kant could constitute another way of approaching the question. The reference to Moore, decried by the French philosopher, was in fact a critical tool against all forms of idealist philosophy at the beginning of Russell's philosophical career. If we now turn to the very end of Russell's intellectual career, the criticism of Kant is still present. In the introduction to *Human Knowledge,* Russell declares that we should start from the results of the natural sciences, disregarding any prejudices that might arise from adherence to any epistemological theses[(20)]. The point here is to criticize Kantianism, in which he sees not a Copernican revolution but a "Ptolemaic counter-revolution" that restores the anthropocentrism that Copernicus had dispelled[(21)]. If human knowledge is always rooted in subjective experience, insofar as the results of the natural sciences are presented as objective, it is up to the philosopher to understand the way in which this objectification takes place. There would then be a contradiction between the Kantian conception of the subject and the fact of science. However, there is a sense in which it is possible to say that Brunschvicg's Kantianism is not directly opposed to Russell's realist intuitions. Russell contrasts the specular conception with the pragmatist conception of the mind[(22)]. Both options point to something correct: the mind reflects facts and, insofar as facts generate habits, the subject is active in finding out what general relationships facts have with each other. However, this distinction is resolved in favor of the specular conception insofar as knowledge is irreducible to behavior, so that it is possible to say, somewhat bluntly, that this activity of the subject is of interest, from the point of view of truth, only insofar as it enables real relationships to be brought to light[(23)]. Russell's rejection of idealism, in the name of the natural sciences, is therefore complete.

Yet *Human Experience* repeatedly affirms the thesis that "transcendental idealism does not exclude empirical realism"[(24)].

[(20)] Russell, Bertrand. *Human Knowledge — Its Scope and Limits*. Philosophical Texts. Paris: Vrin, 2002, p. 31.

[(21)] *Ibid*, p. 34.

[(22)] *Ibid*, pp. 457-8.

[(23)] *Ibid*, p. 138.

[(24)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 307.

Brunschvicg's interpretation of Kant is not an isolated one. Russell's accusation of anthropomorphism would then depend on an erroneous psychological interpretation of Kant that misses its target. However, it is important to understand how Brunschvicg manages to conceive the subject's activity without falling into psychologism and abandoning empirical realism.

> Kantian idealism does not form a couple with realism. It does not respond to the solution of an alternative whose two terms are determined in the abstract by their mutual opposition. In fact, whereas realism stops at the appearance that makes being the object of an immediate presentation, transcendental idealism sees this presentation as the product of an elaboration which, in order to be understood, requires us to penetrate into the depths of the activity proper to the knowing subject. We will cease to compare the mind to a mirror, to ask it for a faithful image of being in itself. The object of knowledge bears the imprint, impossible to eliminate, the definitive mark, of the original activity that constitutes it as an object[(25)].

The solution is to reject the alternative, on which Russell's critique is fundamentally grounded: it is not a question of asking whether such and such an object exists in consciousness or in a world that is external to the subject. If the debate were posed in these terms, Brunschvicg's position would simply be contradictory. When, during a session of the *Société française de philosophie*, Dominique Parodi opposed idealism on the grounds that the mind "comes up against heterogeneous matter" that forces it to question itself and develop new theories, Brunschvicg did not take this remark as a major objection[(26)]. The real terrain on which Brunschvicg's philosophy, which he presents as the "intellectual awareness of knowledge"[(27)], should be read is that of the history of science. On the other hand, in the field of common experience, critical idealism seems to limp along, as when it leads its defender to assert that *autrui* "is a piece in the system of my judgements of

[(25)] *Ibid*, p. 301.

[(26)] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 289.

[(27)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 318.

existence"[28]. To which his interlocutor is at liberty to reply: "I do not admit in any way that I can be reduced to a judgement of the existence of Mr Brunschvicg's consciousness"[29].

On the theoretical level, then, both philosophers agree that the subject is active to a certain extent. On the other hand, Brunschvicg emphasises the fact that this activity produces *sui generis* realities throughout history. Reducing this creativity to the application of an *organon* — such as Mill's *Logic* or the postulates that Russell would later set out in *Human Knowledge* — is futile[30]. To take one example, when Jean Perrin compiled the evidence for molecular reality, and began by stating the "law of definite proportions" according to which "the proportion in which two elements combine cannot vary continuously"[31], he was working, on the one hand, with data that were intelligible only insofar as they had been developed through experimentation and, on the other, he conceived a new way of fitting them into a theory — by detecting the existence of a discrete phenomenon in a reality that seemed continuous. This makes it possible to give meaning to the seemingly absurd idea that "the existence of nature as a unity of interrelated phenomena depends on thought"[32]. The very formulation of a problem presupposes terms that have meaning only for the mind, and leads to the creation of a new entity — the theory — which is itself irreducible to the data of the situation that gave rise to it. To reinterpret this idea by arguing that any theoretical activity presupposes a background theory is completely foreign to Brunschvicg's philosophy, and in fact presupposes a conception of experience that he rejects, as we shall see. In short, it is not a question of placing nature under the dependence of the mind, but of recognizing the existence of a type of reality specific to theoretical constructions.

It therefore seems possible to understand how it is possible for Brunschvicg to argue without absurdity against Russell that critical idealism is a form of empirical realism. The question that then arises is what kind of reality should be accorded to these theories,

[28] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 321

[29] *Ibid*, p. 327.

[30] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 77.

[31] Perrin, Jean. *Les atomes*. Champs sciences. Paris: Flammarion, 2014, p. 43.

[32] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 301.

which, although produced by the subject, do not call empirical realism into question. Before going any further in this direction, let us take a diversion, for while Russell accuses idealism of being incapable of explaining how science works, Brunschvicg returns the accusation. Thus, Russell's conception of mathematics would necessarily lead him to establish a gap between reality and the theories supposed to represent it — and to miss the important lesson of Kantianism. The preface to *Human Knowledge* formulates the problem that will occupy the author: understanding how important theories can be developed from the very poor empirical basis available to us[33]. This discrepancy between the poverty of the data and the importance of the speculative construction then lead Russell to consider the intrinsically conjectural character of all theoretical knowledge[34]. This small dose of scepticism is, however, in his eyes, in complete accord with the empiricism he professes elsewhere.

This position is opposed to the Kantian thesis that theories make it possible to arrive at "a necessity [...] in which the proper character of reason is recognised"[35], which cannot be reduced either to probable knowledge or to logical necessity. Brunschvicg locates the origin of this disagreement with Russell in the latter's philosophy of mathematics. Russell would have conceived of mathematics and reality as two different types of heterogeneous entities, comparable to Aristotelian form and matter, so that the development of an abstract mathematical theory from experience could only be conceived as a distancing from the empirical basis[36]. The heart of the matter is the principle of analysis. According to this principle, entities must be reconstructed using the resources of logic. To use Brunschvicg's Aristotelian notions, it is a matter of going back to the order of science to find the order of things, to go back from the natural integers to the logical notions, or from a science to its fundamental notions. Once the analysis has been completed, the philosopher is faced with a Cornelian dilemma that faced the mechanics of the nineteenth century[37]. The first option is to grant

[33] Russell, Bertrand. *Human Knowledge — Its Scope and Limits*. Philosophical Texts. Paris: Vrin, 2002, p. 31.

[34] *Ibid*, pp. 36 and 543.

[35] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 59.

[36] *Ibid*, p. 468.

[37] *Ibid*, p. 440.

the first principles of a science — mechanics in this case — the status of rational evidences, and thus to follow Lagrange, who considered that his *Mécaniqe analytique* constituted a propoer chapter of Analysis. The second is to declare that mechanics is an empirical science and to deny the rational specificity of these principles, thus creating an unbridgeable gap between experience and theoretical constructs. The natural sciences are thus struck by an irreducible contingency. It should be noted that between the two branches of the dilemma there is no place for the specifically Kantian solution of real necessity. In Brunschvicg's view, this is obviously a false dilemma, and the virtue of Kantianism is that it avoids it.

> Until the Kantian critique, philosophy was condemned to oscillate between two conceptions equally inadequate to the fruitfulness of modern thought: Hume's psychological atomism and Wolff's scholastic panlogism. From our point of view, we should say even more. The uncertainty and confusion created by the divergent paths taken by Leibnizian thought did not cease with Kantianism; quite the contrary. In Kant himself, the spirit of critical reform was altered to the point of allowing either a return to a system of conceptual and ontological hierarchy at the same time, or a return to a representation of isolated and discontinuous elements[(38)].

It should be noted here that the two conceptions reflect each other. Conceiving of the sciences — whether natural sciences or mathematics — through the prism of analysis leads us to question the status of primary notions in their relation to reality. Now, insofar as the natural sciences are obviously not *a priori*, it seems necessary to consider that the application of mathematics to nature has something contingent about it. The conception of analysis and experience are therefore two sides of the same coin. The Aristotelian dualism of the form of matter is found in "the disproportion between knowledge of a world that appears endowed with a stable organisation and the bare form of affirmation that

[(38)] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 17.

is like the root of perception"[39]. The key to Brunschvicg's critical idealism lies in his rejection of the idea that experience should be conceived as something radically heterogeneous to thought in favour of "human experience", which gives its title to his book on physics. Nature is not a fundamentally irrational entity that resists thought. Experience itself already possesses a form of unity that a philosophical approach that proceeds by analysis dissolves at its peril.

> Causality cannot be compared to a rope that can be grasped and drawn before being rolled around the parcels it is used to unite, because causality in no way has the function of linking objects that have already been given. It is exercised by an act of linking that will give the objects, without the linking and the object being able to be considered and represented separately[40].

What makes Brunschvicg's thesis counterintuitive is nothing other than the ease with which it is possible to consider mathematics as a hypothetico-deductive system on the one hand, and brute experience on the other. Once the two are separated, the question of how one applies to the other necessarily arises, leading to the two antagonistic conceptions mentioned above. Our two authors both claim the title of realist. For Russell, Brunschvicg's realism is simply not a realism — or rather, it is incomprehensible — whereas for Brunschvicg, Russell's realism is naive and leads him to an erroneous conception of experience. It would seem, then, that there is a deeper disagreement between the two philosophers on the question of analysis, and that this disagreement should be assessed by examining the relationship between the natural sciences and the experience that is supposed to follow from them. In this way, it will also be possible to clarify the nature of the empirical realism that Brunschvicg claims.

[39] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 468.
[40] *Ibid*, p. 468.

§ 3. — Duhem and Russell, their "common inspiration".

Brunschvicg states on several occasions that there is a "common inspiration" between Russell and Duhem[41], that is to be found in the essentially deductive conception of mathematics that they share. In the case of Russell, we have seen that Brunschvicg attributed his conception to the method of analysis that he adopted. As far as Duhem is concerned, it is necessary to reformulate his thesis to understand where this conception of mathematics operates. In short, physical theories do not refer to reality directly but via a set of necessarily approximate measurement results. Consequently, a physical theory is a symbolic construction that makes it possible to systematise a body of information in the simplest possible way. What's more, a physical theory always involves a large number of factors, so that in the event of an experimental setback, it is not necessarily possible to pinpoint the problem.

> Physics is not a machine that can be taken apart [...] The watchmaker who is given a watch that doesn't work separates out all the cogs and examines them one by one until he has found the one that is faulty or broken; the doctor to whom a patient is presented cannot dissect him in order to make his diagnosis; he has to guess at the seat of the illness simply by inspecting the effects produced on the whole body; it is the latter, not the former, that the physicist charged with straightening out a flawed theory resembles. *Experimentum crucis* is impossible in physics[42].

Duhem's thesis has two sides. On the one hand, crucial experience is impossible. On the other hand, theories are underdetermined by sensible experience, so that a plurality of theories can correspond to each set of observations. Given a series of observations represented by a cloud of points, it is possible to pass a plurality of curves in the vicinity of all these points. Although Russell does not generally cite Duhem, he does use an example in the same vein in *Human Knowledge.* The argument consists of maintaining that it is possible, with the help of Fourier series, to propose

[41] See Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 85 and *L'Expérience humaine et la causalité physique*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 452.

[42] *Ibid*, quoted on p. 442.

a theory that simulates the results already obtained by a theory but predicts radically divergent new results[43]. There is therefore nothing to say whether the world is governed by the laws exhibited so far or by these divergent laws that it is possible to formulate. Russell thus agrees with Hume's conclusions and gives probability to the information provided by the laws[44]. In a sense, both arguments amount to relativising human knowledge of the world by pointing out the possibility that it is in fact constituted in a radically different way from what our theories say. In both cases, there is something formally irreproachable about the analysis: it is always possible to find competing theories. How are we to understand Brunschvicg's comparison between Russell and Duhem? Both arguments focus on the fact that there is a plurality of mathematical entities that can account for the information we have and add another set of predictions of their own. This amounts, in short, to introducing a distance between the world and the theory. Since the principles of the theory cannot be *a priori*, they must be *a posteriori*, and there must therefore be an element of arbitrariness in the choice of theory.

For Brunschvicg, the drama of Kantian philosophy torn between Wolff's panlogism and Hume's empiricism is replayed in Russell's philosophy[45]. However, the letter of Kant's solution, which is bound up with Aristotelian logic and the frameworks of Newtonian mechanics, cannot serve as a remedy for Brunschvicg[46], he chooses another path, which has several complementary facets. First of all, it should be noted that his solution does not claim to be able to confer on theories a greater certainty than that conferred by empiricism. In both cases, it is a question of betting on the future on the basis of information from the past, and there is no rational argument to show that it would be contradictory and logically impossible for the laws of nature to suddenly change[47]. Between the indubitable truth and the contingency of experience, there is nevertheless a place for Kant's real necessity.

The first aspect of Brunschvicg's thesis lies in the field of psychology. He opposes the atomism of the fact of consciousness, the

[43] Russell, Bertrand. *Human Knowledge — Its Scope and Limits*. Philosophical Texts. Paris: Vrin, 2002, p. 514.
[44] *Ibid*, p. 35.
[45] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, pp. 451-2.
[46] *Ibid*, p. 452.
[47] *Ibid*, pp. 65-66.

idea that experience is devoid of any structure, with a psychology of judgement[48]. There is no such thing as brute experience, and to experience something is to judge that something exists. If it is then possible to analyse and separate *a posteriori* what the judgement links, such a philosophical analysis always runs the risk of being arbitrary. The opposition of raw experience and theory is a by-product of the method of analysis, as can be seen from the fact that the simple delimitation of an *explanandum* already constitutes a conceptual elaboration in itself.

The second aspect that particularly sets him against Duhem is his rejection of the distinction, underlying his thesis, between symbolic mathematical construction and judgement of existence. The thesis of *Physical Theory* depends on the opposition between these two notions, which allows its author to reduce the ontological value of theories. The domain of truth seems to be reserved for judgements of existence, of which everyday life provides paradigmatic examples, whereas theoretical principles, whose function is to systematise data that are already mathematical, can only said to be practical. Historically, this distinction has been embodied in the distinction between the mathematical astronomer and the physicist, who is responsible for finding the causes[49]. In contrast, Brunschvicg argues that rationality makes it possible to determine what really exists. This idea underpins the history of science, and in particular the Copernican revolution. To use Brunschvicg's favorite example, there are not two suns, the one of sensible experience, which measures a foot in diameter, and the one whose nature is revealed by reason[50]. Idealism requires us to choose between intelligence and sensibility. This is not an absurd idealism, and there is something trivial about the remark. On the other hand, it does make it possible to question the way in which common sense uses the term 'exist' or the notion of causality. The Cartesian revolution, hailed by Brunschvicg, consists of a "transfer of evidence" from the sensible to the intelligence[51]. In both cases, if we are to trust rationality — which is embodied in the history of science —

[48] *Ibid*, p. 466.

[49] *Ibid*, p. 172.

[50] Brunschvicg, Léon. *The Progress of Consciousness in Western Philosophy*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1927, p. 204.

[51] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 7.

it makes no sense to look to ordinary discourse for a way to question what the natural sciences are achieving. The true meanings of causality and existence are revealed by mathematical physics. This does not, however, commit Brunschvicg to a kind of Pythagorean ontology. Such an interpretation would still depend on the error he denounces: it would mean continuing to consider as paradigmatic the objects of everyday experience, to judge mathematical physics on the basis of them, and to hypostasize numbers. This theoretical gesture is simply another form of anthropomorphism.

> [Langevin] has shown us admirably how, at the starting point, the images of vulgar representation and the simple forms of mathematics are supports for science, and how there comes a time when they abandon it, and turn into obstacles for those who persist in trusting them. And there is a profound reason for this: it is that neither the model of sensitive imagination, nor the ideal of mathematical expression, is homogeneous to itself; on both sides, we come up against a duality in the definition of what should be, either pure intelligence, or pure experience[(52)].

And Brunschvicg concludes by quoting Jean Perrin: "I think it is anthropomorphism to try to draw what happens inside a hydrogen atom". Basically, Duhem's thesis is based on establishing common experience as the norm of existence. If a theoretical construct deviates from this norm, it cannot claim to exist. It is important to note that while, at first glance, the atom — and the way in which it seems easy to represent it to us — may seem to satisfy the requirements of common sense, to be an entity like tables or chairs, this is not the issue for Brunschvicg. For his, there is no opposition between asserting that something is and grasping it by means of a mathematical construction. This dilemma is implicitly based, in Duhem, on the idea that mathematicians have to manipulate abstract ideas, which have no real consistency, whereas they enable us to understand the world by establishing "connections of intellectual relations"[(53)]. The impression that theoretical constructs are far removed from reality therefore depends on a misconception of

[(52)] Brunschvicg, Léon. *Écrits philosophiques, tome III : Science-religion*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1958, pp. 149.

[(53)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 167.

mathematisation and, more fundamentally, on a misconception of experience. The explanation, then, consists neither in inventing a mysterious entity, on the model of the objects of common sense, which would lie beyond sensible experience, nor in imposing an abstract mathematical schema on a restive reality — two symmetrical errors — but in linking together certain aspects of reality in such a way as to say what is. The empirical realism claimed by critical idealism finds its explanation here.

The third aspect of Brunschvicg's response leads him to associate Duhem and Russell insofar as the latter two conceive of mathematics solely from the point of view of deduction. After Hume, Russell was able to write that "facts, however numerous and well selected, never imply other facts"[(54)]. This is obvious, he adds, "to anyone who has grasped the nature of deductive arguments". Without going into the details of the argument, when B is deduced from A, it is logically contradictory for A to take place without B taking place. But it is never logically contradictory for two events to follow each other or not. In Russell's case, the deductions made within logic are therefore heterogeneous — as in Hume's case — to reality. This heterogeneity is also found in Duhem, in that the deduction allowed by a physical theory never reaches reality. Conversely, for Brunschvicg reality is not heterogeneous to the "ideal of mathematical expression". This does not, of course, mean that science is *a priori*. If the *explicandum* is no less intellectually rich than the *explicans*, it is possible to conceive of the development of a theory neither as the elaboration of deductive reasoning, which does not constrain an experience that escapes them, nor as a symbolic construction alien to the question of existence — nor even as the invention of *posits*, as Quine have conceived it. The distance between reality and theory disappears if the causal relation is conceived as a way of linking together the most significant features of reality. For Brunschvicg, Russell and Duhem missed this function played by mathematics.

For all that, Brunschvicg's rationalism does not claim to provide more logical guarantees for knowledge, and nothing is more alien to him than a naively dogmatic conception of the experimental method. He quotes approvingly Schuster when he write: "a theory is worthless if it cannot be shown to be false"[(55)]. This theme is

[(54)] Russell, Bertrand. *Human Knowledge — Its Scope and Limits*. Philosophical Texts. Paris: Vrin, 2002, p. 212.

[(55)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 446.

nevertheless marginal in his work. Yet it seems that his conception of experience allows him to reconcile a certain form of fallibilism with the idea of real necessity. In fact, when the mind judges the existence of an entity, it is affirming the existence of an already structured reality. It is then easy to see how even an erroneous theory captures certain real relationships. The question of theoretical error becomes dramatic when the existence of *posits* is thought of on the model of common sense entities, in which case the third-excluded applies, and an entity must be said to exist or not to exist. Brunschvicg's perspective does not prevent him from asserting the radical falsity of a theory. On the other hand, it does weaken the notion of truth, which is not a problem if the scientific enterprise is understood as a perpetual historical effort. The question of what science would be like at the end of its history leads back to the equivocation of common sense. "It is not philosophically acceptable for the human mind to be equipped to have the last word on things"[(56)].

So how did Brunschvicg understand Duhem's use of convenience? It is certain that conditions of simplicity come into play in the determination of a law and that empirical data do not univocally dictate which curve to choose. Brunschvicg's answer is twofold. The first is simply to admit part of Duhem's thesis, namely that conditions of simplicity come into play in natural sciences. On the other hand, this is not an argument against empirical realism. It only follows that "the notions to which the analysis leads and from which the synthesis will be based" are not "susceptible, I do not even say of an intrinsic justification, but of an intuitive representation, or even of a clear and distinct definition that would allow them to be isolated as elements"[(57)]. Duhem's criticism is in fact directed at a conception of physics that would have theories bring to light entities that would be like the bricks that make up reality, whereas intelligence does not proceed in this way[(58)]. Here again, the break between ordinary knowledge and mathematical knowledge plays a crucial role in Brunschvicg's construction. Finally, pragmatism cannot take advantage of this thesis either[(59)].

[(56)] *Ibid*, quoted on p. 392.
[(57)] *Ibid*, p. 600.
[(58)] *Ibid*, p. 129.
[(59)] *Ibid*, p. 433.

> Need I add that this is no concession to pragmatism either? Precisely because what pragmatism lacks, whatever form it takes, is the ability to recognise the specific character of reason, a speculative and disinterested function that carries with it a capacity for *internal* justification, for verification, in the full sense of the word[(60)].

The fact that the notion of "convenience" comes into play does not provide an argument for the pragmatist, insofar as "convenience is a relative, and one would like there to be convenience in itself"[(61)]. Against instrumentalist interpretations that would like to substitute the notion of convenience for the notion of truth, based on Duhem's thesis, Brunschvicg stresses the fact that the notion of simplicity that comes into play here — especially when theories reach a certain level of sophistication — refers to a strictly intellectual notion and only has meaning in relation to correlative notions, such as that of understanding, which only have value for the mind. While this *sui generis* notion of simplicity would require further elaboration, it is possible simply to underline the equivocality of the term when it is used to designate both the relationship of an individual to his or her environment and the choice of a highly speculative theoretical hypothesis.

It is impossible to suspect Russell of pragmatism, but this diversion brings us closer to a final point on which he and Brunschvicg were in total disagreement — at the time of *Human Knowledge* at least. Russell's last major text emphasises man's place in nature, particularly as regards the origins and development of his knowledge of the world[(62)]. Conversely, for Brunschvicg, the mind and its creativity manifests themselves in the history of sciences, which he sees as an argument in favour of a spiritualism that distinguishes man from the rest of nature. "Man is not a given"[(63)]. Perhaps the most profound opposition between the two philosophers lies in the fact that, when it comes to science, Russell reduces history to nature, whereas Brunschvicg sees it as the very essence of the human being and the foundation of his own spiritualism.

[(60)] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 98.

[(61)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 450.

[(62)] Russell, Bertrand. *Human Knowledge — Its Scope and Limits*. Philosophical Texts. Paris: Vrin, 2002, p. 543.

[(63)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, p. 642.

§ — Conclusion.

The discussion we have outlined is not yet a thing of the past. In his *Kant Lectures* (1999), Michael Friedman argued for a return to neo-Kantianism, which would make it possible to escape from the impasses of a philosophy of science trapped between Kuhnian historiography and its relativist avatars, and Quine's holism[(64)]. Although Michael Friedman does not seem to be interested in Brunschvicg's case, the latter's work is not far removed from these questions insofar as he discussed the theses of Duhem and Russell, which indirectly structure these debates. It is well known that in the *Logical Structure of the World* Carnap the project that Russell outlined in *Our Knowledge of the External World*, and that the theoretical projects of Quine and Kuhn were conceived in relation to their reading of Carnap's projects. It is therefore not surprising that Brunschvicg, who discussed both Duhem's and Russell's theses, was already discussing problems that interested Quine and Kuhn.

We have emphasised the role played by the comparison between ordinary knowledge and scientific knowledge in Russell's work. It is possible to show that Quine subscribes to a similar thesis.

> Considered relative to our surface irritations, which exhaust our clues to an external world, the molecules and their extraordinary ilk are thus much on a par with the most ordinary physical objects. The positing of those extraordinary things is just a vivid analogue of the positing or acknowledging of ordinary things: vivid in that the physicist audibly posits them for recognized reasons, whereas the hypothesis of ordinary things is shrouded in prehistory[(65)].

By considering theories from the point of view of their ontology, Quine in fact dismisses what, in Brunschvicg's eyes, is precisely what should hold the philosopher's attention. For Quine, physical theories are *more or less on* the same level as everyday entities; for Brunschvicg, the entire rationality of the sciences lies in this gap between science and common sense. It is therefore possible to

(64) Friedman, Michael. *Dynamics of Reason. The 1999 Kant Lectures at Stanford University*. CSLI Publications. California, 2001.

(65) Quine, Willard Van Orman. *The Word and the Thing*. Flammarion. Paris, 2010, p. 53 (emphasis added).

understand why Quine has no difficulty in considering that there is an analogy between the gods of Olympus and the *posits* of a theory, whereas such a comparison would be completely foreign to Brunschvicg. To consider a theory from the point of view of its ontology is to dismiss the conceptual ingenuity that underlies it and makes it rational.

It seems possible to compare the case of Quine with that of Mill, to whom Brunschvicg addressed the following criticism: the empiricism displayed in the *System of Logic* is only a façade, since when it comes to establishing rules of induction, its author has no difficulty in abstracting from the rigid rules to which the sciences are supposed to conform themselves[(66)]. Brunschvicg can therefore claim to be more of an empiricist than Mil, insofar as he expects the history of science to tell him how human rationality really works. Quine has a similar duality between the naturalistic credit given to the sciences, on the one hand, and a determined, perhaps naively realistic, way of conceiving the ontological task of these sciences, on the other. The rejection of such a duality is characteristic of Brunschvicg's philosophy: philosophy "becomes immanent to science with the aim of becoming aware of what intelligence and truth have been incorporated into it" without seeking to develop criteria of rationality, of ontological commitment, which would transcend the scientific enterprise itself[(67)].

In the same way, it is possible to note that in many passages of his work, Kuhn's argumentation is based on a similar schema. His rejection of the neo-positivist conception of scientific knowledge, and the idea that there can be no algorithmic procedure for judging the merits of a theory, play a pivotal role in his conception of history[(68)]. Rejecting a certain reading of the neo-positivist is not incompatible with a historical approach that attempts to uncover the mechanisms by which the rationality of certain theoretical gestures is manifested. This is a real *leitmotif* of Brunschvicg's philosophy: very often scepticism stems from an erroneous and over-ambitious conception of the way in which the sciences are supposed to proceed.

[(66)] Brunschvicg, Léon. *Human Experience and Physical Causality*. Bibliothèque de philosophie contemporaine. Paris: Félix Alcan, 1922, pp. 67 ff.

[(67)] Brunschvicg, Léon. *The Stages of Mathematical Philosophy*. A. Blanchard. Paris, 1972, p. 427.

[(68)] Kuhn, Thomas, *The essential tension: selected studies in scientific tradition and change*. Chicago University Press. Chicago, 1977, p. 326.

> Is intelligence capable of *understanding*? The affirmative answer, which has been much contested in our day, would, in our opinion, be obvious if we could first distinguish between a false ideal of intelligence and its true reality[(69)].

In both cases, then, it seems that the sceptical consequences that can be drawn from Quine's or Kuhn's theses stem from a purely philosophical conception, independent of the history of scientific rationality, an approach that Brunschvicg constantly warned against throughout his work.

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[(69)] Brunschvicg, Léon. *Écrits philosophiques, tome II : L'orientation du rationalisme*. Bibliothèque de philosophie contemporaine. Paris: PUF, 1954, p. 285.