Causal Realism, Epistemology and Underdetermination

Abstract: It is often charged against realist philosophers of science that because they are committed to an ontology that is realist about causal categories and hence committed to the truth of various claims that are underdetermined by any and all possible evidence, they run afoul of certain epistemic constraints on rational inference. In this paper I defend causal realism from the charge of underdetermination. After reconstructing the non-realist argument, I argue that the soundness of the complaint depends on the truth of the claim that there is a uniquely correct set of epistemologies, none of which permit inferences to realist theories. I then argue that, given the current state of the discipline, we have no good reasons for thinking this claim is true.

1. Introduction. It is often claimed against realism, especially realism about causes or natural laws, that realist theories are epistemically unacceptable because they are underdetermined by any and all possible evidence. Two sorts of underdetermination of theory by data were distinguished at least as early as Descartes. While both bear on the epistemic acceptability of realism, I think realists and non-realists alike have in general neither been sufficiently careful in distinguishing between them, nor been sufficiently clear about the role of each in challenges to the cogency of realism. When the role they play in challenge to realism from underdetermination is made plain, the challenge itself is seen to require more than any non-realist is now in a position to supply. The difficulties a complete defense of realism must overcome are similarly illuminated. The non-realist
challenge and the realist’s complete defense each require a different claim about the set of all philosophically acceptable epistemologies, i.e. the set of epistemologies any one of which it would not be irrational to adopt. Neither of the relevant claims have been established, nor could they be given the current state of philosophic knowledge.

At the end of the First Meditation (1988, 79), Descartes famously entertains the hypothesis that the entire folk ontology of objects, causes, laws and so on is mistaken: only he and an evil demon exist. Because both folk ontology and the evil demon ontology are consistent with any possible set of observational evidence, the evidence underdetermines the true ontological theory. Call this sort of underdetermination **ontological underdetermination**. Earlier in the First Meditation, Descartes considers a second kind of underdetermination. He considers the possibility that his experience of himself sitting in front of the fire, etc. is in fact a dream.(1988, 77) Descartes is not yet questioning the correctness of folk ontology; he has not yet relinquished the supposition that there are objects, causes and so on. He is rather pointing out that, on that very ontology, there are two distinct process by which the very same set of data, the very same experiences, may be generated, and so the data themselves do not suffice for a determination of which process is actually at work. Let us call this sort of underdetermination **theory underdetermination**. One might think that either sort of underdetermination is alone a problem for causal realism in the philosophy of science. But that is a mistake.

If ontological underdetermination holds, the assumption of any complete ontological theory can be no more than that-- an assumption. To be more, e.g. a justified assumption, there must be epistemically virtuous reasons for making that assumption
rather than some other, or none at all. But if ontological underdetermination obtains, there can be no such reasons. Hence the assumption of a causally realist ontology can be no more than an (epistemically) unjustified assumption. The same is, of course, equally true of any other kind of ontology that includes categories knowledge of which is inferentially justified.

But ontological underdetermination is by itself a problem for causal realism only so long as the realist is in the business of showing there are epistemically virtuous reasons for adopting an ontology at all, and for adopting hers in particular. Normative philosophers of science are not, however, engaged in any such business, at least not qua their activities as philosophers of science. Normative philosophers of science are rather concerned to answer two general questions, viz. 1) ‘How is it that scientists are so successful at discovering empirically adequate theories?’ and 2) ‘By what methods might the success of science be yet further improved?’. The business of science is to describe the organization of observable phenomena, i.e. the architecture behind the pattern of observations we make. The practice of science, and therefore the above philosophical questions about that practice, simply make no sense absent the assumption that there is an architecture to be described, absent, in short, the assumption that there is an external world which scientists sometimes do successfully describe. Hence, normative philosophers of science are committed at least to a minimally realist ontological assumption, i.e. that there is an external world, but not to any epistemic defense of such a minimally realist ontology.

If ontological underdetermination is not alone enough to challenge the cogency of realism in philosophy of science, neither is theory underdetermination, for the simple
reason that the latter sort of underdetermination is underdetermination *relative to* a particular set of ontological assumptions. Descartes’ dream argument, for example, presupposes that there are such things as chairs, fires, persons and dreams. Descartes point is that, given the existence of dreams with content indistinguishable from real experiences, one can never know whether one is currently confronting, e.g., a fire, or simply dreaming that one is currently confronting a fire. But there is no reason, here, to doubt the existence of such things as fires. Indeed, Descartes introduces the evil demon argument precisely in order to induce doubt about the existence of such objects as well as doubt about conceptual and mathematical truths.

But together both sorts of underdetermination issue in an apparently compelling critique. The two-part criticism is roughly this. (Argument for Theoretical Underdetermination) Suppose a philosopher assumes an ontology that is substantively realist, i.e. not only postulates an external world but recognizes as well some particular category $C$ of unobservables. Suppose further that the realist’s ontology is correct. Nevertheless, for any empirically adequate realist theory, e.g. the theory that $C$ is instanced at a particular spatio-temporal local, there is an equally adequate instrumentalist competitor. That is, given any realist theory and any body of data, there is an instrumentalist competitor which has exactly the same logical relations to the observation reports comprising the data as does the realist theory. Since the data bear the same logical relations to both theories, there will be no empirical reason for preferring one theory to the other. But, the challenge continues, (Continuation Argument) if we are never in a position to rationally justify the acceptance of any realist theory, ontological underdetermination rearises as a pressing concern. Though the practice of science and
hence of normative philosophy of science requires the assumption that there is an
external world, an epistemically virtuous practice of science will never include inferences
to the truth of theories that refer to unobservable entities in that world. Hence there is no
point, and some epistemic cost, to adopting substantively realist ontologies. Though
normative philosophy of science requires the assumption of some ontology, the
assumption of any substantively realist ontology over an ontology that is only minimally
realist constitutes a risky but superfluous, and hence unnecessary, extension. Since
rationality counsels that we avoid such extensions, substantive realism is to be avoided.

Though I know of no non-realist who has put the underdetermination charge in
precisely this form, I think much recent non-realist criticism advances arguments with
1992, for example, are all works I think can be fairly, indeed best, understood as
advancing criticisms of this kind.

2. **Realist Responses**. Recently, Laudan (1990) and Laudan and Leplin (1991 and
1993)), have pointed out that, so put, the argument against realism is unsound. To see
why, consider a further distinction among kinds of theory underdetermination. If, as the
non-realist argument supposes, there is no difference in the logical relationships borne by
the two theories to the data, no purely deductive methods justify an inference to the
realist theory over its instrumentalist competitor, or vice versa. Laudan (1990, 269) has
dubbed underdetermination of this sort of Humean Underdetermination. Laudan and
Leplin point out that the mere fact that Humean Underdetermination obtains does not
entail that the choice between the realist theory and its instrumentalist competitor is
rationally underdetermined because there may well be epistemically virtuous, but not
deductive, reasons for accepting one but not the other of the competing theories.
According to Laudan and Leplin, then, the non-realist complaint against realism from the
charge of underdetermination requires that the non-realist be able to give convincing
reasons to think that every realist theory is, if not false, at least rationally
underdetermined by all possible empirical evidence.

I shall say that a body of empirical evidence rationally underdetermines a set of
theories if either 1) the canons of rational inference do not counsel inference to any
theory in the set, or 2) inferences to two or more theories in the set each violate none of
the canons. Let the theory set of a theory \( T \) be the set of all constructable, distinct
alternatives to \( T \). I shall say that a body of evidence rationally underdetermines a
particular theory \( T \) if the evidence rationally underdetermines \( T \)'s theory set, and does
not warrant an inference to \( \sim T \). Finally, I shall assume that if \( T_1 \) is a rationally
underdetermined realist theory, then in its theory set are two other theories, \( T_2 \), some
empirically equivalent anti-realist theory, and \( T_3 \), the hypothesis that \( T_1 \) and \( T_2 \) are both
empirically adequate.

Though their particular arguments are novel, Laudan and Leplin (1991 and 1993)
follow a standard realist strategy in defending realism from the charge of rational
underdetermination. They first deny that rational underdetermination always holds,
partly on the basis of arguments restricting the range of alternative theories which must
be regarded as serious competitors, and then they attempt to show that various commonly
accepted inference rules give us reason for thinking that, at least sometimes, it will be the
realist theory rather than its instrumentalist competitor which is to be preferred. If they
are right about these claims, then the non-realist’s argument from theory underdetermination to ontological underdetermination is denied a crucial premise.

While I think Laudan and Leplin are correct in their diagnoses of a gap in the non-realist’s move from Humean Underdetermination to the rejection of realism, I think their strategy for defending realism is a mistake. It is not just that I think, though I do, that they have managed a compelling defense of neither the required restrictions on competing theories, nor the inferential strategies used to justify inferences to realist theories. Rather, I think this way of responding to the non-realist’s complaint is a strategic error. To anticipate results that will emerge, this sort of response gives the non-realist more ground than he is entitled to; it pins realists’ hopes to the defense of an epistemological claim I think very likely false; and there is little hope of establishing the claim, even if it is true.

I begin with a view of just what ontologies and epistemologies are, and of the connections between the two. This allows a distinction between three kinds of rational underdetermination, only the last of which entails the epistemic unacceptability of realism. Finally, I argue that non-realists have given no reason to think the relevant kind of rational underdetermination holds, and indeed could not do so absent substantive philosophical investigation into the standards by which we ought adjudicate between competing epistemologies.

3. **Ontology.** An ontology is partly constituted by a set of categories which are, or might be, instanced in our world. So, e.g., we shall have a category of EXPERIENCE, and the category of OBJECT, another of PROPERTY, and so on. Ontologies that are realist about
causes will include categories of, e.g. CAUSAL RELATIONS, or NATURAL LAWS; non-realist ontologies will not.

The categories alone will not exhaust an ontology, for the ontology will also make claims about what categories are co-instantiable in a particular (presumably spatio-temporal) locale. E.g. most of us will agree that you cannot have a molecule of H$_2$O without having also an atom of Oxygen, and two of Hydrogen. Likewise, most realists about natural laws allow that one can have a universal regularity, e.g. all A’s being B’s, with or without a corresponding law covering the regularity, i.e. the regularity may be nomic, or accidental. An ontology then specifies a rather large set of possible co-instantiations of ontic categories, or what I shall call ontic arrangements. Because it is more trouble than it is worth to identify an ontology by specifying all such arrangements, we might represent such an ontology as a set of categories and a set of filling instructions: any arrangement is possible on the ontology, and so in the ontology, provided it can be generated by assigning instances of categories in the ontology to a space-time region without violating one or more filling instructions.

If ontologies are so understood, we can add precision to the anti-realist challenge. The anti-realist is claiming that, given theory underdetermination, the following is true. We know, from the fact that theory underdetermination is true, that if an ontology is realist about a causal category then any inference to the instantiation of this category or to a theory making reference to this category is epistemically unacceptable. Elaborating the continuation argument we then have: The causal category recognized by the realist’s ontology is superfluous, since inferences to instances of it are never epistemically
acceptable. Hence including it in our ontology runs unnecessary and therefore irrational epistemic risks. The realist ontology ought therefore be rejected.

The continuation argument clearly depends on the claim that inferences to instances of the realist category are never epistemically acceptable, for otherwise it simply will not be true that the category is superfluous. But just what is it for an inference to be epistemically unacceptable?

4. Epistemology. Just as an ontology is a theory about what things exist, an epistemology is a theory, a theory about which beliefs, or degrees of belief, are rationally justified. We are here especially concerned with justified inferential beliefs. Inferences are varied, and so epistemologies are large theories. We shall be concerned with just one part of epistemologies: the part which specifies which sets of observations license inferences to realist theories in general, and to claims about the realization of ontic arrangements in particular. Epistemologies must, if they recognize categories beyond those of experience, observation or data, include some sub-theory which says when it is that one is entitled to infer from an arrangement of data to the realization of a robust ontic arrangement at a particular spatio-temporal locale. I shall call this part of an epistemology a set of bridging pairs. A bridging pair is an ordered pair of the form 

\[ \langle S_s, R \rangle, O \],

where \( \langle S_s, R \rangle \) is an *epistemic condition* and \( O \) is an ontic arrangement. An inference from an *epistemic arrangement*, or structured data set, \( S \) to the instantiation of an ontic arrangement \( O \) is justified, i.e. rational, on a given epistemology if and only if that epistemology includes a pair \( \langle S_s, R \rangle, O \rangle \), and \( S \) satisfies \( S_s \) and \( R \). \( S_s \) is a condition on the structure of any arbitrary data set \( S \), \( R \) a condition on the construction of arbitrary
S. S, might, for example, be the occurrence of a constant conjunction of A’s and B’s, R the condition that the data sample be representative of the population of all data, past, present and future, and O an ontic arrangement including a natural law of the form □(∀x)(Ax ⊃ Bx).

With epistemologies so understood, it will come as no surprise to note that the both the scientific and philosophic communities are deeply divided about what the appropriate epistemology is, in part because both communities are divided about what sets of bridging pairs may legitimately appear in an acceptable epistemology. Consider here the continually active debates in philosophy between those who endorse inference to the best explanation and those who reject it, or debates in the social sciences between those who endorse factor analytic techniques and those who prefer regression. In either case there is no general agreement within each camp, much less between them, about what ontological claims may be legitimately inferred, and under what conditions they may be so inferred.

5. The Underdetermination Charge Revisited. We are now in a position to make completely precise the non-realist’s underdetermination challenge. The continuation of the non-realist’s underdetermination complaint correctly assumes that a realist ontology O is epistemically unacceptable unless there is at least one philosophically acceptable epistemology E, i.e. an epistemology satisfying all the canons of rational inference, such that, for each realist category C in O, there is in O at least one realist ontic arrangement containing an instance of C and appearing in at least one bridging pair in E. Absent any bridging pair containing such an ontic arrangement, inferences to instances of C are never
licensed by the epistemology. Hence, on that epistemology, the category $C$ is superfluous. If every philosophically acceptable epistemology fails to include a relevant pair, no acceptable inferences to instances of $C$ are ever possible--theories about $C$ are at best rationally underdetermined and at worst rationally held to be false. Therefore, the ontology $O$ which includes $C$ is, in virtue of theory underdetermination, an unnecessary extension of the assumption that there is an external world, and assumption that, though necessary, is itself unjustified in virtue of ontological underdetermination. Hence $O$ is epistemically unacceptable.

So if the non-realist about causes or laws is to deploy the continuation argument against realism, then he must claim that every realist ontology $O$ fails to include any realist ontic arrangement that appears in a bridging pair in some philosophically acceptable epistemology $E$. Let us say that theory $T$ is *locally underdetermined* by an epistemology $E$ if $T$ includes claims about an ontic category $C$, and $E$ includes no bridging pair $\langle S, R, O \rangle$ where some instance of $C$ is in $O$. If we call an epistemology that locally underdetermines every realist theory an *instrumentalist epistemology*, and one that does not do so a *realist epistemology*, then the non-realist’s charge depends on the claim that every acceptable epistemology is an instrumentalist epistemology.

Once the non-realist’s charge is clearly made out, it should be obvious why rational underdetermination per se is a red-herring. Suppose that the canons of rational inference underdetermine the correct epistemology, i.e. more than one distinct epistemology is philosophically acceptable. In that case, a given theory can be rationally underdetermined even if it is not locally underdetermined on every acceptable epistemology. Suppose $T_1$ and $T_2$ are elements of a given theory set, and that $T_1$ and $T_2$
differ in the ontic categories about which they make claims only in that $T_1$ makes claims about category $C$ whereas $T_2$ does not. Let there be two acceptable epistemologies $E_1$ and $E_2$. Suppose we have data set $S$ on which $E_1$ counsels inference to $T_1$ and $E_2$ to $T_2$. Then $T_1$ is rationally underdetermined-- an inference to $T_1$ is faithful to the canons of rationality, and so is an inference to $T_2$ (though each inference requires the adoption of different, though acceptable, epistemologies). But this in no way impugns the epistemic acceptability of the realist ontology required for the truth of $T_1$, for it will not follow from the fact that $T_1$ is rationally underdetermined that an inference to $T_1$ is epistemically unacceptable. The inference is shown to be acceptable by appeal to $E_1$ and $S$, and the non-realist had better allow that it is if he wishes his own inference to $T_2$ to be epistemically acceptable.

To see this, consider the two possible cases: $T_2$ is either 1) an anti-realist theory, or 2) the claim that $T_1$ and some anti-realist competitor $T_i$ are both empirically adequate. If 1, then since $E_1$ is an acceptable epistemology it will not counsel inference to both $T_1$ and $T_2$ (on pain of incoherence), so the non-realist must appeal to $E_2$ to justify his inference. But because $E_2$ is no less underdetermined than $E_1$, the non-realist cannot now claim that the realist’s inference to $T_1$ is inadmissible on the ground that its justification requires an appeal to an underdetermined epistemology, $E_1$. If 2, then the non-realist might justify his inference to $T_2$ either by appeal to $E_2$ or by appeal to $E_1$. The latter appeal is possible because $T_2$ here is the claim that $T_1$ and an empirically equivalent competitor are both empirically adequate, so any acceptable epistemology that licenses an inference to $T_1$ had better also license an inference to $T_2$. If the non-realist appeals to $E_2$ to justify his inference, then again he had better not claim that the realist’s appeal to $E_1$ is
unacceptable because $E_1$ is underdetermined, for $E_2$ is equally underdetermined. If, on the other hand, he appeals to $E_1$ to justify his inference, then he had better allow the realist to appeal to the same epistemology. Thus, although $T_1$ is rationally underdetermined, inferences to $T_1$ are nonetheless epistemically acceptable because the correct epistemology is underdetermined and among the acceptable epistemologies there is one that licenses inference to $T_1$ given the available data. Hence the realist category $C$ is not superfluous, and therefore there is no basis for the charge that adopting the realist ontology required by $T_1$ is epistemically unacceptable.

Let *global rational underdetermination* of a theory set be rational underdetermination which arises from the acceptability of such distinct epistemologies, some of which counsel inferences to different members of a theory set. Let a set of epistemologies *universally underdetermine* a set of theories if every epistemology in the set locally underdetermines every theory in the set of theories. The continuation argument requires the premise that the set of philosophically acceptable epistemologies, whether this set has a unique member or several members, includes no realist epistemology. Hence if realism is to be shown by some underdetermination argument to be somehow less rational than non-realism, the non-realist must do more than merely show that all realist theories are rationally underdetermined. He must show that all realist theories are universally rationally underdetermined by the set of all acceptable epistemologies.

The strategic mistake committed by the Laudan-Leplin line of defense can now be made plain. They allow the non-realist the implicit assumption the constraints on rational inference do not underdetermine the correct epistemology, and hence allow the further
assumption that if realist theories are rationally underdetermined, they are epistemologically unacceptable. The second assumption is not only a mistake, it invites disaster. Under this assumption, realist theories are guaranteed to be globally rationally underdetermined, and hence rationally underdetermined, if there is even one acceptable instrumentalist epistemology. Since I am not, as it were, an evangelical realist, I think it likely that some such epistemology is acceptable, and further that even if no such epistemology is acceptable, it will be virtually impossible to demonstrate that fact. Such a demonstration will be required of a full defense of realism along the Laudan-Leplin lines. Hence that line of defense gives more ground to the non-realist than is required, and is committed to the truth of a claim which is firstly improbable and secondly virtually impossible to establish even if true.

On the other hand, it is not at all clear that there is no acceptable realist epistemology. And if even one such exists, then causal realism will not be epistemically unacceptable. Given an acceptable realist epistemology, realism, as any other metaphysical position on which it is possible to pursue normative philosophy of science, will involve an unjustified (but not therefore irrational) commitment to an ontology that includes categories other than experience. But within the scope of the assumed ontology and associated acceptable epistemology, inferences to realist theories and to realist ontic arrangements will be no less epistemically acceptable than are inferences to instrumentalist theories within the scope of instrumentalist epistemologies.

Until and unless, then, the non-realisnts can develop and defend some particular canons of rationality, or as I shall say, some set of meta-conditions on acceptable epistemologies, and show that any realist epistemology must violate one or more of these
conditions, they cannot show that realism is epistemically unacceptable by appealing to underdetermination. This, I claim, simply has not been done. Indeed, it simply could not be done absent some definitive and precise statement of the meta-conditions an acceptable epistemology must satisfy. No such statement is currently available; hence neither a complete defense of realism, nor a complete and cogent underdetermination challenge to realism are as yet possible.

6. Meta Conditions. Let us say that an epistemology saves an ontology if for each category in the ontology there is some bridging pair in the epistemology that includes an ontic arrangement that itself includes an instance of that category. The non-realist’s complaint requires that he establish that no realist ontology is saved by a philosophically acceptable epistemology. To show this, the non-realist must establish some meta-condition on acceptable epistemologies violated by any epistemology that saves a realist ontology. What, then, as a general matter, ought we require of an epistemology if we are to regard it is acceptable, i.e. as countenancing only inferences we take it not to be irrational to make, both individually and collectively?

Minimally, of course, we should require self-consistency. The epistemology had better not license inferences both to \( T \) and to \( \sim T \) on any given body of evidence \( S \). Two other meta-conditions seem obviously necessary; they have at least been enormously popular in this century: falsifiability and reliability. Realism can satisfy both of these requirements. Consider first falsifiability.

One version of this condition requires that an acceptable epistemology license inferences only to theories that are potentially falsifiable, i.e. theories such that there is
some logically possible set of observations that, if made, would disconfirm the hypothesis. Such epistemologies will not, therefore, allow inferences to the existence of ghosts or angels or vital spirits or homunculi, where the existence of such entities is understood to be compatible with any set of experiences. Realism clearly can satisfy this version of the falsifiability condition, since, e.g., inferences to the nomic claim that $\Box(\forall x)(Fx \supset Gx)$ are inferences to a theory that is falsified by the observation of any item that is both F and $\sim G$.

A more stringent version of the falsifiability condition is that acceptable epistemologies license inferences only to theories such that if they are false they are discoverably false. Some versions of realism cannot satisfy this condition, e.g. one way for the above nomic claim to be false is for the implied regularity to hold, but to do so as a matter of accident, and in this case it is empirically impossible to falsify the nomic claim. So there are two questions, viz.: Is there any version of causal realism such that some epistemology both saves it and satisfies the stronger falsifiability condition, and which version of the falsifiability condition is, in fact, the right version?

The second question is, to my mind, the more interesting. Note that the stronger version can be defended only by appeal to some set of standards by which to adjudicate between competing views of the correct meta-conditions on acceptable epistemologies. So far as I know, non-realists have given no compelling argument for the claim that this stronger version is to be, much less must be, preferred. For one thing, this version of the condition has some implausible consequences. On the strong interpretation one cannot ever infer to the denial that things of kind C exist if the hypothesis that nothing is of kind C is compatible with all possible arrangements of data, for such denials can be false
without it being possible to discover that they are false. Hence, such a meta-condition
would appear to entail that it is irrational to believe that there is no god, and that vital
spirits and homunculi do not exist, and so on.

Indeed, the most prominent non-realist now writing, Bas van Fraassen, cannot
endorse any such interpretation of the falsifiability condition. While in general an
agnostic non-realist, van Fraassen does hold that there are no such things as sense data.
(1980, 72). But he does not appear to hold that the hypothesis that there are sense-data is
empirically disconfirmed, but rather that the hypothesis is not scientific.(1980, 72) By
the latter I take it he means, at least, that the hypothesis that such things exist is not even
weakly falsifiable, i.e. that the hypothesis that such things exist is consistent with any
pattern of experience. But if so, then the hypothesis that such things do not exist is not
itself strongly falsifiable. Van Fraassen at least cannot insist on the strong version of the
falsifiability condition.

Consider now reliability. One might claim against realist epistemology/ontology
pairs that it is impossible to establish the reliability of licensed inferences to ontic
arrangements that include laws or causes, on some or another account of reliable
inference. As it turns out, there are at least two sorts of reliabilists these days: the
naturalized epistemologists and the learning theorists. The former category includes, for
example, Kitcher (1992 and 1993), and Goldman (1986). Such philosophers take
establishing the reliability of an inferential process or rule to be an empirical matter. So,
e.g., one can establish the reliability of inferences to the existence of objects under
normal viewing conditions by showing that, under such conditions, experimental subjects
reliably infer to correct claims, i.e. subjects say there is an object when the experimenter
takes there to be an object, and subjects say there is no object when the experimenter takes there not to be such an object.

Whatever the merits of reliability so understood, it seems unlikely that human subjects would turn out to be unreliable inferers about certain kinds of causal connections. To the extent that we are ‘reliable’ pickers out of medium sized objects—apples, tables, buildings, lions etc., we are reliable pickers out of causal relations between such objects, under normal viewing conditions, and for exactly the same reasons. If when looking at a baseball and a window we can reliably determine that we are doing so, then we make equally reliable inferences about the causal connections between baseballs and windows, at least when we see particular baseballs crash through particular windows.

The second, more abstract, kind of theory of reliability is generated by the theory of computation. Here a discovery algorithm is said to be reliable for a given class of hypothesis in a given class of possible worlds provided the algorithm will in the limit converge to the correct assessment of the truth of an hypotheses of that sort in every possible world in the class. Kelly (1996) has proved some important negative theorems about discoverability in this sense, and these theorems appear to place important limitations on permissible realist theories. But also, Spirtes et.al. (1993) have proved the reliability of a variety of algorithms for causal discovery in certain classes of possible worlds. If an ontology includes filling instructions guaranteeing that any world in which the ontology is true is also a member of one of the relevant classes of possible worlds, then reliable discovery of causal connections on that ontology is possible. So some kinds of causal realism, at least, can pass the muster of the reliability requirement, at least so interpreted.
Perhaps, of course, there are other versions of the reliability condition waiting to be formulated, versions unsatisfiable by any realist epistemology. And perhaps there are good reasons for thinking those versions of the reliability requirement are preferable to the alternatives described above. There are three things to note about such as yet undescribed versions of the reliability condition. The first is that we can have in them no good reason to reject realism until and unless at least one of those versions is described and defended, and it is shown that no realist epistemology can satisfy the condition, so understood. Second, we certainly wish to demand of any acceptable epistemology that it be reliable, in some sense of the term. But until we know what exactly the correct sense of reliability is, we cannot know what sets of meta-conditions insure that acceptable epistemologies are reliable in the relevant sense. Unfortunately, it is not at all clear what, if anything, objectively recommends one notion of reliability as against alternative conceptions as uniquely rational. Third, any such choice between notions of reliability is complicated by the desire for acceptable epistemologies to possess other properties. While consistency, falsifiability and reliability are important, indeed essential, features that meta-conditions ought to insure acceptable epistemologies have, they cannot exhaust the features we demand of epistemologies. In particular, our standard of reliability must be sufficiently weak to accommodate some condition on what might vaguely be called the power of an epistemology.

7. Power and Reliability. Consistency, falsifiability, and reliability cannot exhaust the meta-conditions on acceptable epistemology because it is simple enough to construct entirely unsatisfactory epistemologies that satisfy especially demanding versions of those
standards. Consider, for example, inferences to the value of parameters. Interval estimations of such values can be made perfectly accurate, and hence, in this respect, maximally reliable, simply by minimizing the precision of such estimates. Similarly, one can both minimize the number of falsehoods in one’s corpus of beliefs and maximize ratio of true to false claims in that corpus, simply by accepting only the evidence and whatever propositions are deductively entailed by the evidence. Either way of securing reliability gives up more content, more of what we might vaguely call power, than we are generally willing to forego.

Presumably there are various ways in which the notion of epistemic power may be made precise, each describing an axis on which we must trade the reliability of our epistemology against the content of the inferences it licenses. If we demand maximal reliability of our epistemologies, they turn out to be useless because uninformative. Conversely, if we demand maximal power from our epistemologies, they turn out to be useless because completely unreliable. We are then confronted with the following meta-epistemological quandaries: 1) What are the general conditions, if any, on the appropriate tradeoff between reliability and power for an epistemology. 2) Do these conditions individuate a unique set of meta-conditions on acceptable epistemologies, meta-conditions such that adoption of an epistemology that does not satisfy them is essentially irrational? 3) Is the set of epistemologies that satisfy these resulting meta-conditions composed solely of instrumentalist epistemologies?

I think very often non-realists assume, without defense, that the general conditions on the appropriate tradeoff between power and reliability yield one or the other of two meta-conditions on acceptable epistemologies. Each entails the
unacceptability of virtually any realist epistemology. But I think both are mistaken, and neither may be assumed without substantive defense. Consider first the following condition. One might think that given two otherwise equally acceptable epistemologies, the epistemology that minimizes one’s ontological commitments is to be preferred, if only because increased ontological commitments come at the price of decreased reliability. Of equally minimal and otherwise acceptable epistemologies (e.g. among equally reliable epistemologies), one should choose the most powerful. But one should always prefer increases in reliability to increases in power, and hence one should always prefer epistemologies with more minimal ontic commitments. Something like this view is implicit in the non-realist’s continuation argument.

This meta-condition, if right, would clearly count as unacceptable any realist epistemology, and hence any epistemology that saves a realist ontology. Any such realist epistemology will, by definition, license inferences to some category \( C \), inferences to which are not licensed by some competing and otherwise identical instrumentalist competitor. Since there is some possibility that \( C \) is in fact never instanced while the conditions that, on the realist epistemology, license inference to an instance of \( C \) are instanced at least once, the realist epistemology is necessarily in this intuitive sense less reliable than its instrumentalist competitor.

Nonetheless, I think one ought be dubious about the legitimacy of this meta-condition. One can see why it is a good practical constraint on the choice of ontology to prefer ontologies that minimize one’s ontic commitments. The adoption of an ontology is epistemically acceptable only if that ontology is saved by an acceptable epistemology. The more categories an ontology recognizes, the fewer the epistemologies that allow
inferences to the instantiation of all such categories, and hence the less likely that some acceptable epistemology will save the ontology. It is therefore a good search heuristic when choosing ontologies to pick the most minimal ontology one can.

But it is not at all clear why the same condition should apply to epistemologies. Consider to otherwise acceptable epistemologies $E_r$ and $E_i$ that differ only in that $E_r$ licenses some realist inference that $E_i$ does not. Since both epistemologies are otherwise acceptable, there is nothing irrational about the realist inference in and of itself. The ground for preferring $E_i$ to $E_r$, then, is just that in allowing such a realist inference $E_r$ runs an epistemic risk not run by $E_i$, namely the risk that the conditions which license the inference might be realized even when the relevant realist category is not instanced. But just why is it that it is irrational to prefer increases in power at the price of running just this sort of risk? One could surely justify the meta-condition if one held that, ceteris paribus, it is better to minimize the number of falsehoods in one’s corpus of beliefs than to maximize the number of truths in that corpus. But I think few will find any such position plausible, and even those who do ought agree that the position is at least in serious need of defense.

There is another meta-condition, not dissimilar to the minimality requirement, that would ensure that the canons of rational inference do not underdetermine the correct epistemology. We might call this condition the \textit{universality requirement}, for it holds this: the correct epistemology is that epistemology that licenses all and only those inferences licensed by \textit{every} otherwise acceptable epistemology. There are a number of reasons to be dubious about this meta-condition.
First, there is no guarantee that there are any inferences licensed by every epistemology in the set of epistemologies satisfying all other meta-conditions. If it should turn out that there is no such inference, the uniquely acceptable epistemology will license no inferences at all. Second, the adoption of this meta-condition amounts to an unjustified preference for minimalist epistemologies. Suppose every inference licensed by $E_2$ is licensed by $E_1$, but the converse is not true, and that both are otherwise acceptable. Then, according to this meta-condition, $E_2$ is to be preferred. But we might well ask why it should be. Why should we prefer a weaker to a stronger epistemology even when the extra inferences licensed by the stronger epistemology are otherwise acceptable? Such self imposed epistemic abstemiousness is perhaps unobjectionable, but why is it required? Again, justificatory appeals to the preferability of minimizing falsehoods over maximizing truths in one’s belief corpus are possible, but are themselves surely in need of defense. Absent a sustained defense of the enjoined preference for weaker over stronger epistemologies, I think realists need not, and ought not, take this supposed meta-condition seriously.

I am unaware of further articulations of conditions on the tradeoff between epistemological reliability and power that obviously entail the unacceptability of realist epistemologies. No doubt many different such articulations are possible, and perhaps some are defensible. But if the non-realist is to use these grounds to establish the unacceptability of realism, he must provide us not only with a condition on the relevant tradeoff, but show as well why that condition is the right condition. I not only am unsure about what the right condition on the tradeoff is, I am unsure that there is any uniquely right condition on this tradeoff, and equally unsure about what it would take to establish
some condition as uniquely right. In what respect is it, exactly, that it is irrational to prefer stronger epistemologies even at the price of reliability, or conversely, just what exactly is irrational about the skeptics’ preference for reliability over power? At the least, the non-realist has some good bit of work to do, here, if he is to establish the claim that every realist epistemology must trade reliability for power in some unacceptable fashion. Similar work confronts the realist if she seeks to establish conclusively that realism is acceptable, much less that it is the only acceptable ontological view. This work has little or nothing to do with the underdetermination of theory or ontology by available evidence. It has everything to do with the choice of epistemology: what may we appropriately demand of an epistemology, and how may we justify our insistence that epistemologies lacking the properties of concern are unacceptable? Absent systematic and general answers to these questions, it seems to me, the non-realist’s case against realism on the grounds of underdetermination is little short of hopeless, as is any conclusive defense of realism.

8. Conclusion. So I take it that, whatever the faults of realism may be, they do not lie in the fact that realist ontologies allow claims that are rationally underdetermined by experience. Contra Laudan and Leplin, that realist theories admit of such underdetermination may well be true. Indeed, all realist theories will be globally rationally underdetermined, and therefore rationally underdetermined, if there is even one philosophically acceptable instrumentalist epistemology. But such rational underdetermination does not entail that realism is rationally unacceptable, for global rational underdetermination need not make the acceptance of any, much less every, realist
theory irrational, and the non-realist’s continuation argument requires this result as a
premise. To establish the relevant unacceptability one must show that every acceptable
epistemology is instrumentalist. One way to defend such universal rational
underdetermination is to motivate a meta-condition on acceptable epistemology that
realist epistemologies cannot satisfy. I think no such meta-condition exists; certainly
there are none that have to date been sufficiently well motivated.

Moreover, a compelling defense of any such meta-condition requires a general
and systematic account of what properties ought be demanded of acceptable
epistemologies, and why it is appropriate to demand those properties and not others. Just
here lies, I think, an immensely interesting and important area for philosophical
investigation that is in need of systematic development.
References


