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Is testability falsifiability?

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Introduction

Those who know the work of Karl Popper will have recognized in my title the transformation into interrogation of a formula repeated several times by this eminent philosopher of science, whom some consider as the greatest of the 20th century in his specific field - even if they do not share his theses. This Popperian formula, to which I wish to devote my analyzes here, has at least the merit of being clear and impactful. But as often, what is clear and impactful can become too simple for what is to be thought, and perhaps even too simple to express faithfully the philosophy which one seeks to summarize there. Writing this, I am not claiming that Popper was not really a falsificationist. Far be it from me to dispute that the great thesis of his epistemology consists in making any scientific theory worthy of the name falsifiable or refutable. This is indisputable: for Popper, the dividing line between scientific theory and non-scientific theory lies precisely in this falsifiable character. That is why psychoanalysis, for example, is not for him a science: it

cannot be refuted. But - and this is also well known - Popper's falsificationism never wanted to be radical, even if it often tended to be so.

I must however clarify that my intention is absolutely not exegetical, but philosophical: it is to carry out a critical examination of Popper's theses, both in their sometimes radical tendency and in the specific way in which they try to moderate themselves. I will therefore not need to distinguish, as Imre Lakatos did (Lakatos 1992 : 181-182), between "three ways" in Popper, even if the text which most explicitly introduces a little verificationism1 in Popperian falsificationism dates from 1953 - Popper 2, in Lakatos - and not from 1930 - Popper 1. And if I consider the recurrent formula "testability is falsifiability"2 as too simple, not only to be exact, but also to express Popper's very position, it is because:

- this formula is epistemologically questionable, which will relate to how Popper claims to learn from the upheaval introduced by Einstein. Here, the Bachelardian heritage will be precious, if it is true that Bachelard learned other lessons from Einstein. But the idea of Philosophical Relativity which I wish to introduce will be part of going beyond Bachelard himself3;
- this formula does not allow us to integrate what, in Popper himself, would nuance his radicalism. We will see moreover that the mode according to which these nuances are introduced generates tensions or even contradictions in Popper's thought. The question will in fact be that of the coherence, within his thinking, between the problem of "demarcation" and that of scientific progress considered, this time, for itself and through its "conditions"4 rather than its effects.

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[1] I will recall the very particular meaning which has been given to this term by the positions of the Vienna Circle, and which is not the meaning used when I write that Popperian falsificationism has occasionally tried to integrate a little verificationism in order to moderate itself.

[2] See for example Popper 1962 :36.

[3] The idea of Philosophical Relativity is not reduced to the aspects that will be discussed here. On this idea, see my forthcoming book *La Philosophie du paradoxe. Prolégomènes à la Relativité philosophique* (Barthélémy, 2022).

[4] See for example Popper 1962 :243.

These are the two theses that I would like to defend here, in the order of their enunciation. Not without first specifying, and by way of introduction, how exactly Popper's formula is radical.

One might first think that this formula, which comes repeatedly from Popper's pen, does nothing more than express in a concentrated manner the falsificationist thesis as such and without any simplification. Because according to this falsificationist thesis, a testable theory is not a definitively verifiable theory, but a theory which will one day be overtaken by another by virtue of the progress of which all true science is capable. So, to be testable is always to be refuted one day. Yet the formula is radical, and that is precisely why it will be possible not only to challenge it, but also to show that Popper himself probably does not assume it to the end. Because this formula, in fact, does not say exactly that a testable theory will one day be refuted, or rather it does not say only that. Indeed, it suggests that testatibility itself and in general resides in only refutability (falsifiability), and not in verifiability. In other words, it tends to move from the idea of absence of absolute and definitive verification of a theory to the idea of absence of verification, even relative.

Now, even if we can conceive that a theory is never absolutely and definitively verified, while conversely the refutation of a theory is absolute and definitive, the question is on the one hand to know if we are speaking of the same theory in both cases. It is at this point that it will be a question of discussing a Popperian conception which could well have unwittingly prepared, not a subtle and complex philosophical Relativity, but the more or less assumed relativism of some of his heirs - Feyerabend but also Kuhn[5]. For to assert that testability lies in refutability is to take the risk of discrediting in advance any theory that is currently corroborated. On the other hand, we will see that when he thinks of the conditions of scientific

[5] For a "return to the Kuhn problem" as the problem of Kuhn's denied relativism, see Barthélémy, 2005 :24-35, and Barthélémy, 2021: §21.

progress, Popper asserts this time that verifiability is one of these conditions, even if this verifiability would only be relative and should be renewed with the notion of corroboration. That is why I announced that from the point of view of Popper's texts themselves, the formula which sums up his falsificationism turns out to be too simple. We will also see that certain contradictions result from the very strong nuances introduced by Popper in his falsificationism. I will then come to defend the Bachelardian notion of relativization against that, proposed by Popper, of refutation (falsification), if it is true that Newtonian physics, as it was relativized by Einsteinian physics, remains true within the limits of its application domain. In this, the two notions of "absolute and definitive refutation" and of "impossibility of an absolute and definitive verification" cannot relate to the same theory considered as such, Newtonian theory taken globally being concerned only with the second notion - while the first notion can relate to a hypothesis within it. The real problem is that of the both explanatory and predictive power of a theory, and that is why the idea of encompassing relativization must come to replace that of refutation when one talks about scientific progress that leads from a previously verified theory to a broader and newly verified theory.

"Falsificationism" and the problem of dogmatism: a critical look at critical rationalism

Let us first briefly recall what is well known, and which is to be credited to Popper: the "demarcation criterion" which defines his central problem is what makes the natural sciences different from both non-science and the formal sciences, and this criterion is not for Popper the fact that the statements of the natural sciences would be endowed with meaning unlike, for example, metaphysical statements or alleged analytical statements of mathematics. On this point Popper is an exception, in the context of the era which was marked by the verificationism of the Vienna Circle but also of the first Wittgenstein - and whatever the specificities, sometimes

ignored, of Wittgenstein also vis-à-vis the Vienna Circle. This ‘verificationism‘, where the word takes on a very special meaning, asserts that the propositions of the natural sciences owe their meaning themselves, and not only their scientificity, to their testability. This is a very simplistic view of the sense-making, and Popper cannot adhere to it. In his view, testability is a condition of scientificity, but not of sense-making, "because metaphysics need not be meaningless even though it is not science" (Popper 1962 :253). And this testability, in Popper, will also be falsifiability without being verifiability: this is the problem, which was announced in my introduction.

For the moment, it appears that Popper's ‘falsificationism‘ is not the symmetric of the Vienna Circle's ‘verificationism‘: in Popper, testability answers the question of the scientific nature of the natural sciences without answering that of their sense-making[6]. Now, what he calls the “problem of demarcation", or even "Kant's problem", presents itself on the other hand to him as a more fundamental problem than the "problem of induction", that is to say the "Hume’s problem ”. That is why we can say that, in the context of his time, Popper substituted the first problem for the second, which dominated the discussion. The argument for such a substitution is as follows: if empiricism and logical empiricism "tend to pin their faith to the method of induction”, it is mainly because they believe “that this method alone can provide a suitable criterion of demarcation” (Popper 1992 :11). And if Popper rejects the inductive method, it is first because “it does not provide a suitable ‘criterion of demarcation’" (Popper 1992 :11).

This, which is well known, now being recalled, one can enter into the problem of what I call the *risk of residual relativism*, as it appears within Popperian rationalism

[6] Such a dissymmetry between the very *meanings* of ‘verificationism‘ and ‘falsificationism‘ should therefore not be confused with what Popper calls ‘asymmetry‘, *within* his thinking, between verification and falsification, this asymmetry being, for its part, attached to the falsificationist thesis according to which scientificity and its condition testability reside in falsifiability alone.

itself. So let's start again from the way Popper *prepares* his falsificationist thesis on the threshold of *Conjectures and refutations*:

> "The way in which knowledge progresses, and especially our scientific knowledge, is by unjustified (and unjustifiable) anticipations, by guesses, by tentative solutions to our problems, by *conjectures*. These conjectures are controlled by criticism; that is, by attempted *refutations*, which include severely critical tests. They may survive these tests; but they can never be positively justified: they can neither be established as certainely true nor even as 'probable' (in the sense of the probability calculus)" (Popper, 1962 :Preface, VII).

As we can see, the falsificationist thesis is prepared here through a prior declaration of the anti-verificationist type, no longer in the particular sense of this term which was at stake in the debate with the Vienna Circle, but in the sense that scientific "conjectures" are immediately qualified as unjustifiable. Their testing is presented as directed towards 'refutation' to the extent that, in any case, resistance to this refutation attempt is not synonymous with verification. One can add that from this point of view, *Conjectures and refutations*, in many of its passages, is hardly less radical than *The Logic of Scientific Discovery*, where the discourse was certainly provocative in some places[7]. Popperian rationalism, as it was born in this first work, therefore signals once again its singularity from the first page of *Conjectures and refutations*, and it will distinguish itself from other rationalisms in that it will consider that irrationalism, which is their common adversary, has in fact dogmatism as its crucible.

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[7] This is for example the case in the following lines: "Our science is not knowledge (*épistémè*): it can never claim to have attained truth, or even a substitute for it, such as probability.[…] *We do not know, we can only guess*.[…] Like Bacon, we might describe our contemporary science - 'the method of reasoning which men now ordinary apply to nature' – as consisting of 'anticipations, rash and premature' and of 'prejudice'" (Popper, 1992 :278; Popper emphasizes).

This is certainly a very prudent view, which allows Popper to denounce as not being fully rational the rationalism of apodictic evidence, which he calls "intellectualism" and to which he opposes his "critical rationalism". Here, the fact that Descartes himself questioned everything he inherited from tradition does not constitute for Popper a decisive anti-dogmatic fact, since the Cartesian approach has for *telos* the establishment of an absolute and definitive truth. This very aim, in fact, is already in itself a problem for critical rationalism: there must be no absolute and definitive truth, since the process of knowledge is a real progress, and not an accumulation of truths which would add to each other without recasting.

But the other side of this Popperian prudence is a very strange assimilation between dogmatism on the one hand, and the rational requirement of verification on the other. Because for Popper this requirement is no longer presented as a requirement, but as a trend, implicitly unfortunate as such. Admittedly, he sometimes takes care to specify that what he means by 'dogmatism' is a tendency to check the laws which tends at the same time to neglect what would refute them. But then it is the concept of verification which is no longer suitable, if it is true that this concept corresponds not to a trend, but to a requirement. No doubt one might want to resolve the embarrassment by noting that Popper, when he exposes his own rationalism, speaks of 'corroboration' rather than 'verification'. But firstly, we will soon see that when he comes to stating the "three conditions of scientific progress", he makes 'verification' the third of these conditions. Secondly, this still does not explain to us how the idea of verification would in itself refer to a dogmatic tendency to absolutization, rather than to a fully rational requirement.

It is not yet time to enter into the partial rehabilitation, which I have just announced, of the concept of verification. The nuances inherent in Popper's words, the very ones that will make his formula "testability is falsfiability" simplistic, will be the subject of the second part of my remarks. As I said in the introduction, the first phase aims to suggest the idea of a philosophical Relativity beyond a

falsificationism which, unbeknownst to its own critical rationalism, prepared the ground for the relativism of its successors. So let's resume our review.

Popper must first be recognized for opposing the concept of reducing scientific theories to mere instruments. It is this very specific meaning that Popper gives to the term "instrumentalism", which can take on other meanings in other epistemological debates. That scientific theories cannot be reduced to simple instruments, this does not at all imply that the objectivity of physics cannot be constructed *via* the double mediation that is mathematical-instrumental decentering as we can theorize after Bachelard, the thinker of mathematical-instrumental physics as "phenomenotechnics"[8]. Popper, without theorizing this decentering as such - that is to say as the very condition of the objectivity of the physical method itself -, at least perceives the difference between a theory that has been experimentally tested and a mere useful instrument. He knows that experimentation is itself controlled by theory and led by hypotheses, and he sometimes has some reflections that converge with Bachelard's thought of scientific instruments as "materialized theories". However, insofar as he does not think of the mathematical-instrumental decentering of the knowing subject of physics, he does not take the further step which is however possible, even beyond Bachelard.

What is this further step? The very one which will make the falsificationist thesis in its overly radical version problematic. It is the step by which the laws of nature are verified in the very thing that they make possible, but which has hardly been thought of as resting on them: the very functioning of scientific instruments. We are here beyond the Bachelardian idea of "materialized theory", because what we need to understand is the fact that beyond the materialization of simple theories, in the functioning of scientific instruments are integrated more and more already known natural laws. There is here as *a praxic dimension of the objectivity of physical laws*, and the idea of techno-*logos*, as it was explored by Simondon in a truly original and

[8] See for example Bachelard, 1951 :92 ; 1972 [1953] :65 ; 1983 [1934] :16-17 ; and Bontems, 2010 :48-57.

powerful way, already opened us to this dimension through the properly Simondonian theme of the "naturalization" of technical objects[9]. When we consider them in their increasingly complex functioning and no longer solely in their uses, they crystallize an increasing number of natural laws, which are indeed necessary for this complex functioning itself. That is why technical "recipes" are not just recipes but are based on objective knowledge. This was the meaning of Simondon's criticism of pragmatism: the latter is not only false because it abusively reduces sciences to techniques, it is also false because it reduces techniques to recipes (Simondon 1958 :254-255). Pragmatism, says Simondon, confuses technique with work as a utilitarian activity, while technique is both the original *condition* - the inclined plane of Galileo mentioned by Kant at the threshold of the *Critique of pure reason* - and the always more complex *result* - particle accelerators, we would say today - of the very objectivity of physics in its progress.

It is because the instrumental experiments crystallize, in the very functioning of these instruments, a natural lawfulness already known that the experimental verification of the newly discovered laws does not need to be repeated endlessly as a never guaranteed sensitive experience needs to. Now, the fact that Popper does not dwell on deepening the question of the mathematical-instrumental decentering of the knowing subject of physics is not unrelated to his inconsistent relationship to Einstein and to the contribution of the theory of relativity. Indeed, it is because he does not seek to think of the growing process of mathematical-instrumental decentering that Popper, while nevertheless valuing the encompassing relativization of Newtonian physics by Einsteinian physics, makes practically nothing this encompassing relativization in his theory of falsification. In fact, if he had made something of it, he would not have been a falsificationist, but a relativist in the good sense of the term, that is to say in the Bachelardian sense of a thought *of the relativization of previously corroborated theories rather than of their refutation*. It

[9] See for example Simondon, 1958 :46-49, and Barthélémy, 2005 : 179-184.

is interesting, in this regard, to examine the words used by Popper in his relationship to Einsteinian relativity: "And this [the approach of critical rationalism] was made possible by Einstein, who taught us that Newton's theory may well be mistaken in spite of its overwhelming success" (Popper 1962 :27). The problem is obviously that such a statement claims Einstein as a decisive source, but refuses in fact its subtlety. Because Einstein's lesson is not that “Newton's theory may well be mistaken”, as if it would be generally wrong, but that the laws discovered by it can be deduced and reinterpreted from a broader and more counterintuitive theoretical framework, which delimits the relevance of the Newtonian theoretical framework. To relativize is not to refute but to encompass by delimiting the validation. Hence the idea of encompassing relativization, expressed by Einstein himself when he made Newtonian physics a "special case" - one should say a *borderline case* - of his own. And Bachelard learned the lesson - not to become a falsificationist. I will have the opportunity to return to this lesson further, to specify it more.

Ultimately, and to speak like the subtle Alan F. Chalmers (Chalmers 1999), a good scientific theory is for Popper a theory which is highly falsifiable but which resists falsification. It is also more falsifiable than the falsified theory it replaces. And the question is to know if such paradoxes are indeed simple paradoxes on the part of Popper, or if they are not rather contradictions, as such insoluble. Perhaps it was to alleviate this contradictory character that Popper, from *The Logic of Scientific Discovery* in 1934 and then in his conference "Science: conjectures and refutations"[10], presented scientific progress in terms of the struggle for survival delegated to theories themselves, thus relieved of the stakes of objectivity proper, within which only the contradiction presents itself[11]. In fact, as soon as the great

[10] This conference, which gives its title to this famous collection of texts that is *Conjectures and Refutations*, was given in Cambridge during the summer of 1953.

[11] The subtitle of *Objective Knowledge* itself will also speak of an "evolutionary approach". Popper was overtaken on this very strange path by Ernst Mach and Charles Sanders Pierce. See on this point Cariou, 2019 : 559, 626, 647.

resistance to tests is presented as an ability to survive, it becomes compatible with the high falsifiability of the very theory that survives, since unlike falsifiability, the ability to survive is no longer a strictly epistemological expression. But then, it is again the relativism of the successors of Popper which is already being prepared.

The ambiguities of Popperian thought of scientific progress and the process of relativization of theories

If we now go back to the very origins of Popper's questioning on the criterion of demarcation, we can see that these origins lie in the almost simultaneous success, in Austria, of Einsteinian relativity and of the three interpretative theories that are Marxian theory of history, Freudian psychoanalysis and the individual psychology of Alfred Adler. What strikes me as very revealing here is that Popper is content merely to point out that proponents of these three interpretative theories see confirmations everywhere. Popper in no way seeks to criticize these so-called "verifications", as if in any case the very idea of verification represented more of an unfortunate tendency - linked to "dogmatism" - than a requirement against which these theories, unlike physical theories, could prove to be failing. From the outset, therefore, Popper chose falsifiability as the sole "demarcation criterion", because, in his eyes, verification seemed easy and not decisive: "It is easy to obtain confirmations, or verifications, for nearly every theory - if we look for confirmations" (Popper 1962 :36). It is particularly astonishing to see a great epistemologist explicitly ignore, at least in this passage, the methodological difficulties which make verification a requirement and a conquest. Because everyone knows that interpretative theories *are no more experimentally verifiable than they are falsifiable*. But Popper, for his part, only wants to think here of the second point, to make it the criterion of demarcation.

As it turns out a little further in his text, he is nevertheless well aware of the impossibility of experimentally *validating* theories such as those of Adler and

Freud: "These 'clinical observations' which analysts naïvely believe confirm their theories cannot do this any more than the daily confirmations which astrologers find in their practice" (Popper 1962:37). But it is only in Chapter 10 of *Conjectures and Refutations* that the radical thesis of the assimilation between testability and falsifiability comes to clearly nuanced - and in a way which introduces, as we will see, strong tensions in Popper's thought.

It is indeed in the conference "Truth, rationality and progress of scientific knowledge", never published nor even pronounced but integrated into *Conjectures and refutations*, that Popper seems to modify his position somewhat. First, the explanatory and predictive qualities of a theory are highlighted before it is even tested. Added to this is the idea that progress from one explanatory theory to another even more explanatory theory is also progress leading from certain problems to other more fundamental problems. The debate between supporters of verification and supporters of refutation is then presented as opposing a requirement to the impossibility of its realization. It will be noted that this time, at least, verification is also defined as a requirement rather than as a simple "tendency" which would be external to the "critical spirit" and which would favor "dogmatism" to the detriment of true rationalism. Popper notes on this occasion that the proponents of verification embody a major tradition of rationalism, that of the struggle against superstition and the weight of arbitrary authority. He then recognizes that there are degrees of correspondence with the facts, or degrees of truth, depending on whether a theory is more or less precise, more or less broadly explanatory, more or less the source of new tests not previously considered, more or less unifying with regard to various problems. This completes the list, already started in the first two points, of the criteria for scientific progress, and Popper finally invokes these criteria to recall that Newtonian mechanics, even "refuted", remains superior to the doctrines of Kepler and Galileo. Finally, writes Popper, even if the holistic conception of tests supported by Duhem then Quine leads the solely proponent of verification but not that of

refutation to skepticism, the fact remains that the holistic argument goes much too far, because a counterexample to a predictive theory prohibiting certain events satisfies most or even all of the axioms of this theory, except for one, thus independent.

Now, Popper comes here to formulate the three conditions necessary for the progress of knowledge, and the third of these conditions confirms the inflection and nuance within his thought. The *first* condition of scientific progress is nothing other than one of the criteria stated above: the capacity of the new theory to bring, says Popper, a unifying idea that is at once simple, unprecedented and powerful. The *second* condition also overlaps with one of the criteria set out above: the ability of the new theory to make new tests possible for the prediction of phenomena which have not been observed but which are both new consequences and likely to be tested. The precision and also the explanatory breadth of the theory, further criteria set out above, are clearly linked, according to Popper, to these two fundamental conditions, the virtue of which is moreover to make it possible to discard *ad hoc* theories. Now, the *third* condition is distinguished from the second as the "logical" form is distinguished from the "empirical" matter, says Popper, and this third condition is experimental success in new and very rigorous tests at the same time. Here, therefore, testing is no longer just refuting, because scientific progress also requires verification - which is not to say absolutization. This last remark will soon have to be clarified, and we will find there the Einsteinian and Bachelardian idea of encompassing relativization: if the verification of a theory is not its absolutization, conversely its future relativization will not be a refutation since what has been validated cannot become absolutely false.

For the moment, it is necessary to insist on the internal tensions thus produced by this obvious nuance brought to falsificationism because of the association of the question of the very *conditions* of "scientific progress" with that of 'demarcation'. Because Popper's words in this belatedly published conference are clearly

embarrassed. Insisting on the one hand, and as usual, on the idea that any refutation must be considered a great success *in the name of which the third of the conditions of scientific progress is not absolutely necessary*, Popper adds, however, *as soon as this third condition is not regularly satisfied, scientific progress becomes impossible*: "In the first place, I contend that further progress in science would become impossible if we did not reasonably often manage to meet the third requirement" (Popper 1962 :243). Here again, the paradoxes are no longer mere paradoxes, but leave room for contradictions. And the question is no longer only to know if Popper's position remains capable of coherence, but also to understand how a statement as obvious as the last assertion could have become, in his theory, *a surprising and even embarrassing concession*. Now, whether this concession is indeed a concession to the "proponents of verification" and thus introduces a problem of consistency within Popperian theory, there is no doubt: Popper explicitly recognizes that there can be a degree of verificationism in his falsificationism, and that we must take its side.

The question is therefore ultimately whether Popper could have avoided preparing the ground for his relativistic successors other than by enconsistently introducing verificationism into his falsificationism. And it is at this point that the idea of Philosophical Relativity, as we can construct it after Bachelard, stands out from the false Popperian solution: in Philosophical Relativity, there is neither falsificationism nor dogmatic verificationism - which is not to imply, as Popper did, that *all* verificationism is dogmatic - and therefore not a mixture of principal falsificationism and verificationist nuances either. The idea of Philosophical Relativity can only really be understood from a theory of decentering in the sense defined above: decentering is the operation by which the subject of common sense is reconstructed as a knowing subject *via* mediations, such as the double mathematical-instrumental mediation which governs physical knowledge. Each science has its own mode of decentering, which suits its object. Now, the Theory of

decentering as I started to lay its foundations in my book *The Society of invention*[12] no longer consists in saying that objectivity is the inaccessible *telos* of a scientific progress which would only remain provisionally corroborated conjectures – until their refutation. Objectivity becomes much more the characteristic of a *method* of decentering born with Galileo, and therefore *the very condition* of legislative-explanatory-predictive progress rather than its inaccessible *telos*.

Because he does not think of this decentering which allows the subject of common sense to reconstruct itself (himself or herself) as a knowing subject *via* the double mathematical-instrumental mediation, Popper prepares the Kuhnian refusal of the difference in nature between on the one hand the *methodological* rupture which separates Galileo from Aristotle, on the other the *theoretical* rupture which separates Einstein from Newton. Only the first break is an absolute discontinuity, because it creates a scientific methodology which will then establish *a continuity underlying all the changes in "paradigms"*. This is what *La Philosophie du paradoxe. Prolégomènes à la Relativité philosophique* develops, and we can clarify this point here by returning to the idea of encompassing relativization as it applies much better than that of refutation to the relation of Einsteinian physics to Newtonian physics.

At the end of *What Is This Thing Called Science ?*, Chalmers formulates in a precise way the idea of encompassing relativization as it was first highlighted by Bachelard, and as it remains *unthought* by Kuhn and his friends, proponents of a discontinuity *whose radicalism becomes incompatible* with this same idea of encompassing relativization where continuity - of the *same* discipline - and rupture are *mixed*. Since in Einstein, the mass of a system whose speed is small compared to a set of reference frames will be approximately the same regardless of the reference frame in which it is produced, we can, without making a big mistake, make this

[12] This work, published in 2018 by Éditions Matériologiques, delivered in its second part the *structure* of the future radically anti-dogmatic system that is Philosophical Relativity. The forthcoming work *La Philosophie du paradoxe*, on the other hand, determines its *method* more precisely.

mass a property, as was the case with Newton, rather than a relation. Still in Einstein, if we treat mass as a property, the sum of the product of mass by speed for each part of the system will remain constant until a high degree of approximation, in a particular frame of reference. Thus, realized Chalmers, we can show, taking the point of view of Einstein's theory, that the Newtonian law of conservation of momentum is approximately valid as long as the speeds are not too great. Here, therefore, the difference between the Newtonian and Einsteinian "paradigms" in no way prevents an underlying continuity by virtue of which the idea of encompassing relativization states the exact nature of their relationship. Ultimately, and to repeat here the deep reason which motivated my critical reflexion on critical rationalism and its strange relation to verification conceived as a "dogmatic tendency", it is the risk of relativism and the prevention of philosophical Relativity that defines Popperian logic and its legacies[13].

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[13] I thank Terence Blake for his proofreading of this very synthetic - and imperfect - English version.

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