

# How to be a Realist about Natural Kinds

P. D. Magnus

University at Albany, State University of New York, USA

e-mail: pmagnus@fecundity.com

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## ABSTRACT

Although some authors hold that natural kinds are necessarily relative to disciplinary domains, many authors presume that natural kinds must be absolute, categorical features of the reality —often assuming that without even mentioning the alternative. Recognizing both possibilities, one may ask whether the difference especially matters. I argue that it does. Looking at recent arguments about natural kind realism, I argue that we can best make sense of the realism question by thinking of natural kindness as a relation that holds between a category and a domain.

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## NOTES ON CONTRIBUTOR

P.D. Magnus is a Professor and Department Chair of the Philosophy Department at the University at Albany, State University of New York, USA. PhD in Philosophy at the University of California, San Diego. His primary research is in philosophy of science, guided by a fallibilist but non–sceptical conception of scientific knowledge. He has published on underdetermination, scientific realism, and natural kinds; also on related issues in the history of philosophy, social epistemology, and art ontology. He is the author of *Scientific Enquiry and Natural Kinds: From Planets to Mallards* (New York: Palgrave Macmillan, 2012).

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# How to be a Realist about Natural Kinds

P. D. Magnus

**R**ICHARD BOYD WRITES, “It is widely recognized that the naturalness of a natural kind —its suitability for explanation and induction— is *discipline relative*” (1999, p. 148). For example, the category *predator* has a plausible claim to being a natural kind. This is true even though there is no difference in the material constitution of predators and non-predators. It is not plausibly an intrinsic feature of an organism, because a particular animal might be a predator in one environment but not another. And a description of the parts of that animal at the quantum scale will not require recourse to the predicate ‘predator’. However, this does not show that predator is an ersatz kind as a category in ecology —i.e., in the context of understanding an animal in an actual or possible environment.

Although Boyd claims that this is “widely recognized”, most authors writing about natural kinds presume the opposite. Many impose the requirement that natural kinds can be characterized only by intrinsic properties. Many suppose that natural kinds must reflect fundamental ontology, so that kinds are natural without reference to domains, disciplines, or anything outside themselves. Even taking these possibilities seriously presumes that, if there are natural kinds, then those kinds are natural *full stop*. Alexander Bird and Emma Tobin write that if “there are in fact natural divisions among things” then “there is a fact of the matter as to whether that classification is indeed genuinely natural” (Bird and Tobin 2015).

These approaches presume that being a natural kind is a one-place predicate. Either a given kind is natural (full stop) or it is not. Call this the *simpliciter view*.<sup>1</sup>

Boyd rejects this view and writes “that ‘natural’ kinds are relative to disciplines, inductive task or contexts of enquiry” (1982, p. 642). He even puts the point in language close to mine: “Thus the fundamental notion in the theory of theoretical natural kinds is not the notion of such a kind, *simpliciter*, but instead the notion of a kind’s being natural with respect to... the role it plays in a disciplinary matrix” (1999b, p. 57).

If natural kinds are domain-dependent, then natural kindness is not a one-place predicate. The basic notion is not ‘K is a natural kind’ but rather ‘K is a natural kind for domain D’. Call this the *relation view*.

Note that it is possible to accept that every natural kind is associated with some domain or discipline but still hold the simpliciter view. To offer an analogy: It may be that every functional kidney exists in relation to a functional heart, but the logic of what it is to be a kidney need not mention the heart explicitly. Similarly, one might think natural kinds can be

<sup>1</sup> Elsewhere, I call this the ‘simpliciter assumption’ (Magnus 2012, pp. 39–45).

defined without reference to domains even if every natural kind occupies some domain or other.

Marion Godman offers an argument for such a position. She accepts that a “kind must be minimally associated to some systematic and theoretical concerns for us to make claims of it being natural and indispensable”, but she nevertheless insists that “this does not show us that [the] *very same kind* can have different claims for naturalness in different domains.” So, she remarks, “I can see what justifies an understanding of naturalness, which is sensitive to relevant theoretical and systematic concerns of the sciences related to the kinds, but not why we should thereby accept a stronger domain relativity of natural kinds” (2014, p. 346).

Godman worries that if natural kindness is a relation, then it is possible for a kind to be natural in one domain but not in another. A specific kind  $K$  might be a natural kind in one domain  $D_1$  but not in another domain  $D_2$ .

Yet why should this be odd? The kind *top quark* is plausibly a natural kind, because of its importance in high-energy physics. This is not to say that this disciplinary importance is what makes it a natural kind, because even essentialists will agree that natural kinds will be important categories for science. And even though the kind *predator* does no work in the high-energy or small-scale domains where top quarks matter, *top quark* does no work in the biological or ecological domains in which *predator* is a natural kind. Neither has a claim to absolute importance, but they are important in relation to different contexts and phenomena. The very same kind *top quark* is a natural kind in the domain of particle physics but not in the domain of ecology; and *vice versa* for the kind *predator*.<sup>2</sup>

Even if it is not such an odd view, someone like Godman might object that nothing forces it on us. One might still hope for a simpliciter account of natural kinds. Different domains and perspective might be due to our epistemic practices rather than ontology.

In what follows, I argue that such an attempt to save the simpliciter view muddles questions of realism. The relation view helps us understand how natural kinds are genuine features of the world.

In §1, I distinguish three different senses of ‘realism’ that arise when discussing natural kinds. In §2, I discuss Laura Franklin-Hall’s arguments for anti-realism about natural-kinds. Franklin-Hall offers a surprising explanationist argument for anti-realism, but presumes the simpliciter view and so categorizes several avowed realists as anti-realists. In §3, I argue that the relation view allows us to make better sense both of debates about natural kinds and of the sense in which natural kinds are real.

<sup>2</sup> Some philosophers avoid this result by eschewing natural kinds in biology and accepting only the fundamental categories of physics. This is a high cost to pay if we want to make sense of scientific practice, because most science (even most physics) is not fundamental physics.

## §1. Three flavours of realism

There are at least three different ways to understand the question of whether natural kinds are real. I will begin by characterizing each briefly in terms of its core commitment and the varieties of anti-realism which serve as foils.

1. There is a familiar philosophical sense of ‘realism’ as the view that genuine categories correspond to universals. This sense of realism is defined in opposition to nominalism (the view that there are no general categories) and conventionalism (the view that genuine categories are purely mental).
2. There is a familiar sense of ‘realism’ as the view that things have mind-independent existence. This sense is defined in opposition to idealism (the view that things are ultimately mental).
3. There is a sense of specifically ‘scientific realism’ which holds that unobservable posits like electrons and genes are just as much part of the world as observable things like sparks and trees. This sense is defined in opposition to views like constructive empiricism which hold that scientific evidence does not obligate us believe in electrons or genes.<sup>3</sup>

Alexander Bird and Emma Tobin (2015) distinguish the first and second sense of realism as strong and weak realism, respectively. They characterize strong realism as “the view that there exist entities that are the natural kinds”. Weak realism, which they also call ‘naturalism’, is the view that natural kinds are theory-independent and “exist independently of the scientists and others who talk about them”. The latter is weaker because a sophisticated nominalist can be a weak realist, holding that there is a mind-independent fact about which categories are natural kinds; the nominalist will just hold that the facts are ones about resemblance between kind members rather than about universals or other abstract entities.

(1.) Realism in the first sense seems to turn largely on general metaphysical issues. If it turns out mundane categories in the world are universals, then it seems likely that natural kinds will be too. The larger question of whether there are universals is not a question to which the philosophy of science has anything much to add, and if it were settled then the result could be imported into the philosophy of science. It is typically supposed, whatever the deep metaphysical structure is diagnosed to be, that all natural kinds will have the same fundamental ontology. So I am going to set aside ‘strong realism’. It is too heavy and deep for me to say anything helpful about it.<sup>4</sup>

<sup>3</sup> Debates about scientific realism have been framed in these terms at least since van Fraassen (1980).

<sup>4</sup> Debates about universals and nominalism long predate discussions of natural kinds, and we should be careful not to presume that natural kinds fit comfortably in medieval frameworks. ‘Natural kind’ as a term of philosophical jargon dates back no further than the 19th century (Hacking 1991), and the sense it has in current debates goes back only about fifty years (Magnus 2014).

(2.) Regarding realism in the second sense: We can ask whether the natural kinds identified by different sciences are mind-independent, and perhaps we will get different answers for physics and chemistry than we do for biology and sociology.<sup>5</sup>

By taking mind-independence as the mark of the real, however, we risk counting mental states and the results of human artifice as trivially unreal. C.S. Peirce notes that, “There are... phenomena within our own minds, dependent on our thought, which are at the same time real in the sense that we really think them” (1887, p. 136). More than that, our conscious actions have wrought changes in the Earth’s climate. So there might not be any ecosystem on the planet which is independent of what we have thought and done. This leads Graham Harman to remark, “Parrots and ice-shelves are not fully natural, since they are both absorbed and transformed by various networks of tourism, nature films, and ecological depletion” (2010, p. 80).

In response to this kind of worry, Laura Franklin-Hall writes, “What must be mind-independent for the natural kind realist are facts concerning *which groups form, or do not form, natural kinds*, not the existence of the members of those groups” (2015, p. 928, fn. 4). Her strategy is to draw a distinction between affecting what members of a kind are like and affecting whether those individuals comprise a natural kind or not. However, such a distinction will be hard to draw if we think that the natural kind structure of the world is contingent. Changes to individuals who are now members of one kind might make them comprise separate natural kinds or no natural kind at all. Parrots might comprise a natural kind even though they are transformed by actual tourism (etc.), but sufficient human influence might affect them so much that they comprised multiple kinds or no kind at all.

Khalidi complains that advocates of realism (in this sense) “have not articulated a clear way of distinguishing a problematic form of dependence (e.g., constitutive) from a nonproblematic form (e.g., causal)”; so, he argues, “the whole effort to make such a distinction is misguided in this context because mind-independence is a red herring” (2013, p. 221). He maintains that what would undercut realism is not mind-dependence (whatever that might mean) but “subjectivity in the sense of biases that subvert our epistemic purposes” (2013, p. 222).<sup>6</sup>

We should not pose the question of realism in a way that presumptively precludes there being any psychological or biological real kinds, but perhaps ‘mind dependent’ can be refined (along the lines Franklin-Hall suggests) or replaced with ‘subjective in a problematic way’ (along the lines Khalidi suggests). For the sake of argument, I will accept from here on that it can.

<sup>5</sup> Franklin-Hall writes, “Though it sometimes pays to explore natural kind realism *in general* — that is, in the broad form just characterized — it is more customary to consider realism *with respect to a particular domain* of individuals or processes, such as organisms, atoms, or mental states” (2015, p. 927). By different ‘domains’, she just means to ask whether different (e.g.) mental state kinds are mind-independent. She still supposes the simpliciter view and is not suggesting that a category might be a natural kind just in a specific.

<sup>6</sup> See also Khalidi (2016).

(3.) Realism in the third sense is what I have elsewhere called *equity realism* (Magnus 2012, ch. 4). Equity realism about natural kinds is the view that natural kinds are as much features of the world as familiar particulars; e.g., that we should believe that the kind *electron* is a feature of the world just as much as we believe electrons are. Combined with equity realism about unobservable entities, we get the view that trees, electrons, and the kind *electron* are all on similar footing.

Note that equity realism about natural kinds is compatible with a sweeping, nihilist anti-realism which would deny the reality of rocks, trees, and electrons as much as the reality of natural kinds. Nevertheless, rocks and trees are real in a perfectly ordinary sense. They are persistent and intersubjectively available. An ordinary-language philosopher might take this as grounds to reject nihilism, but one need not go that far. It is significant in any case if natural kinds are as real as familiar ‘real stuff’, even if there were a deeper philosophical sense in which none of them were *really* real.

## §2. Explanationist anti-realism about kinds

The philosophical function of ‘natural kind’ talk is to make sense of how the world constrains scientific taxonomy. Some natural kinds may be beyond human knowledge, but only a radical skeptic would think that they all are. So natural kinds (the knowable ones, at least) are simultaneously features of the world and things that we could learn about. As features of the world, natural kinds exist out there in the world. As things we could learn about, they must exist in relation to our epistemic practices. These provide the chief reasons for realism and anti-realism about natural kinds, respectively.

First, the world: The periodic table in chemistry just seems to better reflect the structure of things than earlier systems. In general, better science seems to involve better systems of categorization. An account of natural kinds must make sense of how this taxonomic progress is possible. Allowing that better category schemes involve learning about the world requires that the schemes be (partly, at least) be features of the world. Laura Franklin–Hall (2015) calls this the challenge of *progress*. It is fatal for an extreme anti-realism which denies that any taxonomic system can reflect the structure of things better than another.<sup>7</sup>

Second, our knowledge: Natural kinds are the categories that ought to appear in scientific accounts. As Franklin–Hall explains, “Most contemporary accounts of natural kinds presume that we learn about the identity of the natural kinds... by inspecting the categories and classifications in use in mature sciences. For this policy to be truth-conducive the scientific categories and the natural kinds must to some degree line up with one another” (2015, p. 932). She calls the way that scientific taxonomy aligns with natural kinds *coordination*, and so she calls this the challenge of coordination: An account of natural kinds must show how scientists

<sup>7</sup> Franklin–Hall calls such extreme anti-realism *nihilism* about natural kinds. She offers Goodman (1978) and Hacking (2007) as exemplary nihilists.

could reliably learn about natural kinds on the basis of empirical evidence. It is, she argues, fatal for realism.

Her argument against the realist requires, as an intermediate conclusion, the *category influence hypothesis*: “that the contours of scientific classifications are to some degree influenced by contingent features of scientists themselves” (Franklin–Hall 2015, p. 933). She argues for this both by example and in principle. As an example, she notes that ecologists sort organisms into groups like *predator* and *prey*, while evolutionary biologists sort them into groups based on lineage. And in general, she notes that any things which might form a kind differ in some respects and are similar in others. Marking groups that include some individuals and exclude others requires attending to the features that group members share and disregarding the respects in which they differ. This attention, she suggests, necessarily reflects the priorities and interests of whoever is doing the categorizing.

Category influence is a problem for realism because it suggests that categories posited to be in the world inevitably depend on us. So the realism which Franklin–Hall targets is the view that a category is a natural kind when its content and status are independent of us (realism in the second sense discussed above). She defines anti–realism as the denial of that realism. With the exception of nihilists, who deny that there are any natural kinds at all, “anti–realists frame accounts according to which the natural kinds depend... on our aims, concepts, or cognitive capacities” (2015, p. 926).

Category influence makes it hard for the realist to meet the coordination challenge. Franklin–Hall writes:

On the one hand, the realist maintains that facts about which kinds are natural and which are not are fully mind–independent, determined in no way by us. On the other hand, she suggests that we infer the identity of those kinds from the categories of science. Yet, as per the category influence hypothesis, had we possessed different explanatory and predictive priorities, the categories would likewise have differed. Therefore, the scientific categories are not mind–independent. But why have categories determined *in part by us* coordinated with natural kinds determined *in no way by us*? Without an account of this, our successful identification of the natural kinds via the scientific categories will appear to be a remarkable instance of cosmic good luck. (Franklin–Hall 2015, p. 934)

I quote this at length because something interesting has happened in her argument. The category influence hypothesis does not show that realism could not possibly be true. Rather, it tasks the realist to make sense of how knowledge of mind–independent natural kinds is possible using mind–dependent methods.

The No–Miracles Argument (NMA) is familiar from discussions of scientific realism. For example: *If atoms did not exist, then the success of atomic chemistry would be an inexplicable miracle. So inference to the best explanation entitles us to infer that atoms exist.* Franklin–Hall turns this familiar NMA on its head by arguing that, if realism about natural kinds were true, then the success of science would be a miracle. So she has given us an explanationist anti–realism!

Having taken herself to have dispatched realism, Franklin–Hall takes up the question of how to understand anti–realism in a way that can meet the challenge of progress. Before offering her own account, she considers what she calls the *simple epistemic* view. She identifies Richard Boyd and I (Boyd 1991, Magnus 2012) as exponents of the simple epistemic view and thus as anti–realists.<sup>8</sup> A tension arises because Boyd and I both self–identify as realists. This is, in large part, because Franklin–Hall characterizes ‘realism’ differently than we do.<sup>9</sup> But the difference matters.

Franklin–Hall argues that natural kinds “reflect the categories that both ourselves and a large array of scientific inquirers with epistemic aims and cognitive capacities differing from our own would sanction in common, thereby converging on a single set of categories and kinds from multiple, distinct starting positions or points–of–view” (2015, p. 940). She calls these *categorical bottlenecks*, because the world is structured so that different enquiries and different enquirers would do best to give their accounts in terms of those same categories. This is not a convergent realist view, however, because the push to identify these categories is not a push upon everyone. Rather, it only presses on enquirers who are sufficiently like us. In metaphorical terms, the categorical bottlenecks constrain us and folk who start in the same bottle as us.<sup>10</sup>

### §3. The relation view defended

Treating realism as mind–independence poses the question as being about the metaphysical status of the natural kinds *tout court*. To put it in terms of words rather than things, the question is whether the truth of ‘K is a natural kind’ is mind–independent. The realist answers *yes*, and the anti–realist answers *no*.

The simpliciter assumption is presupposed by the framework itself. Giving any straight answer to the question of realism —being a realist or an anti–realist in this sense— implicitly accepts it.

Franklin–Hall acknowledges that natural kinds for Boyd and I are domain–relative, but she sees this relativity as just a kind of anti–realism. She argues that it compromises the

<sup>8</sup> It seems like she would say the same about Khalidi (2013). Khalidi does not directly say whether he holds the simpliciter or relation view, but he is explicit that different categories can matter in different domains. He writes, “different categories may be found to be important from the perspective of different scientific disciplines” (Khalidi 2013, p. 54).

<sup>9</sup> She writes, “I am overlooking many interesting properties of Magnus’s and Boyd’s theories, and focusing on just the feature that presents the most useful contrast with my own account” (Franklin–Hall 2015, p. 938, fn. 18).

<sup>10</sup> It is possible to construe Franklin–Hall’s account of natural kinds as categorical bottlenecks so that it aligns with my account of natural kinds as constraints on enquiry in a domain. Once we specify the bottle, the bottleneck constrains what account can be given— and once we specify the domain, natural kinds constrain what account can be given. On that reading, there remain two important differences: (1) She defines realism in terms of mind–independence, whereas I argue this is a mistake. (2) She holds the simpliciter view, whereas I argue for the relation view.



objectivity of natural kinds. Posing what she takes to be a problem case for domain–relativity, she writes:

[T]hough any organism will share many of its features with conspecifics, some of its still properly scientific characteristics can be shared more closely with members of other species taxa. This appears to be the case for some immunological features, which are genetically determined but highly polymorphic within recognized species.... Had the causal consequences of these non–clustered features formed the exclusive focus of our inquiries, it seems that different categories would have been appropriate and, according to [Boyd and Magnus], the result would be different natural kinds. (Franklin–Hall 2015, p. 940)

If scientists were concerned narrowly with immunology, then their natural kinds might be comprised of distant organisms which share immunological features rather than historically–connected members of species.<sup>11</sup> This is structurally similar to the contrast between ecological interest (in predators and prey) and evolutionary interest (in species) which she notes when discussing the category influence hypothesis. If the interests of science can change what counts as a natural kind (she argues) then natural kinds are too subjective to answer the challenge of progress.

Given different interests, different kinds would count as *natural kinds* —but only if we suppose that being a natural kind is something that holds just of the kinds themselves. That is, the examples only reveal subjectivity if we presuppose the simpliciter assumption! That presupposition is precisely what Boyd and I deny.

If natural kinds are domain–relative, then the imagined different biologists do not make a change to the facts about natural kinds at all. Species are natural kinds in a domain which includes populations of organisms and their relations of descent. *Predator* and *prey* are natural kinds in a domain which includes animal behavior and ecology. Classes of animals which share immunological features are natural kinds in somewhat different domains. The different imagined biologists ask about different domains, and so discover different facts. That does not make the facts which they discover subjective, any more than my finding different rooms in my house than you find in yours makes the rooms subjective.

The parts and features of the world which are the domain of biology include diverse, cross–cutting natural kinds. So it is too restrictive to pretend that biologists decide between a domain in which species are natural kinds and one in which *predator* and *prey* are. Those and more besides are natural kinds in the domain of biology.

Immunological categories are natural kinds for biology now. Perhaps they were not part of the domain of biology in the time of Linnaeus, but that does not reveal any subjectivity. Rather, developments in medicine and biochemistry have led scientists to attend to phenomena which were unknown in Linnaeus’ time. New discoveries expanded the domain

<sup>11</sup> Franklin–Hall’s argument parallels the one given by Godman (2014) which is cited above.

of biology in various ways. Yet the expanded domain, qua objects and aspects of objects in the world, is not a result of the discoveries.

In discussing the category influence hypothesis, Franklin–Hall also gives the example of chemical elements. She quotes Robin Hendry (2010), who asks what would have happened if the architects of modern chemistry had been interested in somewhat different phenomena. If early chemists had been more concerned with how certain reactions play out, then they might have defined elements partly in terms of atomic weight rather than just in terms of nuclear charge. Hendry notably sees this as compatible with realism; he writes, “None of this undermines the fact that nuclear charge is a real physical property that predated chemists’ knowledge of it, or the fact that the patterns of behavior it determines are a genuine feature of the causal structure of the world” (Hendry 2010, p. 151).<sup>12</sup> It is only a source of subjectivity if there is supposed to be a single, short list of natural kinds in the world. Yet even chemists with the interests they actually had distinguished *isotopes* in terms of weight as well as *elements* in terms of nuclear charge. It is somewhat subjective which of these they counted as more important, but both are natural kinds in the domain of chemistry.

Franklin–Hall goes on to imagine more extreme possible interests. For example, “had scientists cared exclusively to account for the behavior of material in centrifuges... a classification by density, which would crosscut our current partition, may well have emerged” (2015, p. 933). It is not clear to me what the natural kinds would be for the domain which includes *only* phenomena of substances in centrifuges. It is plausible to think that it would include what we call elements, isotopes, and then perhaps also some density–based categories which actual chemists do not recognize. Or perhaps the concerns of the centrifuge–obsessed enquirers would be so specific that their enquiry would not need to recognize the divisions of the periodic table at all. This would still not be a source of subjectivity, but just a report of how the kind/domain relation varies across different domains. I am unsure just what to say about this case precisely because it depends on what the world is actually like.

Franklin–Hall also poses more exotic possible enquirers, interested in what would seem to us to be odd, disjunctive patterns. She suggests, “any inquirer motivated to illuminate those patterns would deploy categories difficult even to describe with languages we presently have available” (2015, p. 933). Once we begin to worry about arbitrary disjunctive patterns, however, we should start to worry about different ways of dividing the manifold of the world into different individuals. Creatures who see the world in alien ways and who speak about it in ways which we cannot comprehend may be threats to realism, but the threat generalizes into a nihilist anti–realism about pretty much everything. I confess that I do not know what to say about such exotic cases, but they are irrelevant to the modest claim of equity realism.

So far I have construed domains of enquiry, with emphasis on *domains*, in terms of objects and phenomena in the world. Emphasizing *enquiry*, one might instead build in the

<sup>12</sup> Elsewhere, I highlight this realist aspect of Hendry’s discussion (Magnus 2012, pp. 58–9).

instruments which scientists have available and the background theories which they hold.<sup>13</sup> Franklin–Hall seems to understand them in this way; she writes that Boyd and I make natural kinds relative to “packages of epistemic aims and conceptual resources” (2015, p. 938). One might worry that this threatens the objectivity of scientific category schemes.

Imagine that scientists are constructing instruments, adopting background theories, and setting aims in an unconstrained way while simultaneously deciding on a scheme of categories. Almost any category scheme might yield scientific success, if coupled with a change somewhere else in the system. In that scenario, the successful category scheme would be highly sensitive to the scientists’ interests and choices. But, precisely for that reason, their categories would be what I’ve called *fungible kinds* rather than natural kinds (Magnus 2012, pp. 61–7). More importantly, scientists are rarely at such liberty. As Boyd (1990) argues, instruments and methods are historical products which embody the best available scientific understanding of the world. And the world, for its part, condemns many category schemes to fail. Our ability to coordinate our scientific taxonomy to natural kinds is a contingent but non–accidental result of the history of science. In this respect, any account of which kinds are natural kinds depends on our fallible beliefs about the world—but they are our beliefs, so we think that they get the world roughly right. As Khalidi writes, “if metaphysics is not a purely a priori enterprise, then it must be informed by our surest knowledge–gathering endeavors and cannot proceed independently of our epistemic practices” (2013, p. 124).<sup>14</sup>

The domain–relative conception of natural kinds allows us to say that the natural kinds discovered by science are genuine, objective features of the domains which scientists have investigated. If one insists on applying one label or the other, it answers to realism rather than anti–realism. This is not realism in a deeply metaphysical sense, but it rejects a presupposition of the dichotomy and so is not anti–realism in a deeply metaphysical sense either. If we force natural kinds into a rubric of realism and anti–realism held over from medieval and early modern debates, then we cover over important possibilities.

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<sup>13</sup> This is suggested by Boyd’s talk of “disciplinary matrices” (Boyd 1991). See also Magnus (2012, pp. 43–5).

<sup>14</sup> To be clear: Khalidi does not decisively reject the simpliciter assumption. Rather, his account is compatible with it but also compatible with its rejection. For further discussion of this point, see Magnus (2014).

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