

Wilkerson on natural kinds

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Abstract

Wilkerson attempts to distinguish between four kinds of kinds. While he maintains that metaphysical realism presupposes the existence of natural kinds, he considers that they are not to be found in the social sciences. This conclusion seems to rest on his construal of the essential properties that are supposed to determine membership in a natural kind. If the kinds of essential properties that Wilkerson requires are not forthcoming then it seems that we are faced with a decision: Either there are no natural kinds in the way that Wilkerson characterises them, or we must alter our conception of what is necessary and sufficient for natural kind membership. If we are led to such a predicament then it would seem that whether there are natural kinds or not is not only something to be determined by the world in itself as Wilkerson takes it to be, but is also the result of our analytic decision.

Wilkerson's characterisation of natural kinds

In the course of offering an account of natural kinds, Wilkerson distinguishes between four types (or kinds) of kinds:

- (1) **Natural kinds**, which are characterised by real essences, by intrinsic properties that make the individuals or stuffs the kinds of things they are, and which lend themselves to detailed scientific investigation, e.g., the kinds *electron*, *proton*, *neutron*; *carbon*, *water*, *cellulose*; *chimpanzee*, *stickleback*, *narcissus*.
- (2) **Dependent kinds**, whose members are what they are because of a relational dependence upon something else, e.g., the kinds *table*, *coin*, *lintel*, *threshold*, *cliff*, *glacier*, *north wind*, *perennial*, *annual*.
- (3) **Real but superficial kinds**, which are characterised by real, non-relational but comparatively superficial similarities and differences between things, similarities that do not lend themselves to detailed scientific investigation, e.g., the kinds *tree*, *shrub*, *cloud*, *pebble*, *honey water*.
- (4) **Hybrid kinds**, especially hybrids of (1) and (2), e.g., the kinds *vegetable*, *fruit*, *pot plant*, *cattle*, *medicine*, *ham*, *pork*, *bacon*; and hybrids of (2) and (3), e.g., the kinds *ski slope*, *surfing beach*, *gravelpit*, *oasis*, *biennial*. (Wilkerson, 1995 p.59)

His examples of natural kinds are those taken from the fields of physics (*electron*, *proton*, *neutron*); chemistry (*carbon*, *water*, *cellulose*); and biology

(*chimpanzee, stickleback, narcissus*). Wilkerson, (1995 p.73-87) considers that while there is nothing that logically rules out the objects of the social sciences as natural kinds; they are best classified as (2) or (3). I will go on to consider the plausibility of there being a difference in kind between (1), (2), and (3).

I shall attempt to argue that while there may be a difference in degree between the ‘hard’ and social sciences, there is not the difference in kind that Wilkerson takes there to be. As such it would seem that natural kinds may not exist in quite the way that Wilkerson takes them to; or that, alternatively, there cannot be any natural kinds that we can have knowledge of. Either way requires a revision of Wilkerson’s account. Whether there are natural kinds or not would seem to be not only determined by the world, but also a matter of analytic decision as to the precise nature of the essential properties that are required to determine natural kind membership.

Foundations of metaphysical realism

Firstly, we will need to begin by examining some of the foundations on which Wilkerson builds his account of natural kinds. He considers that he will presuppose metaphysical realism (Wilkerson, 1995 p.30). Wilkerson (1995, p.29) takes metaphysical realism to be the position that ‘there is a distinction between reality or ‘nature’ on the one hand, and our beliefs and theories about it on the other’. He considers that metaphysical realists are committed to the existence of natural kinds (1995, p.29).

While I shall not consider his two arguments for this, he does seem correct to note that metaphysical realists are committed to the existence of natural kinds¹. If they maintain that objects, laws of nature, and metaphysical necessity and possibility exist mind independently, or objectively then on Wilkerson’s account of what natural kinds are, they presuppose the existence of natural kinds. Essential properties are required in order for the object to count as the *same* object; they are required in order to delineate the class (or kind) of things relevant to the law; and they are required in order to determine metaphysical possibility and necessity.

¹I will not consider his arguments in any great depth because they seem to me to be flawed though it will not assist my argument to critique them. His observation that metaphysical realists presuppose the existence of essential properties seems correct in that they consider essential properties to exist in the world and acknowledge that these determine natural kind membership.

Wilkerson makes the following claims regarding essential properties;

- (i) Essential properties exist mind-independently and intrinsically in objects. They are necessary and sufficient for membership in a natural kind. (Wilkerson, 1995 p.33.)
- (ii) Laws of nature exist mind-independently and govern objects behaviour in virtue of the objects having essential properties that determine the law (Wilkerson, 1995 p.62).
- (iii) Essential properties are responsible for the superficial similarities in appearances that we observe (Wilkerson, 1995 p.42, 55).

Kripke, (1972); Putnam, (1975); Braddon-Mitchell & Jackson, (1996); and Chalmers, (1996) may be considered metaphysical realists in that they maintain that the referent of a natural kind term is a natural kind that exists as such in virtue of one or more essential properties. Their variety of metaphysical realism is different to Wilkerson's in that they consider that it is metaphysically possible for a substance qualitatively identical to water to have a different real essence, and that it is metaphysically possible for H_2O (as the real essence of water) to appear black and tarry (Braddon-Mitchell & Jackson, (1996)). They consider that it is metaphysically possible for essential properties and appearances to vary independently of one another, and thus would not seem committed to (iii).

Locke maintained that knowledge of real essence is unattainable as we are 'destitute of the faculties to attain it' (Locke, 1993 II, xx iii). The usual Kripke / Putnam variety of metaphysical realism allows the nominal and real realms to vary independently of one another, and thus it seems hard to see how they can maintain that science can inform us of real essences². It seems that the following claims are hard to reconcile;

- (a) Real essences may vary independently from nominal essence.
- (b) Real essences are knowable to us.

It also seems hard to credit real essences as being explanatory if they are unknowable. Wilkerson considers that 'anti-realists would be right to be sceptical about a conception of reality that was, in principle, wholly inaccessible to any kind of scientific investigation' (Wilkerson, 1995 p.66). The Kripke / Putnam view does consider that part of the scientific enterprise is

²I may be extending how Locke's notion of the 'nominal' realm is usually interpreted in considering it to be the whole of appearances or everything that we can observe and experience of the world.

the discovery of real essences, and thus Wilkerson offers us a plausible account of what would need to be required in order for scientists to have any chance of discovering them.

Wilkerson, (1995, p.55) avoids this unsatisfactory conclusion by maintaining that essential properties are of interest to us precisely because ‘The real essence of a thing not only determines its proper de re classification... but also directly explains many of its properties... It is precisely because gold has the atomic number 79 that in normal atmospheric conditions it is malleable, fusible, soft, and heavy’. Locke maintained that real essences produced nominal essences and thus real essences explain the nominal essence; and so Wilkerson may be thought to be a Lockean regarding the explanatory power of real essences.

Wilkerson thus offers a rather plausible version of metaphysical realism. He maintains (1995, p.66) that metaphysical realism entails the existence of natural kinds, and that

the commitment to natural kinds is a commitment to certain real essences that permit scientific generalisation, and that scientific generalisation consists in the articulation of de re necessary truths about the causal powers of things... scientific generalisation is over causal powers, some of which are constituted or realised by the real essences that determine membership of natural kinds. So the properties that determine membership of natural kinds are precisely the properties that determine in general how individual members must behave in such and such circumstances (Wilkerson, 1995 p.62).

He thus considers that real essences determine nominal essences and that intrinsic essential properties determine the behaviour of the objects according to the laws of nature. Science is thus plausibly construed as the enterprise of discovering, and informing us about real essences (among other things).

Natural Kinds in the Social Sciences

While Wilkerson considers a variety of reasons why kinds in the social sciences do not constitute natural kinds I shall focus on three of his main objections. The first is that he considers that;

many kinds in the social sciences are clearly dependent kinds, that is, membership of the kind is determined relationally by

something else. In some cases it depends upon human laws, conventions, interests, moral attitudes, etc... Had the conventions and interests been different, there would not have been the same nations, clubs, banks etc (Wilkerson, 1995 p.79).

One could consider that biological kinds may be similar in that if their interests had been different; if, say they were not interested in surviving and reproducing, then they would not exist either. It would seem, though that Wilkerson's point is more that social kinds logically depend on interests whereas biological kinds do not. This point rests on the notion that the essential properties that determine natural kind membership are intrinsic and not relational.

He considers that 'since causal powers are constituted or realised by intrinsic properties, it follow[s] that the real essences of natural kinds would be intrinsic properties' (Wilkerson, 1995 p.61).

The basic furniture of the world consists of 'powerful particulars', which, given their intrinsic features, necessarily change and develop in certain ways and not others, the first state of affairs must in context generate the second. Given the intrinsic features of hydrogen, any application of a naked flame to the hydrogen in the presence of oxygen must produce ignition and water vapour. Hydrogen must ignite and produce water under certain conditions; if, per impossible, it did not, it would not be hydrogen (Wilkerson, 1995, p.68).

He maintains that natural necessity is best construed as either (a) a property of essential properties, or (b) a property of true scientific generalisations as to how the object must behave (Wilkerson, 1995 p.72). The notion would thus seem to be that the intrinsic properties of the objects determine the laws of nature without remainder. It is not as though the world consists of objects with their essential properties and that the laws of nature exist as a superimposed extra; rather the laws are determined by the objects intrinsic essential properties.

He acknowledges that sometimes physics characterises objects in terms of relational properties; 'An electron is a particle with a negative charge, which orbits the nucleus of an atom; an acid is a proton donor; a gene is a complex molecule which governs the properties of the phenotype; and so on' (Wilkerson, 1995 p.32). But he then maintains that it should not do so as 'if we fail to produce a story about intrinsic properties, we are left with a mystery, with the unexplained brute fact that various objects are related in various

ways' (Wilkerson, 1995, pp.32, 33).

Problems with the intrinsic / relational distinction

It seems to me that in considering intrinsic properties to be something over and above a complex bundle of relational properties Wilkerson is faced with the following, difficulties:

- (a) Considering that various objects have essentially non-relational properties that determine how the object will interact with the world and appear to us would seem to be a contradiction³.
- (b) It is hard to see how we could discover or come to know of an intrinsic property that is not essentially relational.

If objects do not essentially have relational properties then relational properties would seem to be irrelevant for natural kind membership. It would thus seem that the essential properties that are relevant for determining natural kind membership are intrinsic, non-relational, thus can leave no mark on the world; and are thus unknowable in principle. Wilkerson would seem to be led to the same problem that Locke, Kripke, Chalmers, Braddon-Mitchell & Jackson, and Putnam's variety of metaphysical realism faced. He would need to sacrifice (iii) (p.3 above) and be left with the unsatisfactory conclusion that we cannot know real essences. I think that Wilkerson's story would be more plausible if he acknowledged that the essential properties that determine natural kind membership are essentially relational. Different natural kinds would thus be distinguished in virtue of engaging in distinctively different relations with other objects. This latter line has the consequence that it does not count against kinds in the social sciences that their essential properties are relational.

He considers that if we are externalists about beliefs and consider that beliefs represent in virtue of having the appropriate causal connections with the objects of the kind represented then 'It follows that psychological representations, such as beliefs, thoughts, and intensions, are determined, not

³I can see that perhaps the main motivation for considering the relevant essential properties to be intrinsic and to unfold in such a way as to produce the behaviour and appearances that we observe is that an object could be the same object even if everything else in the universe ceased to exist. I still consider, though, that such a property is either relational (in the sense of being *causal* or correctly defined as *functional*) or else unknowable and as explanatory as Locke's 'pin cushion' model of substance.

by the intrinsic features of the people concerned, but by a complex relation between them and the rest of the world' (Wilkerson, 1995 p.79). If we consider Newtonian mechanics then the relevant essential properties are mass, force, velocity etc. While each term may be thought to pick out an intrinsic essential property of the object, the terms are defined relationally or functionally with respect to how each property interacts with another to produce behaviour that scientists may observe. I fail to see how this example from physics is different in kind from Wilkerson's example of beliefs, thoughts, and intensions. While it may be possible to re-describe relevant properties in a way that is non-relational it is hard to see how essentially non-relational properties can produce effects on the world or be the objects of scientific investigation.

Multiple Realisability

Another of Wilkerson's objections to natural kinds in the social sciences is that kinds in social sciences are multiply realised

There can be no science of psychology, economics, politics or sociology, no confident generalisation or prediction at the high level of function... The possibility of multiple realisability is likely to undermine all but the roughest and least ambitious explanatory remarks. Success is possible only in cases where all the realisations are fundamentally rather similar... But then the success of the high level sciences (e.g., the social sciences) depends entirely on the explanatory success of those at the lowest levels, those dealing with the realisation (e.g., physics, chemistry, biology)' (Wilkerson, 1995, pp.85-86).

He also considers, though, that at one level of explanation cancer might be construed as a natural kind, whereas at a lower level there might be different kinds of cancer (Wilkerson, 1995, p.75). He considers, though, that the success of biology is that its kinds seem to be realised by kinds of chemicals, and that the success of chemistry sees its kinds realised as kinds of particles. He also maintains that biology cannot be reduced to chemistry and that chemistry cannot be reduced to physics 'for all sorts of familiar reasons' (Wilkerson, 1995, p.86).

Wilkerson considers chemical isotopes which have the same atomic number but a different atomic weight and he concludes that he has

constantly referred to different explanatory levels, and have quite

deliberately left open the possibility that two objects might belong to the same kind at a higher level and to different kinds at a lower level. Indeed, if the distinction between function and realisation is ever to have application to members of natural kinds, we would be foolish not to leave that possibility open (Wilkerson, 1995, p.110).

Wilkerson thus seems to vacillate between considering that biology and chemistry are successful only because they are realised by physics, and maintaining that each level supports legitimate natural kinds that cannot be reductively explained because they are multiply realised from the perspective of the lower level. He considers that multiple realisability on the chemical level does not count against chemical kinds as natural kinds. I do not see that there is a difference in kind between multiply realised chemical kinds and multiply realised psychological kinds.

It would seem that natural kinds are determined by real essences but we need to come to a decision as to what real essences are relevant for the kind that we are interested in. Chimpanzees, gold, water can all realise Newton's properties of mass and velocity but in a sense the essential properties are not multiply realised because the instantiation is irrelevant. Likewise, we have decided that isotopes are only irrelevantly different on the chemical level and thus the atomic weight is irrelevant with respect to chemical kinds. He considers that we can 'quite consistently lump with the chemists and split with the physicists (Wilkerson, 1995 p.110)' and I think that a similar case can be made for lumping with the psychologists or social scientists and splitting with the biologists, and / or chemists, and / or physicists.

Scientific generalisability and boundary conditions

Wilkerson considers that the social sciences do not support scientific generalisations. Interestingly, he also considers that agriculture, horticulture, geology, geography and meteorology are in the same boat.

Indeed the conspicuous success of statistical methods in say, meteorology depends on the constancy and stability of terrestrial conditions. It would be impossible to use terrestrial agriculture, horticulture, geology, and geography and meteorology to explain and predict the behaviour of objects whose constitution and local conditions were very different from those on earth. (Wilkerson,

1995, p.84).

What he fails to acknowledge, though, is that the essential properties utilised in the hard sciences are also restricted to boundary conditions or qualified by a *ceteris paribus* clause. Newtonian mechanics is largely considered correct although the boundary conditions are more restrictive than Newton envisaged. Physics relativises its essential properties and laws to systems, which is a delineation of boundary conditions.

While Weinert distinguishes between *phenomenological laws* that apply to predict and explain observable features and are restricted to boundary conditions, and *fundamental laws* that are not restricted to boundary conditions but instead predict and explain the boundary conditions, Wilkerson makes no distinction (Weinert, 1995, 49- 51). The phenomenological laws are intrinsic to objects but will only produce their usual effects if certain external boundary conditions obtain. They thus would seem to depend on external conditions for their realisation. The fundamental laws that predict and explain the way in which phenomenological laws interact with boundary conditions are functional laws that describe the relationship between the ‘intrinsic’ properties / laws and extrinsic boundary conditions and are themselves not restricted to any particular boundary conditions, or particular laws.

While this account of physical laws / essential properties may be controversial I do think that there is more a difference in degree rather than kind between the restrictions that apply to, and the scope of the generalisations that are legitimately made from, the natural and social sciences. Wilkerson considers that

I can presumably predict that trees will be blown over by gales, will die from drought, will undermine my neighbours foundations and will plunge his garden into shade without knowing their species (Wilkerson, 1995., p.56).

There do seem to be rational predictions and generalisations that we can make from all of the kinds of kinds that Wilkerson acknowledges. While he seems to consider that there is a sharp divide between the social and natural sciences, though, it would seem more plausible to consider that there is rather a difference in degree. While this is controversial, Dennett (1998) considers that use of the intentional stance (in this context considering beliefs and desires to be natural kinds), gives us ‘predictive leverage we can get by no other method’. We can predict that Mary will go to a shop to get some toilet paper by noticing that she is out of toilet paper and thus will soon come to believe she is out and will desire to get some more. Such a prediction would

not seem to make sense at any lower level of explanation as no lower level can capture the relevant kinds of belief, desire, or indeed the notion of a shop, or toilet paper.

Wilkerson offers his position as an alternative to the explanatory liberal (who is not a metaphysical realist but considers that there are natural kinds).

they were prepared to countenance any entity that fulfilled certain very general conditions, and any entity that appeared in a serious descriptive and explanatory discipline. The very general conditions were that the entity should have a clear criterion of identity, that it should have a certain structural unity, and that it should lend itself to description and explanation in terms of relevant scientific generalisations' (Wilkerson, 1995 p.29).

Wilkerson maintains that this is not acceptable, but his alternative account of when a scientist is entitled to say that they have discovered an essential property relevant for determining a kind seems quite similar;

we always have some sort of a guarantee that our scientific theories are true, if they obey the general constraints on rational acceptability – if, for example, they are consistent with observation, are comparatively simple and mathematically elegant, yield true predictions, generally get us from truth to truth, and minimise inexplicable coincidence. Not only can we be confident that a theory that passes such tests records natural necessities, but it would be absurd for us to ask for any further guarantee... The possibility of scientific mistake is cause for congratulation, not complaint. (Wilkerson, 1995, p.69)

This, though does not seem to be an adequate account as to when a scientist may consider they have discovered the objective, mind independent essential property that determines natural kind membership. If there is always the possibility that the scientist is wrong then it would seem that we can never have knowledge of these essential properties. If essential properties are essentially intrinsic then it would seem that we cannot observe them and thus intrinsic essential properties are explanatory posits and we have no way of determining whether they mirror reality or not as we can never access the reality itself. The criterion that we have for determining whether the posits are acceptable or not can thus not be whether they correspond to reality or not; rather we are left with the explanatory liberals' account of adequacy, simplicity, coherence etc.

Wilkerson's metaphysical realism thus seems to lapse back into explanatory

liberalism with respect to the practice of scientific investigation and the criterion that we have for accepting essential properties that determine natural kind membership would seem to be the same for both Wilkerson and the explanatory liberal. Wilkerson cannot maintain that the essential properties that determine natural kind membership are both essentially intrinsic and accessible to scientific investigation. As such it would seem that we have an analytic decision to make with respect to whether there are natural kinds or not. Either this is a matter that is to be determined by the world in itself and thus is beyond us in principle; or essential properties are posits that explain and predict nominal similarities and natural kinds are determined by the success we have with predicting and explaining phenomena. If the latter is the case then it would seem that the differences between Wilkerson's kinds of kinds is a matter of degree. If we wish to distinguish between them categorically then the distinction is determined by a relational property, the *comparative* predictive and explanatory success of our posits.

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