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## Discussion

# The electrons of the dinosaurs and the center of the Earth: comments on D.D. Turner's 'The past vs. the tiny: historical science and the abductive arguments for realism'

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### Abstract

Turner [The past vs. the tiny: Historical science and the abductive arguments for realism. *Studies in History and Philosophy of Science* 35A (2004) 1] claims that the arguments in favor of realism do not support with the same force both classes of realism, since they supply stronger reasons for experimental realism than for historical realism. I would like to make two comments, which should be seen as amplifications inspired by his proposal, rather than as a criticism. First, it is important to highlight that Turner's distinction between 'tiny' and 'past unobservables' is neither excluding nor exhaustive. Second, even if we agreed with everything that Turner says regarding the arguments for realism and their relative weight in order to justify the experimental or historical version, there is an aspect that Turner does not consider and that renders historical realism less problematic than experimental realism.

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Turner (2004) has the great merit of presenting with unusual clarity one of those difficulties, that are instantly recognized as obvious when one reads about it, but which one would not have thought about until reading. He points out that it is

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necessary to distinguish between two types of scientific realism, which correspond respectively to two different classes of unobservable entities. Experimental realism speaks of entities, events and so on, which are unobservable because of their small size relative to us (e.g. the electron). Historical realism, in turn, speaks of those entities, processes, events and so on, which are unobservable, because they occurred or existed in the past (e.g. a dinosaur). Turner claims that the arguments in favor of realism do not support with the same force both classes of realism, since they supply stronger reasons for experimental realism than for historical realism. The reason is the following one: of the two roles that the unobservable entities can carry out (unifying phenomena and as tools for producing new phenomena), the first one can only be attributed to unobservable entities because they no longer exist, while the tiny unobservable entities can fulfill both. According to Turner, this allows—in the case of experimental realism, but not of historical realism—to avoid Laudan's and Ladyman's objection accusing Boyd's classical abductive argument for realism of being a circle.

In principle, I have nothing to object to Turner's interesting paper, but I would like to make two comments, which should be seen as amplifications inspired by his proposal, rather than as a criticism.

First of all, it is important to highlight that Turner's distinction between 'tiny' and 'past unobservables' is neither exclusive nor exhaustive. This is not necessarily a defect, because the author never says that he wants to speak of all possible unobservable entities, but it doubtless reduces the richness of his proposal, which could be complemented with a slightly more precise division. As Turner notices, there are unobservable entities, processes, events and so on that are tiny (and, at the same time, now-existing), like an electron. There are also unobservable entities, processes, events, and so on that no longer exist (and which are not tiny), like the dinosaurs. But there are also unobservable tiny entities that no longer exist, for example, the electrons of the dinosaurs or of some star whose light we receive now, even if they have disappeared thousands of years ago. This is the reason why we said his distinction was not exclusive. There are also now-existing entities that are not tiny and are, however, unobservable, like the center of the Earth or any other entity that is very far from us or that, for some technical reason which does not have to do with its size, cannot still be observed. Here lies the non-exhaustive character of the division. As we said, this remark should not be taken as a criticism, but as a complementary comment, because it does not seem difficult to apply Turner's conclusions about the power of realistic arguments to these two new cases.

Probably, however, it would be better to use some other division criterion for unobservable entities and to combine it with their historicity and their size. A good proposal would be to apply the distinction that [Harré has proposed in many of his works \(see 1986, 1993, 1996\)](#). He intends to distinguish: (1) unobserved but not unobservable entities: those that are not being observed but that could be observed without difficulty (i.e. the hidden face of the Moon); (2) entities unobservable for technical reasons: those that still cannot be observed today due to technical limitations, but that could be observed some day (i.e. the center of the Earth); (3) in principle unobservable entities: those that, according to the current theories, will never be

able to be observed, not due to technical limitations but because of their own nature (e.g. subatomic particles). It seems that when Turner speaks of tiny unobservable entities he has in mind those of the third type and that, when he speaks of no-longer-existing unobservable entities, he keeps in mind entities that, during the time they existed, belonged to the first type. But the other possibilities also exist and it would be necessary to keep them in mind if we want to have a complete picture.

The second point renders these distinctions even more pertinent. Even if we agreed with everything that Turner says regarding the arguments for realism and their relative weight in order to justify the experimental or the historical version, there is an aspect that Turner does not consider and that renders historical realism less problematic than experimental realism.

Indeed, if we consider Turner's no-longer-existing unobservable entities as belonging to Harré's type 1 and tiny unobservable entities as belonging to Harré's type 3, no-longer-existing entities have an advantage over tiny ones, which does not depend on the fact that the latter are tiny and the former no-longer-existing, but on the fact that the latter are of type 3 and the former of type 1.

Harré claims that scientists, when proposing models in order to eliminate underdetermination, use the strategy of drawing inspiration from well known and accepted ontologies of entities that we have already been able to observe. Infinitely different models could explain the same phenomena, but very few of them are ontologically plausible. The inspiration in well known ontologies grants the models certain plausibility, since they resemble things, processes, events and so on that really exist (or existed). But, obviously, this strategy in order to cut underdetermination is more successful with entities of types 1 and 2, and considerably less with type 3 entities, because, in this last case, we have never been able to observe their ontology (see Derksen, 1994). To put it in a nutshell, there is a higher risk in putting forward a possible ontology for a proton than in doing the same for a dinosaur, since we have observed entities that are similar to the dinosaurs but not to the protons. Thus, at least regarding this aspect, the dinosaur comes off better than the electron.

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