On the syntax and semantics of observability: a reply to Muller and van Fraassen

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In this journal, Peter Lipton and I (Dicken & Lipton 2006) discussed Musgrave's (1985: 207–9) objection that the constructive empiricist cannot consistently maintain his own distinction between the observable and the unobservable, and van Fraassen's (1985: 256) initial reply. We considered several possible interpretations of van Fraassen, and expressed misgivings about each. Muller and van Fraassen (2008) have consequently clarified the official constructive empiricist response to Musgrave, although some issues still remain.

According to Muller and van Fraassen, Musgrave's objection assumes that constructive empiricism is to be understood in line with a *syntactic* account of our scientific theories – whereby a theory consists of a set of sentences formulated in some suitable language – whereas constructive empiricism has always been wedded to an explicitly *semantic* account of our scientific theories, which understands a scientific theory in terms of a class of models. Once this oversight is amended, the objection is seen to be toothless. As Muller and van Fraassen write:

> Indeed, the only proper response, and the one that turns the table on Musgrave and his followers, is to argue that his incoherence argument does not work in the context of the semantic view as here elaborated, while the bad consequence he draws is an inevitable corollary to the older view within which he presents it. (2008: 200)

The force of Musgrave's objection therefore turns on nothing more than implicitly saddling the constructive empiricist with an independently problematic account of what a scientific theory is.

This move should cause some surprise however, for Musgrave's objection – albeit usually presented in conjunction with an explicitly syntactic construal of our scientific theories – is in fact quite neutral between these competing accounts. As Musgrave originally put it, in order for the constructive empiricist to draw his distinction between observable and unobservable entities, he must believe certain statements about unobservable entities such as 'electrons are unobservable'. Yet since the whole point of constructive empiricism is not to believe any statements about unobservable entities, the position is incoherent. The same point however can be put explicitly in terms of models. The constructive empiricist only believes those parts of his theories (i.e. those substructures of the models of his theories) that are about (embed the representations of) observable entities. Thus in order to know which parts

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of his theories to believe, the constructive empiricist needs to rely upon his best scientific theory of observability – call it T* – to tell him the identity of the observable entities. Yet the constructive empiricist only believes the empirical substructure of T* – the part of T* that is about observable entities – to be an accurate representation of the world. Thus if T* classifies a particular entity as unobservable – that is, if the representation of that entity is not embedded within the empirical substructure of T* – then that is a representation of T* that the constructive empiricist cannot believe to be accurate. So just as the constructive empiricist cannot believe a statement of the form '*x* is unobservable' since this is not a statement about an observable entity, neither can the constructive empiricist believe a representation of *x* as an unobservable entity since this would not be a representation that was embedded with the empirical substructure of the model. Whichever way it is put then, syntactically or semantically, Musgrave's objection is the same: in attempting to draw a line between what he can and cannot believe, the constructive empiricist finds that he must step beyond it.

Simply moving to a semantic account of theories therefore will not in itself resolve Musgrave's objection. Moreover, it is also hard to see what relevance a semantic account of theories has to Muller and van Fraassen's proposed solution. According to them, for a theory to classify an entity as unobservable is simply for that theory to fail to classify that entity as observable. To take a variation on their example, suppose we have a theory that includes amongst its available classifications the categories 'electron' and 'observable'. Suppose further that there is no model within the class of models that constitute the theory in which these two categories overlap – there is no model in which an entity is classified as both an electron and as observable. It follows then that if we believe the theory to be empirically adequate (that all the actual observable phenomena are represented as such in some model of the theory), then since we know that nothing that is classified as observable by any model of the theory is also classified as an electron, then we must also believe that there are no observable electrons; in other words, electrons are unobservable. The same strategy has an obvious parallel in terms of syntax: since statements involving the predicate 'unobservable' are problematic, restrict your belief to statements involving the predicate 'observable'; then, since you believe your scientific theories to be empirically adequate, you can infer that anything not predicated as observable must in fact be unobservable.

The issue over the syntax and semantics of a scientific theory is therefore completely irrelevant to the matter in hand. This of course in itself does not disparage Muller and van Fraassen's position. In our original paper, Lipton and I argued that such a response left Musgrave and the constructive empiricist in somewhat of a stalemate: we argued (2006: 232) that all van Fraassen's argument established was that belief in the unobservability of electrons was entailed by belief in the empirical adequacy of the theory; yet since nothing had been said about the credentials of the former belief,

one was entitled to simply challenge the constructive empiricist's latter belief via modus tollens. It is now clear to me that this is the wrong interpretation. The sense in which Muller and van Fraassen contend that belief in the empirical adequacy of a theory entails the (quite harmless) belief that electrons are unobservable is just that *there is nothing more to* the belief that electrons are unobservable than the belief that the theory gives an exhaustive list of the observable phenomena that does not include electrons.

This strategy was in fact also canvassed in our original paper. There we considered the possibility that since Musgrave's objection only concerns issues of unobservability, claims about the observability of entities are presumably kosher; in which case 'it looks as if [the constructive empiricist] can draw his distinction between observable and unobservable entities after all, from the observable side' (Dicken and Lipton 2006: 228). Our complaint there was that such a strategy was incomplete, since some of the entities not classified as observable may not be unobservable, but simply overlooked observables. This objection however also misses the mark, since it is an assumption of the debate that the constructive empiricist believes his theories to be empirically adequate, i.e. capture all of the actual observable phenomena. Yet something like this worry of incompleteness informs Muller's extension of Musgrave's objection; and it is here ultimately that one finds Muller and van Fraassen's solution unsatisfactory.

The extended problem is that the belief that a theory is empirically adequate (all actual observable phenomena are classified as such), coupled with the knowledge that no model of that theory classifies something as both an electron and as observable only entails that all *actual* electrons are unobservable. Presumably though, the constructive empiricist's epistemic policy is meant to extend to all electrons, actual or otherwise. How then to bridge this gap, and to come to the belief that *all* electrons are unobservable in the sense required? Unfortunately, Muller and van Fraassen's (2008: 204) response at this point is purely stipulative: one simply adds the caveat that when issues of observability are at stake, one is entitled to extend one's belief accordingly.

Such a policy however presumably does not hold for our other classificatory categories. None of the scientific theories that I believe to be empirically adequate – that is, those theories that I believe to have correctly classified all actual observable phenomena – classify any entity as both a sphere made of gold and greater than 10 miles in diameter. I therefore believe that there are no actual golden spheres with a diameter greater than 10 miles; I don't however believe this combination to be *impossible* in the same way that I discount the possibility of an observable electron. Muller and van Fraassen's response therefore assigns a privileged status to claims about observability, which, while not necessarily ad hoc, certainly lacks any independent motivation. Observability, although obviously of enormous importance to the constructive empiricist, is in all other respects a perfectly straightforward

scientific concept, to be investigated and determined by our accepted scientific theories like any other scientific concept. Not only then is Muller and van Fraassen's suggestion unsatisfactory as a response to the extended version of Musgrave's objection, there also remains a lingering doubt as to whether it even manages to engage with the original objection. The spirit – although granted, not the letter – of Musgrave's complaint was that in order to draw his distinction between observable and unobservable entities, the constructive empiricist had to assign a status to claims about observability that was neither warranted nor justified by his position. Muller and van Fraassen simply concede this point: claims about observability are to be assigned a privileged status because they *must* be assigned a privileged status. Of course, there is nothing *incoherent* with this strategy; and a constructive empiricist who shares van Fraassen's epistemological predilections may argue that this is the only criterion by which we can assess it. The only motivation for the position then is to argue that questions of motivation are moot. In which case then we can see that Muller and van Fraassen's response to Musgrave turns not upon the intricacies of a semantic account of theories, but upon the wholesale adoption of van Fraassen's voluntarist epistemology.

The semantic account of theories is therefore a red herring in responding to Musgrave, since both the objection and the putative solution are perfectly neutral on this issue. Moreover, Muller and van Fraassen's response to this technical niggle is only as good as the radical epistemological overhaul upon which it depends. Finally, in their belief that model-theoretic manoeuvring can take the place of a substantive epistemology (or rather, in the light of van Fraassen's broader voluntarism, that model-theoretic manoeuvring *must* take the place of a substantive epistemology), Muller and van Fraassen overlook a far more promising – and far less controversial – resolution of the present difficulty. Rather than trying to rehabilitate belief in unobservability in terms of exhaustive beliefs about observability, and then attempting to make up the difference with an otherwise unmotivated epistemic policy, the constructive empiricist should just take Musgrave at his word. Yes, the constructive empiricist cannot believe claims about unobservability; the most he can do is accept them. Yet acceptance, as van Fraassen tells us, is a robust attitude in its own right. It involves 'a commitment to a research programme, to continuing the dialogue with nature in the framework of one conceptual scheme rather than another' (van Fraassen 1980: 4); that which we merely accept can feature in our explanations, direct our research programmes, and generally involves 'a commitment to confront any future phenomena by means of the conceptual resources' of that which we accept (12); it is 'a wager that all relevant phenomena can be accounted for without giving up that theory' (88). Surely then, that which we merely accept can also underwrite our distinction between the observable and the unobservable? This strategy was broached in our original paper (Dicken and Lipton 2006: 228); it has been explored in greater detail with respect to the

constructive empiricist's attitude towards mathematical objects (Dicken 2006) and an appropriate constructive empiricist account of modality (Dicken 2007).[1]

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1 Many of these ideas were discussed with Peter Lipton before his untimely death in November 2007. It is with the deepest regret that I note that their execution has been all the poorer for his loss. I would also like to thank Fred Muller for his comments on this paper; and the Master and Fellows of Churchill College, Cambridge, where I completed this work as a Research Fellow.

Against semantic multi-culturalism

GENOVEVA MARTÍ

Kripkean anti-descriptivism about proper names has recently come under attack. The attack is not the result of theoretical considerations: a group of philosophers who practice what has come to be known as *experimental philosophy*, E. Machery, R. Mallon, S. Nichols and S. Stich [MMNS], contend that there is empirical evidence casting doubt on the claim that proper names are not descriptive. MMNS's conclusions and, specially, the

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