

CONTINGENCY AND THE LIMITS OF SCIENCE

ILLUSTRATION: TROND KULTERUD

The fruitfulness of scientific enquiry is well known. Almost as uncontroversial is the uselessness of dogmatic philosophical speculation, where one position stands up against another with no way of deciding between them. «The battlefield of these endless controversies is called *metaphysics*.» (Kant 1998: Aviii) But what if a Kantian view on the limits of science leads to a resurrection of a new kind of metaphysics of the absolute?

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Is it plausible that science will pace on into the future, forever posing new problems and answering new questions, never coming to a halt? There are two main threats to such a scenario. The first, obvious one is the threat of *perplexity*, of unanswerable questions. Perhaps there are some questions that we can raise, but also see that we are in principle powerless to answer. The other one is the threat of *completion*, the possibility of a completed science. In this case, it would come to a halt not because of its inability but precisely because of its actualized ability to answer all possible questions.

Among those defending an open-ended view of science against these threats is Nicholas Rescher, in his book *The Limits of Science*. I will argue, however, that this view is the philosophical commonplace of the twentieth century: The claims of late 18th-century physicists with regards to the nearly completed state of their field (just before the revolutionary breakthroughs of relativity theory and quantum mechanics) have been amply ridiculed. Equally, positing scientifically unsolvable questions has a bad track record; thus even the problem of subjective experience and *qualia* is considered, among philosophers, as a *hard* problem of consciousness rather than as an *insoluble* problem.

Rescher's book is interesting to us because it poses this question on a theoretical level; it deals with what science could possibly do, and thus abstracts away from the contingent limitations of time, money, energy, public support, etc. This allows me to bring out the properly science-fictional scope of the claim of science's open-endedness. And in fact, it will also allow me to play the pied piper. According to the argument of this article, the epistemic considerations of Rescher come up short when faced with some of the more interesting science-fictional scenarios – in this case, time travel. In attempting to defend the limitless conception of science, it will therefore be necessary to introduce a metaphysical supplement, an absolute principle, which I will obtain from Quentin Meillassoux. The logic of Rescher's argument exemplifies a broad philosophical tendency Meillassoux calls «correlationist», while at the same time pointing towards its self-overcoming. In one sense, I will be arguing that Meillassoux' views nicely complement those of Rescher. In another sense, I will try to lead you, as well as Rescher, from common-sense assumptions about science, through considerations of

time travel, before throwing you into a world of absolute contingency.

Rescher's contradiction

Are there legitimately scientific questions that science is powerless to answer? To this question one could, of course, answer with a «no» by definition. It could be claimed that any question which is in principle impossible for science to answer, is not a legitimate scientific question.¹

But Rescher wants to make a substantive claim in saying that there are no such questions, or rather that there are, and can be, no such questions which can be identified.

He distinguishes between three different insolubilia theses: 1) The permanence of unsolved questions, which is just what he has been defending against claims about the possibility of «complete» science. This is therefore completely acceptable for him. The reason for this is, of course, that it does not entail insolubilia, because it does not say that any question is unanswerable, but merely that there will always be unanswered questions, it «is perfectly compatible with the circumstance that every question that arises at a given stage will eventually be answered» (Rescher 1999: 112). 2) The existence of insolubilia. This means that there are «immortal questions» (Rescher 1999: 112), questions science can never answer. Rescher will not argue directly against this proposition, but rather against the strengthened theses: 3) The existence of identifiable insolubilia. This seems natural, as the thought of insolubilia only becomes interesting once you are in a position to actually put forward a candidate.²

The crucial point of Rescher's defense against the possible existence of identifiable insolubilia, the one which his entire discussion revolves around, is his claim that «present science cannot speak for future science» (Rescher 1999, 103). Thus, a question that looks completely irresolvable at a given time cannot because of this be identified as an insolubilium, as the history of science clearly shows. Rescher points to many past mistakes, where problems supposedly beyond the reach of human science have received solutions based on later science, science which those judging the problems as irresolvable clearly did not and could not expect. When it comes to making secure inferences from the answers, theories and methods of present science to that of future science, Rescher claims that this «is in prin-

[Rescher] deals with what science could possibly do, and thus abstracts away from the contingent limitations of time, money, energy, public support, etc.



ciple impossible» (Rescher 1999: 103). And this is where it begins to get interesting: where Rescher makes what seems to me a remarkably strong claim. I will proceed by attacking it directly, thus bringing out his supporting arguments and claims along the way. The question which arises immediately, for me at least, is whether one could derive an insolubium directly from the strong claim, by inferring that the question «What are the answers, theories and methods of future science?» is in principle unanswerable. If this is not a legitimate scientific question, one wonders what makes it different in kind from other questions about future states of different systems. And indeed, just a few sentences on, this suspicion seems to be confirmed. The future accomplishments of science constitute a limit of science: «Given that it is effectively impossible to predict the details of what future science will accomplish, it is no less impossible to predict what future science will *not* accomplish» (Rescher 1999: 103). This puts a limit to *prediction*, one of the aims of science (according to Rescher). It also clearly puts a limit to description, explanation and control of future science, those being the three other aims of science listed by Rescher. Thus, he seems to contradict himself. Compare with:

The one and only thing that is determinate about science is its mission of description, explanation, prediction and control over natural phenomena, and the commitment to proceed in these matters by empirically based rational controls for the testing and substantiation of our assertions that have become known as ‘the scientific method.’ Everything else – methods, mechanisms, theories, and so on – is potentially changeable. [...] An enterprise that, on the cognitive/theoretical side, did not aim at either the description or explanation of nature, and that, on the applied/pragmatic side, did not aim at either prediction or control, simply could not count as natural science. (Rescher 1999: 104)

Saying that future science does not count as a «natural phenomenon» is not a plausible claim either. Bringing this out even more clearly, Rescher says a bit further on: «Nobody can say what science will and will not be able to do» (Rescher 1999: 108). But can science? If it can’t (if that is impossible), then there is something science cannot and will not be able to do. If Rescher has an answer to this,

it seems to be the following claim:

To be sure, if *predictability* is seen as the hallmark of the scientific, then there cannot be a science that encompasses all human phenomena (and, in particular, not a science of science). But of course, there is no reason why, in human affairs any more than in quantum theory, the boundaries of science should be so drawn as to exclude the unpredictable. Even before the rise of stochastic phenomena in quantum physics, one might have asked: must scientifically tractable phenomena be predictable? Can science not tread where predictability is absent? When we encounter strange ‘intractable’ or ‘inexplicable’ phenomena, it is folly to wring our hands and say that science has come to the end of its tether. For it is exactly here that science must roll up its sleeves and get to work. (Rescher 1999: 109)

There is no clear-cut scientific reason at all to suppose that a predictive science of science is impossible.

Here, it seems, Rescher tries to avoid contradiction by claiming that prediction is not necessary for science. The question then becomes, which of the other aims of science are compatible with Rescher’s views, when it comes to future science? Is it describable? Controllable? Explainable? As I’ve already been suggesting, if we could describe or explain future science, it seems we first would have to be able to predict it in some detail. The comparison with quantum theory might suggest something else, namely that questions about predicting future science are scientifically illegitimate, in the same way that questions about the time of decay of a specific radioactive particle is illegitimate. But we do not have a scientific theory that rules out predicting future science, in the same way that quantum theory rules out predicting the precise time of decay. What we have is a philosophical theory that rules it out, and this seems to put Rescher back with the philosophers he wants to distance himself from. So, even if you concede to Rescher that questions about the prediction of future science might possibly be illegitimate, and in that case they would not count as limits, this does not resolve his problem. The problem is rather that there is no reason analogous to the uncertainty principle applicable to predictions of future science. As a matter of fact there is no clear-cut scientific reason at all to suppose that a predictive science of science is impossible. If we have reasons for supposing that, they are Rescher’s philosophical ones – even though Rescher himself argues

that philosophical preconceptions should never try to delimit science and its capabilities.

This isn't the end of the troubles for this particular argument. Even if it could be scientifically established by the best science of our day that making predictions about future science is outside the range of science, it does not automatically follow that this should be the case in the future. Rescher himself makes this exact argument concerning the case he is comparing with, namely quantum theory, some pages earlier! There he discusses von Neumann's attempt to establish that all possible future theories must be «uncertain» in the way present theories, incorporating Heisenberg's uncertainty principle, are. Rescher says: «But the 'demonstration' proposed by von Neumann in 1932 places a substantial burden on potentially changeable details of presently accepted theory. The fact remains that we cannot preclude fundamental innovation in science: present theory cannot delimit the potential of future discovery» (Rescher 1999: 103). It might seem as if Rescher wavers on this particular point, as he only a few pages earlier seems to suggest the opposite: «The most that science can reasonably be asked to do is to predict what it itself sees as in principle predictable – to answer every predictive question that it itself countenances as proper. Thus if quantum theory is right, the position and velocity of certain particles cannot be pinpointed conjointly. This renders the question 'What will the exact position and velocity of particle X be at time t?' not insoluble but illegitimate. Question-illegitimacy represents a limit that grows out of science itself - a limit on appropriate questions rather than on available solutions» (Rescher 1999: 99). It seems as if Rescher wants to have it both ways with respect to quantum theory; certain questions in quantum theory are not insoluble, but illegitimate, even then they are really just contingently illegitimate because some new scientific revolution might make those questions legitimate by making them solvable.

This means that we cannot be sure that the question «How does light behave when it is travelling at a speed of $2c$ (c being the speed of light)?» will not become a legitimate question either. Some future advance might turn out to show that this is indeed possible and proceed to describe how it would behave, and, even without that, *the laws of nature might themselves be susceptible to change*. Rescher says: «He [Collingwood] held, in particular, that the uniformity of nature must be presupposed if the scientific enterprise is to succeed. But who is to say that cosmology may not decide tomorrow that the universe is par-

tioned into distinct compartments (and/or eras) within which different ground rules apply – that is, that the 'laws of nature' in the universe are not uniform? What seems an absolute presupposition of science at one point may be explicitly denied at another» (Rescher 1999: 106). So, does this mean that whether a question is legitimate or illegitimate does not matter when it comes to deciding whether it is insoluble? If so, it would seem as if much of Rescher's chapter 2 on question dynamics is superfluous, because there is no meaningful question *whatsoever* that can be decisively ruled out as scientifically illegitimate. Questions about the ether? Sure, they are illegitimate now, but perhaps the universe will enter into a new era tomorrow, one where the ether is part of its structure? It cannot be ruled out. In fact, from this the open-endedness of the scientific endeavor follows automatically, at least in the weak sense that even if science were to become «complete», it could still be rendered obsolete at any moment by a change in the laws of nature. Would this also entail that there can be no insolubilia, because any question might become solvable in the future? To find that out, I will take a closer look at what «future possibility» means, or rather: what it could mean and what Rescher could allow it to be. The question is: what if you could know the future?

Back to the future

Though I find it to be his most solid defence, Rescher does not really make his claim based on the possibility of changes in the laws of nature, but mostly on what he calls a «fundamental epistemological law: *the cognitive resources of an inferior (lower) state of the art cannot afford the means for foreseeing the operations of a superior (higher) one*» (Rescher 1999: 97). The concepts with which such superior cognizers solve their problems are in many cases simply not available to the inferior cognizers. Like Rescher says, «Newton could not have predicted findings in quantum theory» (Rescher 1999: 97). The superior cognizers would, in the case we have considered, be future science and scientists, and the inferior ones would be present science. Intuitively, this seems like a perfectly correct statement, which could be generalized into a law. Presumably, this law is what makes Rescher think that we can safely predict the continued orbit of the planet³ or the life of the sun, but not future science. But things are more complicated than that.

What if foreseeing is literally what it could do? Consider, for instance, the situation of there being invented time-machines (something which in itself, of course, cannot be ruled out as impossible, as it would then constitute a limit



of science).⁴ This would make predictions about future science not only possible in theory, but indeed achievable in practice. The argument against something like this would perhaps go along the lines of what Rescher says: «We could not possibly predict the substantive content of our future discoveries – those that result from our future cognitive choices. For to do so would be to transform them into present discoveries which, by hypothesis, they just are not» (Rescher 1999: 97). But is this really true? If it is, then time-travel into the future would seem to be made impossible on these purely conceptual or philosophical grounds, but that surely contradicts Rescher's general point. Another option is to say that such time-machines would change the future, so that if you went into the future and saw yourself going to a particular place at a particular time, you could decide to «invalidate» that future by going somewhere else instead. The same principle would go for science. This, however, seems to be based on a thesis about time and free will which cannot be uncontroversial, let alone the only possible option. Who knows, we might find our theories about free will profoundly changed by such an invention as a time-machine. Thus, the users of such time-machines might in principle be able to predict every scientific advance down to its smallest detail. Drawing on Rescher's own arguments, we simply have no way of knowing for sure whether this might happen or not.

The argument functions in the same way as do arguments about time travel backwards in time. This is not logically impossible, many argue, but it requires that you for instance will not be able to go back in time and kill your then-to-be grandparents, simply because *it didn't happen*. (David Lewis, for instance, develops that basic argument.) Now we certainly have a greater propensity for considering the past unchangeable, whereas we consider the future to be open-ended, full of possibilities not staked out in advance. But who is to say we are not mistaken? Certainly not Rescher, because he could not rule it out completely on philosophical grounds (it is not contradictory to consider the future to be «already» decided), as that would again make him put philosophical limits on what science can or cannot do. In fact, Brian Greene, in his book *The Fabric of the Cosmos*, describes a way, implementing stable wormholes, in which time travel to the future and back could occur without violating any known physical laws.

At this point, we might consider whether Rescher's chapters on the impossibility of self-prediction might be put in a new light. Could such a time-machine be used for self-prediction? It seems it could not, because paradoxical

questions would retain their force even in a situation where you could go into the future and see what you would answer. But as for predicting what science will and will not do in the future, there seems to be no such self-referential problems involved.

Now, it seems important to notice that the position of the debate seems to have changed considerably compared to how Rescher sees it. If, as I believe, I have only drawn the consequences of what is already in Rescher's text, then it seems as if he has not followed his premises through to what is the real stakes of the arguments. On the one hand, the possibility of time-travel, or some other means of actually knowing the future, can hardly be ruled out by fiat. On the other hand,

The predictive inaccessibility of the future of the world (as best we can comprehend its nature) is clearly something that is not *merely* epistemic, something that does not *just* inhere in our own lack of information - our own ignorance. Rather, to the best of our understanding it roots in the very nature of things in a world whose dynamical development is subject to contingency. It is an aspect of reality as such - a result of the fact that presently existing conditions always encompass genuine contingency in that nature simply 'has not yet made up its mind' about the future - 'has not yet decided' at the present exactly and completely what the future is going to be like.

(Rescher 1999: 90)

What does this mean? On the one hand, it seems to be saying that this inaccessibility is not just a result of our ignorance. On the other hand, it says that this is «as best we can comprehend its nature», and that seems to suggest that this might itself be just a temporary epistemic insufficiency. I would like to pull out what seems to me like the two most significant concepts involved here, that would need to be explored and clarified if the obscurities and contradictions of Rescher's book were to be rectified: Contingency and time.

In what follows, I will argue that only by adapting a specific metaphysical stance can Rescher hope to maintain his position on the limits of science. To do this I will refer to the arguments of the French philosopher Quentin Meillassoux.

Speculative Contingency

Let us recapitulate what priorities get Rescher into his awkward, contradictory position. It seems to me that the basic commitment Rescher sticks to throughout his book

is a *non-absolutist* view of science, whether it is the possibility of science reaching the absolute, the total, complete truth, or the possibility of it encountering absolute limits to its progress. However, as we saw, there seems to be an absolute limit to science after all: prediction of future science. And it even seems as if it is possible that this *is not true*, thus bringing us to the ironic conclusion that not only does Rescher actually posit an absolute limit to science, but the limit he posits is not necessarily a limit. Turning to the more general point, I believe this problem arises because it turns out that Rescher cannot afford to be a non-absolutist when it comes to *non-absolutism itself*. The open-endedness of science, its fallibilistic character, cannot itself be a thesis, a fallible proposal. Why? Because Rescher wants to maintain that the world of scientific discovery can always be more, be different than we think it is.

The interesting thing about Rescher, and what brings him very close to Meillassoux, is that he seems to feel forced, by the weight of the history of scientific revolutions, to adopt the view that there are not even contingently necessary limits to science. I can explain this better by comparing his position to Kant's. According to Kant, science is limitless, and Rescher indeed uses Kant's principle of question propagation as one of his main points when he argues for the impossibility of reaching a complete science. But there is a limit to this limitlessness in Kant. Kant and Rescher might perhaps agree on the fact that we never gain knowledge of «things in themselves», but only things as they appear to us, in our best scientific theories (what Rescher calls «the epistemic gap between the apparent and the real» (Rescher 1999: 34).) But for Kant, there are certain specifications that have to be met for it to be possible for anything to become an object of experience. Without delving deeply into this, suffice it to say that Kant's categories and forms of intuition (space and time) are unavoidable, and therefore anything that does not accord with them cannot be a scientific object, indeed it cannot be an object for us at all. These conditions of possible experience are themselves contingent, Kant says, but in so far as they are ours they are necessary, thus the before mentioned contingently necessary limits to science.

This cannot apply to Rescher, because for him the conceptual and methodological innovations of science preclude any such a priori limitations. The ever-changing horizon of science sets temporary limits to what can be

meaningfully and legitimately asked, but nothing substantial is set in stone.

As for Meillassoux, his philosophy aims to attack no less than all post-Kantian philosophy, which according to him can be broadly characterized as «correlationist». What unites all these correlationist philosophies is basically what we saw above, that Rescher and Kant agree that we only ever know things as they appear to us.⁵ There is thus, in our theories, a correlation between us, as knowers, and the things known, and we have no access to things outside of this correlation.

So, if Rescher endorses the basic view that Meillassoux attacks: how can their views be so close? As we shall see, this has to do with their emphasis on contingency. To show this, I will start by drawing attention again to a part of the quote referred to before: «the very nature of things in a world whose dynamical development is subject to contingency» (Rescher 1999: 90). And as I said in the comparison with Kant, for Rescher the same applies to our theories about the world. Now science and philosophy alike have traditionally been looking for necessity, whether for necessary laws of nature, sufficient reasons (as in Leibniz' principle) or necessary conditions of experience. The question which remains undecided when it comes to Rescher is the one I referred to at the end of the last section: Is the contingency of the future of the world merely our current epistemic prejudice, or is it «in the very nature of things»?

For Meillassoux, it is the strong version of this claim, the contingency of the very nature of things, that must be upheld, and that promises to transform correlationist philosophies. In his more strictly philosophical discussion, it is the challenge of absolute idealism that brings correlationism into a position where it has to make this strong claim. Absolute idealism (Hegel is the main example for Meillassoux) asserts that, since any possible knowledge of things are knowledge of things as they appear to us, the possibility of knowing that the «thing in itself» might be different from the thing as it appears for us, is gone, since that already means knowing something about the thing in itself, and thus the boundary between what we can and cannot know is already overstepped by stating it. Therefore, the thing in itself collapses into the thing for us, and the correlation between our grasping of the world and the world is made necessary (through the Hegelian dialectic). This is not exactly the same as Rescher's problem,

There seems to be an absolute limit to science after all: prediction of future science.



which is that if the contingency of our scientific knowledge is itself contingent, absoluteness might be forthcoming. It is the move from *our* present to *any* present in the following quote which seems to require the strong version of the above claim: «The doctrine now at issue effectively holds that there is nothing cognitively privileged about our own position in time. It urges that *there is nothing epistemically privileged about the present – any present*, our own prominently included» (Rescher 1999: 37). A sort of cosmic Hegelianism of the universe coming to know itself through itself might be the link between the two problematics, as that can only be ruled out through the move from our present to any present. In fact, the possibility of a science which can answer all its questions, which Rescher downplays because this «might simply reflect the paucity of the range of explanatory questions Q(S) that it is in a position to contemplate» (Rescher 1999: 16), nicely encapsulates Meillassoux' point, which is that the correlationist must maintain against the absolute idealist that such a correlation is as a whole merely contingent, and «erotic completeness may well indicate poverty rather than wealth» (Rescher 1999: 17).

According to Meillassoux, the correlationist is thus pushed into a corner where he must maintain in order to preserve the contingency of its knowledge, that this contingency necessarily holds. I hope to have shown that this characterization is appropriate for Rescher, who finds himself forced into saying that it is in principle impossible to predict future science, in order to defend the claim that nothing is in principle impossible for science. There is only a short step from this to Meillassoux' speculative materialism:

Speculative materialism asserts that, in order to maintain our ignorance of the necessity of correlation, we have to know that its contingency is necessary. In other words, if we can never know the necessity of anything, this is not because necessity is unknowable but because we know that only contingency necessarily exists.
(Brassier 2007: 38)

Seemingly a small step, it is however a metaphysical starting point from which many surprising conclusions can be drawn. The key point is that this necessary contingency provides us with a *philosophical access to the absolute*, namely, the absolute contingency. This means that the contingency of things is an absolute truth, independent of our existence and our theories. It even goes beyond the certainty of the Cartesian *cogito*, because «what is neces-

sary in the *cogito* is a conditional necessity: *if* I think, then I must be. But it is not an absolute necessity: it is not necessary *that* I should think» (Meillassoux 2007: 429). If I am correct, only this speculative realism can provide Rescher with a rigorous and non-contradictory version of his claims that stays true to his basic commitments; it can deny the possibility of insolubilia and deny the possibility of complete science. Thus, whether or not time-travel is possible, absolute contingency insures that such travels can never ascertain the limits of science once and for all. Time, for Meillassoux, is «absolute time [...] tantamount to a 'hyper-chaos' for which nothing is impossible, unless it be the production of a necessary being» (Brassier 2007: 39). The possibility of predicting future science might even give the predictions a conditional necessity, in the sense that *if* things go as they seemed to go, then necessarily this is what will happen. But that conditional will not itself be grounded in any ultimate reason; rather, its only ground is the absolute *unreason* of absolute contingency, meaning the real possibility that things can change for no reason at any moment.

Though an absolute principle would generally seem anathema to Rescher, in this case, since it is the rejection of necessity that is being absolutized, it suits Rescher quite well. To adopt this position, Rescher would however have to abandon the possibility he outlines when discussing candidates for insolubilia, which is that it might be possible to adapt a teleological principle of «fittingness», of value, as the explanatory «end of the line» for certain basic facts about nature. This is not, in my opinion, a large sacrifice, as it seems to be much more in line with Rescher's position as a whole to ground the basic conditional facts of nature (why there is something rather than nothing, etc.) on absolute contingency, rather than on some necessary teleological principle.

A possible counterargument in this case is that absolute contingency does not explain anything, that it is equivalent to saying «the reason is there is no reason». There are at least two rejoinders: One can use the same line of argument Rescher uses to defend the possibility of teleological explanations: who are you to be so sure what can and what cannot be a scientific explanation? The other maintains that in the absence of conditional necessity (it might, of course, turn out at a later point that a conditional necessity was involved after all), what could possibly be a better «reason» than appeal to an absolute principle, established by sound philosophical argument?

Thus, we arrive at a strange conclusion where Rescher

can maintain his non-absolutist view of science, his view of limits to science as a nonentity, while at the same time grounding this view on the truth of a substantial metaphysical principle. And in fact, it is only because of this principle that it is possible for him to maintain his view.

NOTER

¹ Actually, Rescher comes close to this view. «For if the question is such that its resolution lies in principle beyond the powers of science, it is difficult to see how we could maintain it to be an authentic scientific question.» (Rescher 1999: 124) But this threatens to contradict the distinctions Rescher makes in his introduction, where he claims to focus on the question of «How far *could* science go in principle: what are the *theoretical* limits on science» (Rescher 1999: 2) . If he simply by definition rules out any question that is beyond what science could answer in principle, then the investigation announced here becomes moot. I will therefore proceed on the assumption that he does not hold this view.

² Merely asserting that «there might be a question that is scientific but which science is powerless to answer, though I have no idea what it could be» cannot, as far as I see, be viewed as productively asserting anything at all.

³ Actually, this isn't precisely true, as the N-body problem shows, see Casti, *Boundaries and Barriers*, 25. But up to a degree of time and certainty our predictions are reliable.

⁴ I find it very surprising that Rescher doesn't bring up this subject himself, seeing as he is discussing prediction and what is possible in principle. Surely time-machines, or seeing into the future more generally, is a subject which should be brought to the table at that point? A discussion of something like the movie *Minority Report* or Isaac Asimov's *Foundation*-series within the theme of Rescher's book would, I believe, have been both interesting and clarifying.

⁵ Whether they reserve a conceptual space for «things in themselves», or find that notion incomprehensible, is of secondary importance.

LITTERATUR

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