

# Tolerance and Voluntarism

*Paul Dicken*

**Abstract.** Carnap's mature philosophy of science is an attempt to dissolve the scientific realism debate altogether as a philosophical pseudo-question. His argument depends upon a logico-semantic thesis regarding the structure of a scientific theory, and more importantly, a meta-ontological thesis regarding the explication of existence claims. The latter commits Carnap to a distinction between the analytic and the synthetic, which was allegedly refuted by Quine. The contemporary philosophy of science has therefore sought to distance itself from logico-semantic considerations, and has pursued the scientific realism debate as an essentially epistemological thesis. I show however that one of the most prominent positions in this recent debate—van Fraassen's constructive empiricism—not only ends up in very close proximity to Carnap's attempted dissolution, but even provides the resources for extending and refining his programme. Rather than a historical footnote, Carnap's mature philosophy of science offers a live-option in the current debate.

## 1. Introduction

There is a standard story that is often told about the history of the philosophy of science. It relates how in the early half of the twentieth century, the issue of scientific realism was primarily understood in logico-semantic terms—that the question as to whether or not we should believe in the existence of the theoretical entities variously postulated by our successful scientific theories was ultimately a question regarding the semantics of our theoretical vocabulary. Consequently, philosophers of science were concerned with such projects as to whether or not the theoretical terms of a scientific theory could be reduced to complex conditional claims couched within the observational vocabulary of the theory; or with whether or not the theoretical vocabulary could be eliminated altogether in favour of an entirely observational re-axiomatisation of that theory; or even whether or not the semantics of our scientific language exposed the whole issue of fundamental ontology as a

philosophical pseudo-question. And, so the standard story continues, all of these projects were found to be a complete failure: even supposing that one could draw a principled distinction between the ‘observational’ and ‘theoretical’ terms of a scientific theory, the latter will still possess an irreducibly excess content over the former;<sup>1</sup> even supposing that one could provide a half-way plausible deductive re-axiomatisation of a scientific theory, it will still fail to capture the inductive or probabilistic consequences of the original;<sup>2</sup> and in the case that will primarily occupy the present paper, that even supposing that one was willing to dismiss questions of ontology as philosophical confusion, one would still be committed to an untenable distinction between the analytic and synthetic.<sup>3</sup> The moral of the story is then that the issue of scientific realism should be understood predominantly in terms of epistemology and/or metaphysics, and from sometime around the early 1960s philosophers of science were consequently concerned with the apparently much more promising question as to whether or not the best explanations that we can actually come up with are more likely to be true, even though such a methodology has proved to be highly unreliable in the past.

In this paper I intend to put some pressure on this standard story, at least regarding the claim that the whole scientific realism debate may just be a philosophical pseudo-question. This was the view of the mature Carnap, and followed from two more basic theses that he held: that the logical structure of a scientific theory could be given in a more precise form in terms of its Ramsey-Sentence; and that questions of existence—in this case, the interpretation of the existential quantifiers introduced by the Ramsey-Sentence of a scientific theory—are ultimately language-relative. The first of these theses has been discussed at some length in the literature, particularly

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1 The possibility of a complex reduction of our theoretical vocabulary is most famously associated with Carnap (1928), while the principle difficulties with the project are raised and discussed in Carnap (1936, 1937); see also Ramsey (1931).

2 Such re-axiomatisations are based on the results of Craig (1953, 1956); the best discussion of the project is still Hempel (1958).

3 The *locus classicus* here is Quine (1953), although the precise interpretation and evaluation of the argument there will be discussed in the course of the paper.

in the context of the growing popularity of structural realism. In this paper however I will be mainly focusing upon the second thesis, and attempting to bring out another interesting point of comparison: this time between Carnap's background conception of ontology and his attempted dissolution of the scientific realism debate, and the direction taken by contemporary empiricists following the abandonment of the Carnapian programme. In particular, I shall argue that van Fraassen's constructive empiricism—despite being formulated in explicit contrast to the positivist tradition—ends up in extremely close proximity to Carnap's position, not only in terms of its overall philosophical commitments, but more importantly also in terms of its overall philosophical justification. Ultimately, Carnap's adoption of the Ramsey-Sentence of a theory is justified by his minimalist conception of ontology; ultimately, van Fraassen's own model-theoretic articulation of empiricism is justified by what transpires to be a very minimalist conception of rationality. Such a comparison is very illuminating, although since I take it to be an open question as to whether or not its results are positive or negative I will confine myself to a disjunctive conclusion: that *either* van Fraassen's new empiricism and new epistemology provide the natural extension and refinement of Carnap's philosophy of science, opening up the option of a radical dissolution of the scientific realism debate; *or* that contemporary empiricism still has a lot to learn from the standard story.

## 2. Pseudo-questions in the Philosophy of Science

Carnap's mature views regarding the scientific realism debate are presented most clearly in his *An Introduction to the Philosophy of Science* (1974). In essence, he holds that the traditional debate over the existence of various theoretical or unobservable entities is a philosophical pseudo-question; and in accordance with his general methodology, he proceeds to seek a broader perspective from which the debate can be overcome. He writes:

I believe that the question should not be discussed in the form: 'are theoretical entities real?' but rather in the form: 'shall we prefer a language of physics (and of science in general) that contains theoretical terms, or a

language without such terms?’ From this point of view the question becomes one of preference and practical decision (1974: 256).

In Carnap’s view, the intractability of a long-running philosophical dispute usually lies in an imprecision of the central terms of the debate; and that in order to move forward, one must find a broader perspective from which all parties to the dispute can be acknowledged as being correct in some respect. In the case of the disagreement between scientific realists and instrumentalists, the dispute lies in the existence of theoretical entities; and as Carnap notes, the motivations for the disputants lie in very different conceptions of the aim and purpose of science. For the scientific realist, an important function of our scientific theories is to provide explanations for the observational predictions they produce—and the existence of extra-empirical entities helps us to furnish such explanations. For the instrumentalist by contrast, the purpose of our scientific theories is merely to provide a concise systematisation of these observational predictions—and the existence of additional entities (as opposed to the existence of additional symbolic devices) is ultimately superfluous to this purpose. Yet such conflict only remains while we take the ontological disagreement to be substantive, as about whether or not theoretical entities really exist; if such questions instead reduce to whether or not we should *talk about* theoretical entities, then we can just say that it depends upon how much you want to increase your stock of explanations at the expense of streamlining your predictive tools—and insofar as the realist and the instrumentalist represent extremes positions along this axis, then they can both be acknowledged as being correct regarding the ‘existence’ of theoretical entities, with respect to their particular scientific goals.<sup>4</sup>

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4 Another nice example of this methodology can be found from as early on as his doctoral dissertation in 1922. Here Carnap is concerned with the question as to whether or not the geometry of space is Euclidean, as the neo-Kantian philosopher maintains; non-Euclidean, as the Einsteinian physicist maintains; or a pure relational structure, as the Hilbertian mathematician maintains. Carnap’s answer is to distinguish between the intuitive, empirical and formal notions of space, about which each of the three views are respectively correct. See Friedman (2000: 63-68), and Mormann (2007).

Even this thumbnail sketch raises some immediate objections, and in order to precede it is important to distinguish between the two different components that constitute Carnap's position. The first is a principle regarding the logical reconstruction—or perhaps better, the logical clarification—of the structure of a scientific theory. For Carnap, the most perspicuous rendering of a scientific theory is given in terms of its Ramsey-Sentence, along with an additional meaning postulate known as its Carnap-Sentence. The basic idea behind the Ramsey-Sentence is that in order to preserve the full-range of observational predictions that our scientific theories provide, we will have to talk about more than just the observational entities themselves;<sup>5</sup> however, the additional structural complexity required does not necessarily mean that we need to talk about *specific theoretical entities*—we simply need to talk about enough additional *variables* or other linguistic place-holders for the theory to hang together, without committing ourselves to any particular semantic interpretation. In simple schematic terms, we can think of a scientific theory as a single formula:

$$\text{TC } \{t_1, t_2, \dots, t_n; o_1, o_2, \dots, o_m\}$$

where TC is a complex predicate describing the various theoretical and correspondence relations of the theory (i.e., the purely theoretical laws, and the theoretical-observational bridging principles), satisfied by a sequence of names for the theoretical and observational entities of the theory respectively.<sup>6</sup> The Ramsey-Sentence of the theory is then given by replacing each theoretical name with a variable, along with enough additional existential quantifiers to close the formula:

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5 This requires some qualification, since it is possible to reduce the theoretical vocabulary of a scientific theory to its observational vocabulary *provided* we are willing to make a definitive legislation regarding all future applications of the former i.e., rule-out by definition the possibility of any novel future detection method for the theoretical entity or property in question. The Ramsey-Sentence of a theory is not afflicted with this drawback.

6 Actually, the theoretical terms of the theory will most likely be class terms or relational terms i.e., predicates, meaning that the Ramsey-Sentence of a theory will have to be given in a second-order language. I gloss over this issue for the sake of simplicity.

$$\exists u_1, \exists u_2, \dots \exists u_n \text{ TC } \{u_1, u_2, \dots u_n; o_1, o_2, \dots o_m\}$$

The Carnap-Sentence of a theory is then nothing more than the conditional claim that *if* the Ramsey-Sentence of a theory is true *then* so is the original theory:

$$\exists u_1, \exists u_2, \dots \exists u_n \text{ TC } \{u_1, u_2, \dots u_n; o_1, o_2, \dots o_m\} \supset \text{TC } \{t_1, t_2, \dots t_n; o_1, o_2, \dots o_m\}$$

The Ramsey-Sentence of a theory has the same structural complexity as the original theory, and exactly the same observational consequences, although of course it is much more cumbersome; the Carnap-Sentence of the theory is therefore introduced as a non-logical meaning postulate, effectively legitimising reasoning in the original (and much more straightforward) language of the theory, yet without undermining the central observation that no *specific* interpretation of our existential quantifiers is required.<sup>7</sup> The Ramsey-Sentence also plays an important clarificatory role for Carnap, in specifying precisely the locus of disagreement between realists and instrumentalists, to wit, the interpretation of the additional existential quantifiers.

Implicit in Carnap's argument is the assumption that both realists and instrumentalists will accept the Ramsey-Sentence of a theory as giving the content of that theory, that the replacement of theoretical constants with bound variables is a mere piece of logical clarification. Notoriously however, this claim has been vigorously rejected. From the realist perspective, the problem is that the Ramsey-Sentence of a theory is *much easier to satisfy* than the original theory. For not only does one not need to talk about specific theoretical entities in order to preserve the observational consequences of the original theory, one does not in fact need to talk about theoretical entities at all—the bound variables of a Ramsey-Sentence can be just as easily satisfied by abstract mathematical

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<sup>7</sup> The Carnap Sentence also has a role for Carnap in helping us to specify the analytic statements that lie within the theoretical vocabulary of the theory—these being all and only the logical consequences of the Carnap Sentence (see Carnap, 1958; 1974: 265-274). Although the present discussion is concerned with Carnap's distinction between the analytic and the synthetic, these particular details will not be important for what follows.

entities as they can by unspecific physical entities. Or to put the point another way, the basic insight behind the Ramsey-Sentence is that while one needs some additional structure in order to preserve the observational consequences of a scientific theory, this structure need not be provided through commitment to theoretical entities—the problem then is that there are in fact no constraints at all on what provides this additional structure, making satisfaction of the Ramsey-Sentence of a theory almost trivial. The truth of the atomic theory of gases requires the existence of atoms and gases; the truth of the Ramsey-Sentence of the atomic theory of gases merely requires my ability to organise the observational consequences of the theory in such a way that everything hangs together.<sup>8</sup>

It is often objected therefore that Carnap's proposed reconstruction of a scientific theory is simply a straightforward endorsement of instrumentalism over its scientific realist rival. But it is important to note how the Ramsey-Sentence of a theory is also problematic from the instrumentalist perspective. For the instrumentalist, it is not just that theoretical entities are held not to exist; it is also that our theoretical vocabulary is completely dispensable and (according to at least one flavour of instrumentalism) that this vocabulary has no semantic content whatsoever—theoretical terms are meaningless symbols employed to help systematise observational inferences in much the same way that punctuation marks may be employed. Thus while the Ramsey-Sentence of a theory respects the instrumentalist contention that one need not be committed to specific theoretical entities in order to preserve its observational consequences, it nevertheless fails to respect the instrumentalist contention that our theoretical vocabulary is semantically empty by introducing a range of additional existentially quantified variables in its place, regardless of how they are to be satisfied.

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8 More specifically, the truth of the Ramsey-Sentence of *T* requires that there be an empirically adequate model for *T* whose domain is as large as that of the interpreted language of *T*. This point was first raised, in a slightly different context, by Newman (1928); the relevance of this result for the philosophy of science was made explicit by Demopoulos and Friedman (1985), and rendered formally precise by Ketland (2004).

What it is important to realise however is how the entire issue over Ramsey-Sentences, and Carnap's proposed logical reconstruction of a scientific theory, depend upon the secondary issue of how to understand an ontological dispute. When the realist objects that the Ramsey-Sentence of a theory is much easier to satisfy than the original theory (since it could be made true by set-theory rather than atoms of gas), and when the instrumentalist objects that the Ramsey-Sentence of a theory is much more difficult to satisfy than the original theory (since it takes a semantically meaningless set of symbols to have ontological commitments), they are both presupposing a substantive conception of ontology where quantification over sets is metaphysically distinct from quantification over atoms, or quantification over nothing at all. But this of course is precisely what Carnap denies: on his picture, where questions of existence are understood to be language-relative, one's ontological commitments are nothing more than one's choice of how to speak—it simply makes no sense on Carnap's account for the Ramsey-Sentence of a theory to be 'easier to satisfy' or 'more ontologically committed' than the original, only for it to be a more or less expedient way of talking with respect to some purpose or another.

The most important element in Carnap's attempted dissolution of the scientific realism debate is therefore his background conception of ontology, as it is this that actually justifies his logical reconstruction of a scientific theory (Friedman, 2011). It also provides a diagnosis as to why the debate over this aspect of Carnap's position has itself often appeared intractable: to take a meta-Carnapian perspective, those in favour and those against Carnap's reconstruction of a scientific theory are working with a different conception of what it means for the Ramsey-Sentence of a theory to introduce additional existential quantification. But most importantly for the purposes of the present discussion, it is through focusing upon the ontological dimension of Carnap's position that the close comparisons to van Fraassen's epistemology can be made explicit.



### 3. The Analytic and the Synthetic

Carnap's views on ontology are discussed explicitly in his (1950) paper 'Empiricism, Semantics and Ontology', and referenced throughout his (1974) discussion of the Ramsey-Sentence. The underlying idea is as follows. If questions of existence are to be made *precise*—that is, to be rendered tractable and emancipated from the worst excesses of speculative metaphysics—then one needs to put in place some well-defined standards for what counts as the confirmation, verification or falsification of an existential claim. In most cases then, an existential claim will be straightforwardly synthetic, open to empirical investigation and evaluated with respect to the aforementioned criteria of confirmation, etc. All of this is reasonably uncontroversial. The crucial move for Carnap however is to acknowledge the possibility of different standards of confirmation—different conceptual frameworks or linguistic systems, if you will—against which one and the same existential claim may be evaluated very differentially with respect to one and the same body of evidence. This is of course the standard Carnapian move, and it seeks to diagnose the intractability of various ontological disagreements through attributing to each party a distinct linguistic system or criteria of confirmation. The significant consequence of all this however is then a principled distinction between two different types of existential claim: for each different linguistic system that can be employed, there will be some existential claims that help to define the system in question; and since these existential claims will in part *determine* our standards of confirmation, their truth/falsity will be a purely analytic matter.

One immediate comment is required before proceeding. The above sketch can give the impression that Carnap is committed to an extremely strong and particularly absurd form of relativism, whereby one can bring an entity into existence simply through talking about it—for if one adopts a linguistic system which takes the existence of (say) yetis as constitutive of that framework, then one has made it true that yetis exist, and moreover it seems that one can even know this to be true without further investigation. And this is clearly a problematic view, an example of what Musgrave

(2001) aptly derides as ‘word-magic’. The issue is rather subtle, but it is important to note this is not what Carnap intends; indeed, to argue that an entity exists iff we choose to talk about it is to make a substantive metaphysical claim—and the whole point of Carnap’s approach is of course to eschew substantive metaphysics altogether. The point rather is this: traditional metaphysical questions, traditional questions regarding the existence or non-existence of various entities, are to be *replaced* by the (arguably) more useful and/or tractable question as to whether or not talking about such entities is expedient for the purposes at hand. The idea would be, not that this is what an existence claim actually amounts to, but rather that this is a better way of asking what it is that we actually care about. Whether or not yetis *really exist*, as opposed to whether or not yeti-talk is pragmatically useful, is on Carnap’s view either unintelligible or just not very interesting. On such a reading, Carnap comes out as more of a pragmatist than a social constructivist (although admittedly, this may not be a huge improvement).<sup>9</sup>

In any case, Carnap’s views on ontology—or rather, his *explication* of ontological questions—commits him to a principled distinction between the analytic and synthetic, for if there are alternative standards of confirmation, then there must be analytic existential claims that partly constitute these alternative standards. And as the standard story of the philosophy of science goes, Quine (1951) conclusively demonstrated that this entailment was the *reductio* of the Carnapian position—there is no principled distinction between the analytic and the synthetic, thus there is no principled distinction between those existential claims that are framework dependent and those that are framework constitutive; thus there is no principled distinction between alternative linguistic systems and alternative standards of confirmation, thus ontology cannot be language-relative in any meaningful sense. But here the standard story begins to fragment, as the precise respect in which Quine is taken to

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9 For a fuller discussion on the relationship between Carnap’s philosophical liberalism, and the various currents of American Pragmatism, see Richardson (2007).

have refuted the analytic/synthetic distinction enjoys remarkably little consensus in the literature. Creath (2007: 327) gives a survey of some of the options, from those who take the central argument of ‘Two Dogmas’ to be that the analytic/synthetic distinction is vague or circular, through those who take it to be that the distinction is insufficiently general or even empty, to those who understand the complaint to be that the distinction lacks explanatory value or behavioural significance. Undoubtedly all of these interpretations find traction in the text and within Quine’s broader philosophy. With respect to the philosophy of science however, the central lesson has generally been taken to be *epistemological*, a reading that Quine himself recognised in retrospect when he writes in his autobiography:

I now perceive that the philosophically important question about analyticity and the linguistic doctrine of logical truth is *not* how to explicate them; it is rather the question of their relevance to epistemology (Hahn and Schlipp, 1986: 207).

The idea is this (Hylton, 1982; 2007: 68-74). If there is a principled distinction between those existential claims that are analytic and those that are synthetic, then there will be a principled distinction between their methods of justification: synthetic statements will be investigated empirically and evaluated against the relevant criteria of confirmation that we have in play; while analytic statements, since they constitute and are therefore prior to these criteria of confirmation, will be evaluated on the basis of the overall pragmatic utility of adopting the linguistic system that they define. But according to Quine, this justificatory distinction is an illusion. This is a consequence of his confirmational holism, the thesis that ‘our statements about the external world face the tribunal of experience not individually but only as a corporate body’ (1953: 41). The confirmation of any statement will always depend upon the confirmation of a whole range of other statements, such as those concerning the reliability of the experimental apparatus used to generate the evidence in question; consequently, ‘any statement can be held true come what may, if we make drastic enough adjustments elsewhere in the system’

(*ibid.*: 43). So even when we come to evaluate a supposedly isolated ‘synthetic’ statement, we must in fact make a pragmatic decision regarding a whole critical semantic mass of inter-related statements—the justificatory distinction between the analytic and the synthetic is one of degree not of kind; thus there is no principled epistemological distinction between the two; thus there is no principled distinction at all.<sup>10</sup>

#### 4. The New Epistemology and the New Empiricism

Carnap’s attempted dissolution of the scientific realism debate ultimately rests upon his background conception of ontology; and the central difficulty with Carnap’s conception of ontology is its dependence upon an epistemologically unjustified distinction between the analytic and the synthetic. This at least is the perceived state of play within the contemporary philosophy of science; as van Fraassen puts it:

The main lesson of twentieth century philosophy of science may well be this: no concept which is essentially language-dependent has any philosophical importance at all (1980: 56).

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10 A more technical objection to Carnap’s analytic/synthetic distinction is presented in Quine (1976). The argument is usually taken as follows: whenever we specify a linguistic system by the stipulation of the appropriate linguistic conventions (i.e., the analytic truths), we will in fact have to *presuppose* other linguistic conventions in order to generate the infinite number of logical truths of that system (or else give an infinitely long list of initial linguistic conventions); any such specification will therefore either be incomplete or viciously circular. A similar argument is given by Gödel (1995), who notes that since his second incompleteness theorem shows that any reasonably strong linguistic system will be unable to prove the consistency of its own linguistic conventions, any such stipulation will face an infinite hierarchy of meta-linguistic justification. As Ebbs (2011) makes clear however, such objections misunderstand Carnap’s intentions: that just as Carnap seeks to *replace* questions of existence with more useful questions about our choice of linguistic framework (rather than analysing questions of existence as really being questions of linguistic framework), so too does he seek to *replace* the traditional philosophical questions about the identity and justification of logical truth with the more tractable questions of being logically-true-in-a-language. Carnap can therefore happily concede that his account faces an indefinite meta-linguistic extension, but note that this is only an objection to those seeking to articulate the traditional notion of logical truth (what is *really* logically true) that his account is an attempt to dissolve.

In response, van Fraassen's own articulation of empiricism explicitly avoids any issues of semantics. According to his constructive empiricism, science 'aims to give us theories that are empirically adequate, and acceptance of a theory involves as belief only that it is empirically adequate' (van Fraassen, 1980: 12)—a definition that firmly locates the contours of the scientific realism debate in terms of the attitudes we hold towards a scientific theory, rather than in terms of the interpretation of the language of these theories. The notion of acceptance here is crucial. To believe that a theory is empirically adequate is to believe that what it has to say regarding the observable phenomena is correct; but while the constructive empiricist counsels that we need believe no more of a theory than that it is empirically adequate, we are not therefore to reject, reduce or otherwise eliminate the unobservable content of our scientific theories. Rather, what our theories have to say regarding the unobservable phenomena is deemed sufficiently auxiliary to the main goals of scientific inquiry that, while we will no doubt continue to *use* them for various purposes, such commitment can be satisfied by an attitude other than *belief*.<sup>11</sup>

Central to all of this of course is the notion of empirical adequacy. According to van Fraassen, scientific theories are to be understood model-theoretically, and thus a theory is empirically adequate provided the (representations of the) observable phenomena can be embedded within a substructure of its model; and an entity or process counts as an observable phenomena provided there are conditions under which it could be observed by an instrumentally unaided human observer. This raises two interesting points of similarity with Carnap's position. The first, noted by Friedman (2011: 251-252), is that van Fraassen's model-theoretic articulation of empirical adequacy essentially involves the same

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11 The distinction between acceptance and belief has been the target of many objections to constructive empiricism, the complaint being that the commitment involved in the former is so similar to the latter for there to be no distinction at all. See Horwich (1991) for an excellent articulation of this worry; Dicken (2010) attempts a defence of the distinction, although along slightly different lines than that intended by van Fraassen.

commitments as Carnap's logical reconstruction of a theory in terms of its Ramsey-Sentence. To believe a theory to be empirically adequate is—for van Fraassen—to believe that all the observational predictions of the theory are correct and that they can be embedded within a larger set-theoretic structure; or in other words, that the observational predictions of the theory are correct, and that we can avail ourselves of enough set-theoretic machinery for all of these predictions to hang together. And this of course is precisely what the Ramsey-Sentence of a theory commits us to—to the despair of realists and instrumentalists alike.<sup>12</sup>

The second similarity takes a little more work to bring into focus, but is extremely important for the purposes of this paper. It begins with the irony that, although van Fraassen's constructive empiricism was explicitly developed to avoid the charge of epistemological inconstancy that plagued Carnap's distinction between the analytic and the synthetic, the same charge of epistemological dishonesty almost immediately attached itself to van Fraassen's distinction between the observable and the unobservable. This worry has been raised in various different forms: that since both instrumental detection and unaided human observation equally require training and calibration, we have no epistemological justification in treating the latter as more reliable than the former (Hacking, 1981); or that since belief in the empirical adequacy of a theory requires as much extrapolation from the actual evidence as belief in the truth of a theory, we have no epistemological justification in making the former inference but not the latter (Psillos, 1999: 193-200). One particularly illuminating way of putting the problem concerns what transpires to the *modal* nature of the constructive empiricist's distinction—that an entity is observable if there are conditions under which we *would* observe it without the aid of an instrument; yet inevitably, such counterfactuals prove notoriously difficult to pin down. Churchland (1985) offers a case in point. According to the constructive

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12 The similarity to van Fraassen's model-theoretic approach is made even more explicit when we note that the Ramsey-Sentence of a theory will in most cases be formulated within a *second-order* language.

empiricist, the moons of a distant planet count as observable, even though they may not have yet been observed, since there are conditions under which we would observe them—if we were to travel far enough into outer space in some kind of flying saucer, and look out of the window, we would be able to see them without any kind of instrumental mediation. By contrast, electrons and other subatomic particles are unobservable *tout court* since there are no conditions under which we would directly observe them—they are just too small. But the distinction between these two counterfactuals is shaky. Certainly the issue cannot be one of *logical* possibility, since there are plenty of outlandish—yet logically consistent—possibilities in which we do directly observe electrons, such as the various shrinking machines and fantastic voyages so beloved of Hollywood. Moreover, the issue does not seem to be one of *nomological* possibility either. Suppose that our distant moons are in fact so far away that only superluminal travel would bring us close enough to the moons before the heat death of the universe. For the constructive empiricist, these moons would still count as observable, even though the conditions of their direct observation violate the laws of nature just as readily as in the case of electrons. There is no principled epistemological distinction between the observability of the moons and the unobservability of the electrons; and thus, it is concluded, there is no distinction at all.<sup>13</sup>

What these objections fail to appreciate however is the broader epistemological framework in which van Fraassen's constructive

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13 One immediate response here is that the distinction between the observable and the unobservable is an empirical distinction, and that while our best scientific theories of the behaviour of light and the physiology of the human eye tell us that the size of an object is relevant to its observation, they make no distinction as to where in space-time the observational event takes place (van Fraassen, 1985; Monton and van Fraassen, 2003). Similarly, one might object *contra* Hacking that the similarities he highlights between observation and detection are phenomenological rather than justificatory; and *contra* Psillos, that an extrapolation to the empirical adequacy of a theory, while risky, is nevertheless less risky than an extrapolation to its truth. In any case, what van Fraassen ultimately relies upon in defence of his philosophy of science is his background conception of epistemology, the main focus of this discussion.

empiricism is articulated. There are several components to this framework—what van Fraassen calls *epistemic voluntarism*—but the most important idea for the present discussion is the idea that rationality is a matter of permission rather than obligation.<sup>14</sup> One way to appreciate what van Fraassen has in mind here is the Jamesian observation that the point of our cognitive practices is not simply to maximise our true beliefs—on such an account, one would simply believe *everything*—and conversely, nor is it to simply minimise our false beliefs—on such account, one would avoid forming any beliefs at all. Rather, we seek a balance between the two; and since there can be no universally applicable algorithm for how to set this balance, we are all free to infer as widely or as narrowly as our personal desire for truth at the expense of error dictates (van Fraassen, 1989: 172).

We can put this idea more concretely in the context of the observable/unobservable distinction. When Churchland objects that the counterfactual observability of some entities appears to be no more or less justified than the counterfactual unobservability of others, and goes on to conclude that the distinction lacks epistemological justification, there is an implicit assumption made regarding our background epistemological framework. The assumption is that if one is entitled to infer the observability of one entity on the basis of a piece of counterfactual reasoning, then one is obliged to infer the observability of any other entity that depends upon the same piece of counterfactual reasoning—if both counterfactuals are equally plausible/improbable, then they should be evaluated the same. And what underlies this assumption is a conception of rationality that is fundamentally *rule-based*: there are a finite number of rationally legitimate methods in which we can extend our stock of beliefs—rules of inference—and what legitimises

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14 The other two components are a diachronic constraint on our distribution of credences, which leads to a picture whereby holding a belief is akin to undertaking a future-directed practical commitment (van Fraassen, 1984; 1995); and the understanding of a metaphysical position such as empiricism or materialism in terms of a set of epistemic policies rather than a specific doctrine (van Fraassen, 2002). The relationship between these components is discussed in Psillos (2007).



these methods is their universal applicability. Hence if we are permitted to infer the observability of the distant moons, despite the nomological impossibility of their direct observation, this is because the counterfactual reasoning that lead to this conclusion is a rule of inference; but if such counterfactual reasoning is a *rule* of inference, then we *must* draw the same conclusions about the observability of electrons, despite the nomological impossibility of their direct observation. But it is precisely this rule-based conception of rationality that van Fraassen's epistemic voluntarism opposes: there are no universally applicable methods of extending our stock of beliefs, either because of the readiness in which we can produce counterexamples to our inductive practices, or because of the complications produced by our disparate desires for truth and the avoidance of error. And if there are no universally applicable methods of extending our stock of beliefs, there are no rules of rationality; and if there are no rules of rationality, there is nothing technically irrational in choosing to endorse a piece of counterfactual reasoning in one context and refusing to endorse the same piece of counterfactual reasoning in another. Likewise, the comparative reliability of instrumental detection and unaided human observation, or the comparative precariousness of extrapolating to the truth and extrapolating to the empirical adequacy of a theory, can only oblige comparative epistemological commitment on the basis of such a rule-based conception of rationality. What these criticisms presuppose (the constructive empiricist argues) is an unrealistically authoritarian conception of our background epistemology; and that while Churchland, Hacking and Psillos, may be perfectly justified in rejecting the constructive empiricist's distinction as based upon a set of epistemological principles they find unappealing, they lack any objectively normative perspective from which to criticise them in others.<sup>15</sup>

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15 Of course, any form of *non-ampliative* reasoning i.e., logical deduction from our existing stock of beliefs, will still be normatively compelling. For van Fraassen's arguments against the universal applicability of ampliative reasoning, see van Fraassen, 1989: 160-170

It is not my intention in this paper to evaluate the success of such a response, but merely to hold it up as the second important similarity with Carnap. Ultimately, van Fraassen's defence of constructive empiricism, and its crucial distinction between the observable and the unobservable, relies upon the adoption of an extremely permissive epistemological framework in which different epistemic standards are justified with respect to different cognitive goals—just as Carnap's attempted dissolution of the scientific realism debate, and its crucial distinction between the analytic and the synthetic, relies upon the adoption of an extremely permissive ontological framework in which different existential commitments are justified with respect to different pragmatic goals.

### 5. Conclusion: A Plea for Tolerance

The standard story about the philosophy of science tells us that Carnap's attempt to reject the scientific realism debate as a philosophical pseudo-question foundered upon its reliance upon the analytic/synthetic distinction, which Quine showed to be epistemologically unprincipled. Consequently, contemporary positions within the scientific realism debate have defined themselves in opposition to the logico-semantic issues that occupied Carnap (and the logical empiricists more generally), and have sought to articulate themselves along explicitly epistemological lines. Yet in the case of van Fraassen's constructive empiricism—the most prominent empiricist option in the contemporary debate—we find not only an account of our theoretical commitment that is in technical details essentially identical to Carnap's, we also find a philosophical methodology to defend those commitments that is in practical terms essentially identical to Carnap's too. Another way to articulate the central idea is as follows. According to Carnap, both realists and instrumentalists will endorse the Ramsey-Sentence of a scientific theory as their core

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(concerning inference to the best explanation), and van Fraassen, 2000 (concerning induction in general).

theoretical commitment; and any subsequent disagreement—over the ontological import of their existential quantifiers—is rendered philosophically innocuous given a background conception of the nature of an ontological dispute. For van Fraassen’s constructive empiricism, the empirical adequacy of a scientific theory is likewise a point of agreement between realists and empiricists; and any subsequent disagreement *here*—over whether or not commitment to the observable phenomena demands comparative commitment to the unobservable—is similarly rendered philosophical innocuous given a background conception of the nature of rationality. Both position therefore seek to minimise or constrain the scientific realism debate by offering a supposedly neutral starting point, and deflating further philosophical disagreement by way of a substantive meta-philosophical thesis regarding the nature of that disagreement.<sup>16</sup>

There is of course an important difference in the two positions, since Carnap’s methodology is to adopt an extremely permissive account of ontology against which questions over the interpretation of the existential quantifiers of a Ramsey-Sentence can be effectively finessed; while van Fraassen’s methodology is to adopt an extremely permissive account of rationality against which questions over the justification of our ampliative inferences can be effectively finessed. However, it is precisely this difference that suggests a way in which the latter can be taken to offer an extension of the former. Carnap’s deflationary account of ontology was rejected for entailing a semantic distinction with little or no epistemological justification—since both (putatively) analytic and synthetic statements are accepted or rejected through a combination of

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16 In terms of broad methodology, there are some interesting parallels here with Fine’s (1984) so-called Natural Ontological Attitude; the issue however is complicated, since whereas Carnap and van Fraassen both offer substantial theses regarding the logical structure of a scientific theory, and a substantial meta-philosophical thesis regarding ontology and rationality respectively, Fine’s position is closer to a kind of quietism regarding the philosophy of science in general. I am grateful to an anonymous referee for bringing this issue to my attention, but can only admit a lack of expertise in failing to explore it fully.

evidence and pragmatics, there is no justificatory methodology that one can apply to one that will not equally apply to the other. Such an objection is on a par with those levelled against the constructive empiricist's distinction between the observable and the unobservable—that there is no epistemological traction between the two whereby reasons to be committed to one will not be reasons to be committed to the other. And it is in response to exactly this kind of argumentative strategy that van Fraassen's deflationary account of rationality is developed. In short, epistemic voluntarism provides a background conception of epistemology within which the Quinean objections to the analytic/synthetic distinction are dissolved. The Carnapian ontologist who also adopts a van Fraasserian epistemology—a tolerant voluntarist, as it were—can happily concede that there is no *principled* epistemological distinction between his analytic existence claims and his synthetic existence claims, as the acceptance of any existential claim will be a matter of pragmatics to some degree; yet he can also maintain that this lack of principled distinction is no objection to his endorsement of a language-relative explication of ontology, since he need not endorse the sort of rule-based conception of rationality that draws any normative obligations from this fact. The observability of a distant moon requires as much of a counterfactual leap as the observability of an electron, but we need only endorse comparable commitments on the basis of a monolithic notion of rationality; the justification of a synthetic statement is as much a matter of pragmatics as the justification of an analytic statement, but we need only assume their equivalence on the basis of this same monolithic notion of rationality.

The dialectic is easier to see in retrospect: Carnap attempted to dissolve the scientific realism debate through an ontological thesis that left many of its epistemological consequences unanswered; van Fraassen attempts to dissolve the scientific realism debate by showing how these epistemological consequences are themselves superfluous. Such a conclusion of course can cut either way. Epistemic voluntarism is a controversial component of van Fraassen's overall position, and for those

who reject both Carnap's minimalist ontology and van Fraassen's minimalist epistemology, the preceding discussion has at most a diagnostic interest: Carnap failed because ontology *is* a substantive philosophical issue, and van Fraassen fails because epistemology is *equally* substantive; again and again we see that empiricism is tenable only if one is willing to adopt such a permissive stance that, frankly, anything is tenable. But for those who do find something compelling in van Fraassen's epistemic voluntarism—perhaps as the logical consequence of what has become an intractable debate over the epistemology of the science and the brute intuition trading over best explanations and pessimistic inductions—then one has not only the motivation, but also the resources, for revisiting a Carnapian dissolution of the question altogether.<sup>17</sup>

*Munich Center for Mathematical Philosophy*

*Ludwig-Maximilians-Universität*

*Paul.Dicken@lrz.uni-muenchen.de*

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