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Hegel and Arguments for Natural Kind Essentialism

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Abstract

Natural Kind Essentialism (NKE) is the view that the objects of sciences like physics, chemistry and biology fall into natural kinds, and that such kinds have essences—sets of properties possession of which is necessary and sufficient for kind-membership. Since Putnam and Kripke brought NKE back onto the philosophical agenda, it has found many advocates. But comparatively little attention has been paid to the question of how this view can be positively motivated. After illustrating the current need for an argument for NKE through critical discussions of Putnam's, Kripke's and Ellis's arguments for NKE, this article aims to show that Hegel offers the resources for an original argument for the view. This argument works by deriving metaphysical implications from an account of what it means to understand an explanandum.

There are two basic views in philosophy about the nature of the groupings and classifications that we use to deal with reality. For many philosophers, both today and in the past, reality is like a cake: there are various legitimate ways to cut it into pieces, and which way we should adopt depends not on a fundamental structure of reality itself, but on other factors—e.g., our practical interests and needs, or contingent facts about our linguistic practices. For others, reality is rather like an animal in the butchery: there is a privileged way to divide it into pieces, which cuts reality at its joints. Those who favour the second view face serious metaphysical tasks: not only do they have to provide an argument for the view that reality is structured by joints at all, they also have to develop and defend an account of what those joints exactly consist in—otherwise, the assumption of such joints risks being a mere appeal to mysterious entities.

A particularly influential way of accounting for the nature of reality's joints goes back to Aristotle. Reality is ordered, for Aristotle, by kinds that have *essences*, i.e., *necessary* features.[1] These necessary features are, for Aristotle, not just a matter of the conventional meaning of our kind terms; rather, they are something

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that we need to *discover*. Discovering kinds and their necessary features, developing definitions that incorporate them, and thus grasping the objective structure of reality, is a chief goal of science, as Aristotle understands it.[2]

Aristotle's view that natural kinds have essences—a view that is often called *natural kind essentialism* (NKE)—has been enormously influential, not only in metaphysics in the Aristotelian tradition, but also in the history of science: it was a dominating view in botany and zoology until far into the eighteenth century, and key figures in the development of modern biology such as Linnaeus were firmly committed to it (Mayr 1982: 165, 175–77).[3] Moreover, NKE still has many advocates: it has become popular again since Putnam's and Kripke's seminal work in the 1970s (Putnam 1975; Kripke 1980), and there has been a recent wave of work on 'new essentialism' that defends different variants of the position against critics (e.g., Ellis 2001, 2002; LaPorte 2004; Devitt 2008).

But while NKE offers a popular way of spelling out the idea of reality as being structured by 'joints', the question of how this view can be argued for positively has received relatively little attention. In this article, I will argue that the resources for an interesting, positive argument in favour of NKE can be found in Hegel's writings. Hegel arguably believes in the possibility of carving reality at its joints, and it has been proposed (although not always in these terms) that a version of NKE is crucial to Hegel's metaphysics, and indeed to his entire philosophical project.[4] The argument that I will ascribe to Hegel in the following is therefore concerned with a central tenet of Hegel's philosophy; moreover, it connects several key topics in Hegel's thought, including the category of the 'Concept', the cognitive achievement of 'comprehension' (*Begreifen*), and the nature of subjectivity.[5] But Hegel's defence of NKE is also of considerable philosophical interest independently of Hegel's system, as it uses premises that can be made plausible outside of that system.

The paper falls into two main parts. My aim in the first part (sections I to III) is to show that prominent recent advocates of NKE have failed to provide compelling arguments for their view. After expanding on natural kinds and NKE in section I, sections II and III critically review some arguments for NKE in the recent literature: section II will discuss whether Kripke's and Putnam's work on the semantics of natural kind terms supports NKE, while section III will assess Brian Ellis's argument for NKE. By arguing that those defences of NKE, influential though they are, fail to be compelling, I hope to provide reason to look elsewhere for inspiration for an argument in favour of NKE. The second part of the paper (sections IV to IX) tackles this desideratum by turning to Hegel. Section IV will briefly explain how Hegel can be read as subscribing to NKE, while sections V to IX will reconstruct and defend an argument for NKE that Hegel offers.[6]

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I. Natural kinds and Natural Kind Essentialism

Natural kinds (if there are any) are kinds that are 'out there' in reality—they are not merely imposed by our own cognitive activity, as 'artificial kinds' are. Three important, widely accepted conditions for the naturalness of a kind are the following. First, natural kinds support induction: the detection of shared stable features in a representative sample of kind members gives good (although defeasible) reason to believe that all other members of the kind have those features, too. Second, they are linked to natural laws: if two entities belong to the same natural kind, they are governed by the same specific laws, which hold for them in virtue of their kind membership. Third, natural kinds are normally thought to form hierarchies: an individual can belong to two natural kinds only if one of these kinds is a genus that contains the other as a species. This requirement guarantees that there is *one* way in which things are objectively divided up, and hence one privileged way of classifying them.

NKE proposes a specific, essentialist interpretation of such kinds. It can be formulated as a conjunction of two claims:

NKE (1) The objects of at least some sciences fall into natural kinds, which these sciences aim to capture in their classifications; and

(2) Natural kinds have essences: For each natural kind N, there is a set of properties P = {P1, … } such that with metaphysical necessity, an object is an instance of N iff it possesses each property from P.[7]

The above formulation of (1) leaves it deliberately open as to which sciences exactly have objects that fall into natural kinds. For example, I will count a view on which there are natural kinds in physics and chemistry, but not in biology, as a version of NKE. Moreover, by 'objects' of sciences I understand individuals (in a sufficiently broad sense) that are studied by those sciences, and over which their theories quantify—such as elementary particles in physics, samples of chemical substances, or biological organisms.

Initial motivation for NKE, thus understood, comes from the fact that its essentialist interpretation of natural kinds fits well with the other features of natural kinds that I have sketched before. The essences assumed by NKE could explain why natural kinds support induction (properties of single instances can be generalized if they are part of the essence of the kind), are linked to natural laws (if obedience to a particular natural law is one of the necessary conditions for kind-membership), and form hierarchies (if membership in higher-level kinds is part of the essence of a lower-level kind). Moreover, if they have essences, natural kinds are governed by metaphysical necessities. Again, this fits well with the idea of natural kinds as forming the 'joints' of reality: a classification that captures a

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metaphysically necessary structure in reality is intuitively seen as non-arbitrary, if compared to alternative, 'artificial' orderings that merely pick out some *contingent* relations of similarity between things.[8]

II. Putnam and Kripke on Natural Kind Essentialism

As I have mentioned earlier, Putnam and Kripke have been pivotal in the revival of NKE over the last decades, and both adherents and critics of NKE often refer to Putnam's and Kripke's semantic framework as lending support to or even entailing NKE.[9] Putnam and Kripke argue for a view on which a given sample is part of the extension of a natural kind term if and only if it is of the same kind as a relevant *standard*: according to Kripke's causal theory of reference, this standard consists in the sample with reference to which the term was initially introduced (Kripke 1980: 135); according to Putnam's semantic externalism, it consists in the samples to which members of the speaker's linguistic community normally apply the natural kind term (Putnam 1975: 141f., cf. 149–52). In turn, the relevant notion of 'sameness' of kind is understood by both authors in terms of sameness of *microstructure* (in Putnam's case: *if* the samples in the actual environment of the speaker's community have a common microstructure) (Kripke 1980: 138; Putnam 1975: 160). Assuming that the relevant standard that fixes the use of 'water' in our actual world has the microstructure H_2O, it follows that with metaphysical necessity, water is H_2O: across all possible worlds, those and only those samples which share the microstructure of H_2O are samples of water. So having the microstructure H_2O is (part of) the essence of the kind water.

It is therefore natural to understand Kripke's and Putnam's account of the semantics of natural kind terms as containing or entailing a form of NKE[10]—more precisely, a form which assumes that a determinate *hidden structure* or microstructure is a necessary and sufficient condition for kind membership. By contrast, it is less clear how exactly Kripke and Putnam can be seen as *arguing* for this claim. Nathan Salmon (1982) discusses a reconstruction of Putnam's argument that Keith Donnellan has proposed in unpublished work, and that draws on Putnam's account of how we can specify the meanings of natural kind terms through ostensive definitions (Putnam 1975: 141f.):

P1: It is necessarily the case that: something is a sample of water if and only if it is a sample of the same liquid that this↗ is a sample of.
P2: This↗ has the chemical structure H_2O.
P3: Being a sample of the same substance as something consists in having the same hidden structure.

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Therefore

C: It is necessarily the case that: something is a sample of water if and only if it has the hidden structure H_2O. (Salmon 1982: 166, slightly modified)

As Salmon points out, this argument is valid as it stands, but it will not convince an anti-essentialist, because P3 already presupposes a version of NKE. Someone who denies NKE might give another definition for sameness of substance (or kind)—at least for the case of cross-world sameness with respect to nomologically different possible worlds—and would therefore reject both P3 and the conclusion.

On an alternative reading, Putnam's and Kripke's commitment to NKE is justified by the intuitions that are prompted by their famous *thought experiments*. When the visitor from Earth finds that what people on Twin Earth call 'water' actually has the microstructure XYZ, we expect him to conclude that the term has a different meaning, for XYZ *is* not water (Putnam 1975: 140, cf. 150). When imagining a possible world in which every area that contains gold in the actual world contains superficially identical fool's gold, we would not say that gold has a different microstructure in the counterfactual world; rather, we would say that the substance in question in the counterfactual world is not gold (Kripke 1980: 124f., cf. 119). That people often find thought experiments like these convincing suggests that we intuitively assume a metaphysically necessary connection between kind membership and the possession of determinate microstructural features. And—we may add—unless one subscribes to a general scepticism about intuitions, there is no reason not to treat the essentialist intuitions in question as *bona fide* cases of an exercise of our capacities for rational insight, as they are standardly appealed to by metaphysicians.

Unlike Donnellan/Salmon's reconstruction, this reading ascribes to Kripke and Putnam a reasoning in favour of NKE which is not simply question-begging. Nevertheless, the appeal to intuitions in favour of NKE can be challenged on the basis of *Psychological Essentialism*, a well-established hypothesis in cognitive science according to which our cognitive systems are biased towards essentialist interpretations of our environment (Leslie 2013).[11] As an ample body of behavioural data from children, including pre-schoolers, and apes suggests (Cacchione et al. 2016), we and other animals have a disposition to think and act as if the stable properties of things had their causal root in essences. Our bias shows that we relate those essences to, or identify them with, the inside of things, and order them in hierarchies. Moreover, there is evidence suggesting that the essentialist bias affects the reasoning of adults, too, and even can lure them into patently irrational attitudes. For instance, the widespread suspicion that transplanted organs affect the personality of the patient who receives the organ has been explained as manifestation of the essentialist bias postulated by Psychological Essentialism (Meyer et al. 2013).

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It is hard to avoid the conclusion that our intuitions in favour of microstructuralist NKE that are prompted by Putnam-/Kripke-style thought experiments are a manifestation of the bias postulated by Psychological Essentialism (with 'microstructure' being a more sophisticated way of conceiving of the 'inside' of things) (Leslie 2013). May we assume that this bias constitutes an ability for reasoning and belief-formation that is sufficiently reliable or truth-tracking to provide justification for beliefs that are based on this ability? There are two possible scenarios in which the bias can, in principle, have such a justification-providing status. First, it could be reliable by coincidence. In this scenario, NKE is true, and we have evolved to have an essentialist bias, but there is no causal connection between them. On some versions of externalism about justification at least, our essentialist bias could then produce justified beliefs, as long as we possess no other reliable process such that, if we exercised that process, we would *not* have the essentialist beliefs (Goldman 1979). Second, a bias that produces essentialist intuitions could be evolutionarily valuable *because* NKE is true: the truth of NKE could have an impact on biological and cultural evolution (just as truths about objects in our environment presumably have favoured the evolution of perceptual abilities that detect exactly such truths).

The probability that the first scenario—reliability by coincidence—obtains is very low. If someone assumed such a scenario to defend a positive justificatory role for our essentialist bias, this would be a mere ad hoc manoeuvre. The second scenario—reliability through an impact of NKE on evolution—is more likely. For one way to understand essences and natural kinds is as theoretical entities that are postulated by a science like chemistry or biology. As such, they ought to have explanatory power regarding observable phenomena, and hence an impact on those phenomena. On this view, it should be assumed that *if* NKE is true, its truth can affect evolution: *if* NKE is true, the environment in which organisms live is governed by natural kinds with essences, and in this case an essentialist bias can make it easier for an organism to cope with its environment.

However, there is still a problem here regarding the status of essentialist intuitions. For the question of whether the second scenario, as we have now described it, actually obtains or not, falls into the scope of science. In the case in which this scenario is actualized, we should expect that NKE provides the best explanatory framework for science. If science does *not* favour NKE (either because it speaks against it, or because it is neutral with regard to it), we should assume that the scenario in question does *not* obtain (in which case our essentialist intuitions could still be reliable, but only by coincidence).

We will come back later to whether science actually favours NKE or not. What matters for the moment is the following: if science does *not* favour NKE, someone who uses essentialist intuitions to argue for NKE has to assume that the first scenario obtains, and this would be merely an ad hoc assumption. If,

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instead, science *does* favour NKE, this will be a reason to hold NKE that is *independent* of the essentialist intuitions. While in this latter case, we may assume that our essentialist intuitions are produced by a reliable mechanism, we can do so only because science favours NKE in the first place. The intuitions do not *themselves* add any further reason in favour of NKE in this case.

We can conclude therefore that essentialist intuitions of the kind prompted by Putnam-/Kripke-style thought experiments should not, after all, be treated as good reasons in favour of NKE. Instead, I next turn to an argument for NKE that directly builds upon considerations about science.

III. Ellis on Natural Kind Essentialism

Brian Ellis, who has developed the currently best worked-out version of NKE (Ellis 2001, 2002), motivates his view in a way that avoids appeal to intuitions. Rather, Ellis has proposed that NKE should be seen as part of the best way to spell out scientific realism—that is, broadly speaking, the view that the entities which our best scientific theories postulate actually exist. More precisely, Ellis argues that we should accept a version of the miracle argument for scientific realism which is restricted to entities that are 'essentially involved in causal process explanations of [broadly] physical phenomena' (Ellis 2001: 157): the actual existence of the entities that science refers to in our best causal theories is itself the best explanation for the success of those theories. On the resulting version of scientific realism:

> if a physical causal mechanism is postulated to explain something, and it provides a good explanation—one that is better than any other currently available—then it is reasonable to believe in the reality of the proposed mechanism. Moreover, if the proposed mechanism assumes the existence of entities having various properties or structures, and these properties or structures are appealed to in the explanation that is given, we should believe that these properties or structures exist too. A causal process realist must therefore be a realist about certain kinds of properties and relations, as well as about the things that are supposed to possess them. (Ellis 2001: 157)

Thus, for Ellis, NKE is a metaphysical theory that accounts for those aspects of reality that make possible successful explanations of phenomena in terms of causal processes. More specifically, Ellis thinks that scientific explanation itself aims de facto at uncovering essences: 'Not only are most scientific explanations concerned with the underlying causes of phenomena, and are thus realist in

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character', he writes, 'many are … also essentialist. That is, they are concerned with the essential natures of the kinds of causal processes they seek to explain' (Ellis 2001: 160). Ellis claims that a great deal of inquiry in physics and chemistry aims to uncover the nature of such processes as alpha decay, or the reaction by which metallic copper is turned into cupric sulphate. He thinks that such processes themselves are grouped into natural process kinds with essences, and that science aims at discovering such essences—at understanding what makes those processes the processes they are. In turn, explanations of observed phenomena in terms of process kinds with essences depend on assumptions about the essences of natural kinds of *objects*: 'If, for example, you ask what makes the cupric sulphate chemical reaction one of the kind it is, you will learn that it is the fact of its being a reaction involving just these *kinds of molecules* in just this kind of way' (Ellis 2001: 161). It is the essences of kinds of objects that settle how instances of these kinds behave in given circumstances; for Ellis, the laws of nature are based on natural kinds.

The form of Ellis's argument for NKE can be summarized as follows:

P1 Causal-process explanations in science S typically use as explanantia essences (consisting of individually necessary and jointly sufficient conditions) of kinds of processes and objects (and properties).
P2 The entities postulated by our best causal theories exist. (from the miracle argument for causal process realism)
C NKE is true for the objects of S;

and Ellis endorses this argument for physics and chemistry.

Ellis's argument is flawed by a very similar shortcoming to Putnam's argument on the Donnellan/Salmon reading: P1 presupposes an *essentialist interpretation* of scientific explanation (and even a very specific type of essentialist interpretation) which an opponent of NKE does not have to accept. For there are many alternatives to a view of scientific explanation as uncovering essences that Ellis does not rule out and that his opponent can resort to. Prominent non-essentialist interpretations of scientific explanation include views in which scientific explanation subsumes observed phenomena under natural laws that are not based on essences (Hempel 1965; Armstrong 1983: 40f.; Maudlin 2007);[12] views in which scientific explanation uncovers causal mechanisms that are not based on essences (Salmon 1984); and views in which scientific explanation unifies theories (Kitcher 1989).

Now it might be possible to argue that while different ways of interpreting science are in principle possible, an essentialist interpretation has the best fit with current theories and the scientific practice behind them—and this may well be how Ellis himself would motivate the above premise P1 (applied to physics and chemistry). So does science support NKE in this sense? Critics have cited a

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number of examples from science to show that, far from supporting NKE, science actually speaks against it. For one thing, it has been pointed out that the stock example of NKE since Putnam and Kripke is mistaken:[13] being H_2O is neither a necessary nor a sufficient condition for membership in the kind water, since the liquid and ice phases of water have a much more complex and variable composition.[14] Admittedly, water is a particularly complicated chemical compound (Hendry 2006: 873); but other problem cases for NKE are more pervasive. Thus, it has been argued that many chemical (and biological) kinds partially overlap each other: they are 'cross-cutting kinds'. Such kinds do not fulfil the requirement of hierarchical order, which means that they are not natural kinds, and a fortiori not natural kinds with essences. For example, most, but not all, enzymes are proteins; and some, but not all, proteins are enzymes (Tobin 2010).[15] And the isotopes of the chemical elements can be classified not only according to their atomic number (such that the different isotopes of an element are grouped together), but also according to their mass number, the number of protons and neutrons (such that isotopes of different elements are grouped together) (Khalidi 2013: 70). This mass number-based ordering has predictive power with regard to radioactive decay (Khalidi 2013: 70); it therefore would seem to qualify as a non-artificial system of kinds, which cuts across the system of the chemical elements.

In response to the problem of such cross-cutting kinds, an advocate of NKE could abandon the requirement that natural kinds should be ordered hierarchically (cf. Tobin 2010). But this comes at a high cost, as it threatens the idea that there is *one* objective order of reality that we can capture in our classifications. Cross-cutting kinds support more than one scheme of classification. Which scheme we adopt will presumably depend on our interests and the context of our inquiry (e.g., whether we are concerned with the nuclear or chemical properties of atoms), and this seems to undermine the idea that reality can be carved at its joints.

There are two other ways in which the advocate of NKE can react to the problem of cross-cutting kinds. First, an advocate of NKE can restrict NKE to kinds that are less problematic. In particular, the elementary particles of physics are often seen as unproblematically amenable to an interpretation in terms of NKE. Given the fundamental scientific importance of the kinds of elementary particles (quarks, leptons, and bosons, with their respective subkinds), a form of NKE that preserves the status of a natural kind with an essence for these kinds would still be a substantive metaphysical position.

The problem with this position is that even if it is granted that kinds of elementary particles are bona fide cases of natural kinds, it becomes unclear how an essentialist interpretation of them can be motivated if they are the *only* true natural kinds. It was a key strength of NKE, as traditionally understood, that it

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promised a unified account of scientific explanation, laws of nature and taxonomy for whole sciences like physics and chemistry (or even biology). If the kinds of elementary particles are the only real natural kinds, the explanations, laws, and kinds in chemistry and in branches of physics like thermodynamics and optics must be accounted for without reference to natural kinds and essences.[16] And whatever metaphysical account is adopted in this regard, it is reasonable to expect that this account can also be extended to elementary physics. This puts advocates of the restricted version of NKE under pressure: they need to provide an independent motivation for why they defend NKE in the case of elementary particles, instead of embracing the unified non-essentialist account.

The other remaining option for the advocate of NKE is to accommodate cross-cutting cases by assuming that among the competing divisions of things (e.g., the division of atoms according to atomic number and according to mass number), only one *really* captures the natural kind-structure of reality. The other divisions can still be non-artificial and do important scientific work, but they are not divisions into natural kinds. Whether this option is viable or not depends, too, on whether NKE can be motivated independently. Without such motivation, this option will be a mere ad hoc move.

This leaves the advocate of NKE in an uncomfortable situation. As our discussion suggests, science does not itself speak in favour of NKE: science can be accommodated by NKE (through either of the two moves that I discusse in the last three paragraphs), but the motivation for NKE has to come from elsewhere. In other cases of particular metaphysical interpretations of science, such independent motivation typically comes from metaphysical intuitions. But as it turns out, *essentialist* intuitions should be taken at face value only if there is independent support for NKE from science—which there does not seem to be.

IV. Hegel on Natural Kind Essentialism

In this and the following sections, I hope to show that Hegel offers the resources for an alternative argument for NKE that is not question-begging and does not appeal to essentialist intuitions.[17] More precisely, Hegel can be seen as defending an essentialist interpretation of science in general—and hence, as offering an argument in support of Ellis's premise P1.[18] When combined with the further assumption of scientific realism, this argument is apt to support the conclusion that NKE is true. Before beginning to reconstruct Hegel's argument in the next section, I will in this section say a bit about his understanding of NKE. For the present purpose, I will restrict myself to a very brief sketch of the outlines of such a reading (for more detail, see Knappik 2016a).

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In the third part of the *Science of Logic*, Hegel identifies the category of 'the Concept' as a central logical and ontological principle, claiming that all reality is a realization of the structure of the Concept—a structure that he defines as a unity of universality, particularity, and individuality.[19] This can be seen as the basis for a metaphysical theory on which finite reality is articulated by *individuals* that instantiate, in virtue of their *particular* features, *universal* objective kinds; Hegel's preferred term for such kinds is 'concepts' (e.g., *WL:* 5:26).[20] So while Hegel describes his philosophy as a form of idealism, his metaphysics is actually congenial to the claims of scientific realists about the status of theoretical entities: as Robert Stern puts it in a related context, this 'will only seem oxymoronic if by "idealism" one thinks only of Berkeley and not of Plato' (Stern 2016: 2; see also Stern 2009: 59).

The way in which Hegel understands objective 'concepts', or natural kinds with essences, differs significantly from the views of many essentialists today. Unlike authors like Ellis who restrict natural kinds to physics and chemistry, Hegel also sees biological kinds as natural kinds with essences, and even treats them as his paradigm of natural kinds (at least in nature).[21] In the case of such biological kinds, the properties that make up the essence of a natural kind are not categorical properties for Hegel (such as microstructural properties, e.g., DNA, on some forms of contemporary NKE in biology: e.g., Devitt 2008), but dispositions or tendencies of the organism to live up to a kind-dependent normative standard. This standard, in its turn, is presumably defined (at least partly) in terms of categorical properties. But the extent to which an individual organism actually possesses those categorical properties, and the way in which it concretely realizes them, depend on contingent factors about the individual organism and its environment (see *WL:* 6:517f.). This enables Hegel to accommodate the fact that there is a large variety of actual properties within a given biological kind—a fact that speaks against microstructural NKE (cf. Leslie 2013). (It bears emphasis that a teleological version of NKE for biology is still a viable option today. Thus, teleological accounts of biological kind essences have been recently proposed by neo-Aristotelians, who re-interpret traditional teleological accounts of organisms in evolutionary terms: see, e.g., Walsh 2006.)

While Hegel restricts the *teleological* character of natural kind essences to organic nature, he understands the essences of natural kinds in *inorganic* nature, too, as constituted by dispositional properties that fix how, and according to which natural laws, instances of those kinds behave under given circumstances. For example, when discussing chemical kinds in his *Philosophy of Nature*, Hegel claims that the 'nature' of a chemical kind 'depends on its position with regard to the various processes in which it is the producing, determining factor [i.e., the reagent], or the product' (*E:* §329A, 9:300).[22]

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V. The structure of Hegel's argument

Hegel's argument in favour of NKE connects NKE to considerations about the nature of understanding and, somewhat surprisingly, considerations of conceptual structure and subjectivity. It is clearly a very ambitious argument, and I claim neither that it is the only possible alternative to the arguments for NKE discussed above, nor that it commands assent. But still, I think that it is an argument worth exploring: it is free from the shortcomings of Putnam's, Kripke's and Ellis's arguments; and it provides an unusual perspective on the metaphysics of explanation by addressing the very nature of understanding. Moreover, all steps in the argument can be made plausible also independently of Hegel's system (or so I hope to show by briefly commenting on the plausibility of those steps, as I go along).

The basic structure of Hegel's argument goes as follows:

(1) Hegel first gives an account of what it means to give an explanation, or understand something, at all. This account has the surprising consequence that constraints for an adequate metaphysics of explanation can be derived from *our* structure as thinking subjects.
(2) Hegel then gives an account of the structure of thinking subjects that, in terms of constraints for the metaphysics of explanation, supports a form of NKE.

As we will see, this result does not directly count in favour of NKE; but it does speak for an essentialist interpretation of science, and hence for a version of Ellis's premise P1. It can therefore be combined with scientific realism (Ellis's premise P2) to yield a sound argument for NKE. I address step (1) of Hegel's argument in the next section, step (2) in sections VII and VIII, and I summarize the result in section IX.

VI. Hegel on the nature of understanding

The first step of Hegel's argument consists in a reflection about what it means to give an explanation. For Hegel, it is natural to raise this question in the context of NKE because his defence of NKE is part of a project that enquires into the metaphysical preconditions of successful explanations (cf. Knappik 2016a). But, unlike other philosophers who have thought about the nature of explanation, Hegel attempts to answer this question by accounting for what it means to *understand* or (in his preferred term) *comprehend* (*begreifen*) something—where 'understanding' is to be taken not in the sense of semantic understanding, but of

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the understanding that is conveyed by an explanation, or an answer to a why-question. The following passage in 'Of the Concept in General', the introduction to the *Logic of the Concept*, contains a key statement about the nature of understanding or comprehension:[23]

> The *comprehension* of an object consists indeed in nothing else than in this: that the 'I' makes it its *own*, pervades it, and brings it into *its own form* […]. The object in intuition or also in pictorial representation is still something *external*, *alien*. Through comprehension, […] the 'I' pervades it as *thinking*. But only as it [i.e. the object] is in thinking, it is *in and for itself*; as it is in intuition or pictorial representation, it is *appearance*. […] The object has therefore this objectivity in the *Concept*, and this Concept is the *unity of the self-consciousness* into which it [i.e. the object] has been received; its [i.e. the object's] objectivity or the Concept is therefore itself nothing else than the nature of self-consciousness, has no other moments or determinations than the 'I' itself. (*WL*: 6:255)

A first point that should be made about this dense passage is the following. To elucidate the nature of comprehension or understanding, Hegel uses metaphorical language—he talks about the I 'bringing' the object 'into *its own form*', and 'pervading' the object with its form. There are possible interpretations of such formulations which would make Hegel's position very implausible, and hence should be avoided on a charitable reading. Thus, we should not understand Hegel here as describing an activity in which we literally change the explanandum *itself*—e.g., by physically manipulating it. Rather, he has in mind a characterization of a form of *cognitive activity*. What is changed in such activity is, strictly speaking, not the explanandum itself, but our representations of it. Furthermore, even if one grants this, one might read Hegel here as holding that explanations cannot go *beyond* the explanandum by introducing, as explanantia, principles that are distinct from the explanandum. This, too, would be an uncharitable reading; in other passages, Hegel clearly holds that comprehension *does* make reference to additional explanatory principles (e.g., *WL*: 5:176). Hence, we should assume that in the above passage, Hegel sees the cognitive activity of understanding as one that changes the form of (our representation of) the explanandum precisely by connecting our initial information about the explanandum not only to additional information about the explanandum itself, but also to information about other objects or facts, to hypotheses about explanatory principles, etc. (see *E*: §21A, 8:77f.). The result of such a process of understanding—or, in Hegel's metaphorical language, of such a change in the form of the explanandum—is an explanatory *account* that substantially goes beyond the initial description of the explanandum, but still

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remains *related* to the explanandum because it offers an account precisely *of this explanandum*.—Bearing these clarifications in mind, I will myself use, for the ease of presentation, metaphors like the ones Hegel employs in the above passage, and talk about understanding as an assimilation, transformation etc., of the explanandum.

We can interpret now the claims that Hegel puts forward in the above passage, as well as the connections between them.[24] To begin with, Hegel can be seen as making an observation about processes of understanding that seems phenomenologically plausible: a situation in which we do not understand something is a situation in which the object or subject-matter that we are dealing with is *alien* to us, something we find strange and puzzling. This suggests that in a contrasting situation of understanding, the sense of alienness is replaced by a sense of coping with the subject-matter, or of finding our way around in it. Hence, we experience the process of understanding as a process in which what initially is *alien* to us becomes *our own*.

Hegel goes beyond this intuitively plausible point by interpreting it as follows: he sees the process of understanding specifically as a process in which the explanandum is *assimilated to our own structure*—that is, our structure qua thinking subject, or 'I'. Hegel seems to presuppose two things here: first, that the right way to spell out the idea of understanding as a process in which something alien becomes our own is in terms of a transformation that makes (our representation of) the explanandum *similar* in some substantive respect to the understanding subject; and second, that the relevant respect is one of structure or form, rather than a material respect. Hegel does not argue for either of these points, and since the topic of the nature of understanding is so underexplored in the philosophical literature, it is rather difficult to evaluate his proposal. Still, this proposal can be made plausible by comparing it to possible alternatives. One such alternative would be to interpret the process in question as a process in which the subject gains *ownership* over something that she initially does not possess. However, this condition seems too weak for understanding. Possession or ownership with regard to a represented content does not require understanding in the relevant sense: we own the content simply by representing it in *some* way (it is *my* perception, thought etc.), even if we do not know why that content is the way it is. Similarly, it would not suffice to interpret the process in question as one in which a content is integrated into our belief systems, for we can integrate a content into our belief system without having an available explanation of it. Finally, one might interpret the process as one in which a subject gains practical mastery over something—as one makes a language or technique 'one's own' by learning to use it. But this reading would both include and exclude too much: for example, many people are able to drive cars without understanding how they work, while other persons may have a perfect theoretical

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understanding of the internal mechanisms of cars without being able to use them. Compared to possible alternatives like these, Hegel's proposal—that the idea of understanding as process in which something alien becomes one's own—should be spelt out in terms of a process of *assimilation* is indeed much more promising.

Next, *if* understanding is a process in which the explanandum is rendered similar to the subject, it seems that the respect in which it is rendered similar should not be identified with some *material* feature, such as determinate mental states, physical properties, etc. For otherwise the range of possible explananda would be very much restricted—namely, to other human beings and their properties, or even to human beings that look, think and act like the understanding subject. If such material properties are excluded as relevant standards of similarity, only the *form* of the subject remains as a possible candidate for such a standard.

Hence, there are good reasons for Hegel to interpret understanding as a process in which the explanandum is assimilated to the structure of the subject. Of course, this is a very general characterization, and we have to find out what the relevant structure of the subject concretely consists in. But before we turn to that question, it is important to notice that in addition to assimilation, Hegel formulates a further condition for understanding, which relates to *objectivity*. Not only does the assimilation of given contents that is required for understanding have to match the structure of the subject; it must also do justice to the actual facts about the explanandum (and related parts of reality): rather than distorting reality, it needs to uncover its actual structure. For one thing, explanations are generally seen as veridical: the statement 'p because q' (with 'because q' expressing an explanation for p) commits the speaker to the truth of q. In addition, there is also a widespread view, adopted here by Hegel, on which an explanatory account of an object or phenomenon gives us access to what that object or phenomenon *really is* (as Hegel puts it in the above passage, the way it is '*in and for itself*'), whereas more immediate forms of presentation of the same object or phenomenon (intuition, pictorial representation) give us only some superficial knowledge about it.[25] The resulting two conditions of understanding —assimilation and objectivity—can be simultaneously met only if the process of comprehension makes accessible an objective structure in reality that involves the explanandum, and that is isomorphic with the subject's own structure.

It follows from the objectivity requirement for understanding that Hegel's account of understanding has important metaphysical consequences: if the account is correct, understanding is possible only if the actual structure of explananda (and other parts of reality related to it) is isomorphic with the subject's own structure. So, in this view, one can derive from an account of the structure of thinking subjects constraints on the metaphysical structure that reality must display if understanding of it is possible. This derivation is the second step in Hegel's argument.

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VII. Hegel on the structure of thinking subjects

To unpack this second step, we must ask what account of the structure of the comprehending subject Hegel builds on in this context. In the passage on comprehension that I have been quoting from, Hegel himself gives an extremely dense answer:

> The *comprehension* of an object consists indeed in nothing else than in this: that the 'I' makes it its *own*, pervades it, and brings it into *its own form*, i.e. into the *universality* which is immediately *determinateness*, or determinateness which is immediately universality. (*WL:* 6:255)

Hence, Hegel relies, for his account of comprehension, on a rather cryptic view of the relevant 'form' of the subject (or 'I') as '*universality* which is immediately *determinateness*' or 'determinateness which is immediately universality'. In the following, I will offer an interpretation of what Hegel's technical characterizations of the structure of the comprehending subject amount to.

On this interpretation, there are two important points that are conveyed by these characterizations. First, as the context of the passage in question shows,[26] the formulations '*universality* which is immediately *determinateness*' and 'determinateness which is immediately universality' allude to Hegel's category of 'the Concept'. (As we saw, that category is defined as unity of universality, particularity and individuality, and 'determinateness' in the present passage can be seen as referring to particularity and individuality together.) There is more than one reason why Hegel interprets the structure of the subject in terms of his category of the Concept. A first reason is that he describes, in the same context of the *Science of Logic*, self-conscious subjects as combining a dimension of universality—the subject is a numerically identical, *common* bearer of different mental states, and it is conscious of this—with a dimension of individuality—the subject is numerically distinct from other subjects (*WL:* 6:253). (Elsewhere, Hegel locates the third element of the Concept, particularity, in the determinate mental states of the subject; *GPR*: §7 R, 7:55.) But I think that, with regard to Hegel's argument that I am reconstructing, another way in which he relates subjectivity to the structure of the Concept is of greater interest: the structure of the Concept is for Hegel also the basic form of *conceptual* structure, and conceptual structure is for him the form of *thought*—of the mental activity that is responsible, according to the passage from *WL:* 6:255 cited earlier, for comprehension.

We can understand why Hegel analyses the conceptual structure of thought in terms of the structure of the Concept as follows: in agreement with the Aristotelian tradition in logic, Hegel believes that concepts are hierarchically structured: more specific concepts are subordinate to more general concepts, while individuals fall under both.[27] Hegel uses the notions of universality,

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particularity and individuality—i.e., the elements of the Concept—to analyse such hierarchies of concepts. This offers a plausible account of the conceptual structure of thought insofar as the hierarchical order of concepts provides a model for the *inferential* structure of reasoning: if an individual falls under a more specific concept (corresponding to 'particularity') and this concept is itself subordinate to a more general concept (corresponding to 'universality'), it can be *inferred* that the individual also falls under the more general concept.[28]

Hence, a *first constraint* on the metaphysics of explanation is provided by our structure as *thinking* subjects. Thought is conceptually structured, which means for Hegel that it is articulated by the structure of the Concept; understanding requires an assimilation of the explanandum to such conceptual structure; hence, understanding is possible only if the explanandum itself (together with related parts of reality) is structured in a way that is isomorphic to conceptual structure, i.e., to the structure of the Concept.

In recent work by neo-Hegelian philosophers like Brandom and McDowell, the idea that our cognitive processes can only be successful if reality itself possesses something like a conceptual, inference-supporting structure has played an important role.[29] I think that these authors are right to attribute this point to Hegel, and that the same point applies to Hegel's account of understanding or comprehension (indeed, proper cognitive success *consists* for Hegel in comprehension; cf. Knappik 2016a). However, taken on its own, this point is compatible with quite a broad range of metaphysical options. For instance, a quasi-conceptual structure of reality might be realized by real universals that form hierarchies without having essences, or by a nominalist picture that admits of a hierarchy of classes of individuals in different possible worlds. So, taken in isolation, the claim that comprehension requires us to identify a quasi-conceptual structure in reality, although important for Hegel's position, does not impose sufficient constraints on the choice of metaphysical theories.

A second point that is needed to provide additional constraint, and that has not yet been appreciated by neo-Hegelians, is due to the role that *subjectivity* plays for Hegel in this context: for him, the structure to which we assimilate explananda in understanding them is partly defined by the structure of our *thought*, but partly also by our structure as the *subjects* of such thought. Hegel is not very explicit about this point, but he gives at least a hint when he ascribes to Kant, in the same context in the *Science of Logic* that I have been quoting from, a path-breaking insight into the relation between the subject and the concepts it uses, or 'the Understanding' (meant here in the sense of the ability for concept-use in general, not of understanding-why or comprehension):

> When one speaks ordinarily of the *Understanding* that *I have*, one understands by this a *faculty* or a *property* that stands in the same relation to the I as the property of a thing to the *thing* itself—an

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> indeterminate substrate that is not the true ground and that which determines its properties. According to this notion, I *have* concepts and the Concept, as I also have a coat, skin colour, and other external properties.—*Kant* went beyond this external relation of the Understanding as the faculty of concepts and of the Concept itself to the I. It is one of the deepest and truest insights that there are in the *Critique of Reason* that the *unity* which constitutes the *essence of the Concept* is recognized as the *original-synthetic* unity of *apperception*, as unity of the 'I think' or of self-consciousness. (*WL:* 6:254)

As Hegel presents Kant here, he abandons a view on which the relation between a subject and its concepts is a relation between a substrate and its properties. Indeed, Kant's notion of a synthetic unity of apperception can be read as referring to a unity that we *bring about*, through synthetic activity, among the given manifold content of our representations, and that is a necessary condition of conscious representation (and for the ability of self-ascription that conscious representation famously requires for Kant).[30] Moreover, Kant makes clear that the agent of such synthetic activity is the subject: according to him, the relation of a representation to the identity of the subject 'does not obtain because I accompany each representation with consciousness, but because *I* add one to the other and am conscious of their synthesis' (*KrV*: B133, my emphasis).

So for Kant, there is a sense in which all our (conscious) representations issue from a synthetic activity whose agent is the subject. Of course, this agency of the subject, like other forms of agency, does not exclude responsiveness to externally given conditions and contents. Nevertheless, the resulting representations are, for Kant, to an important extent, rooted in ourselves. In this sense, our synthetic activity is a form of *self-determination*. As Hegel paraphrases the point: instead of having them as simple properties or possessions, we relate to our concepts (and our representations in general, we may add) as their 'true ground' or 'that which determines' them (*WL:* 6:255).

It is important to realize that Hegel's points about the connection between subjectivity, self-determining agency and understanding can also be made plausible independently of Hegel's technical terminology and analyses. For, as far as the argument for NKE that I am reconstructing is concerned, it is sufficient to assume that subjects who engage in processes of understanding are necessarily self-determining agents. This weaker claim suffices to show that agency is a part of the structure of subjectivity, and hence that understanding as assimilation to one's own form has to detect in reality a form of, or analogy with, agency. And the weaker claim is highly plausible: even if we could imagine beings for whom agency is much less important than it is in our lives, it is hard to see how such beings could engage in

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inquiries that aim at *understanding* without engaging at least in a form of *mental* agency that is directed to a goal and sensitive to reasons; and this would already count as a form of self-determining agency in many accounts.

We can sum up our results by saying that, for Hegel, the structure to which we need to assimilate explananda in order to understand them is the structure of *thinkers* —subjects who are self-determining agents of conceptually structured thought. This yields two constraints on the metaphysics of explanation: understanding is possible only if the relevant parts of reality display, first, a quasi-conceptual structure, and second, an analogon of self-determining agency.

Before proceeding, we need to address a possible objection: even if it is granted that assimilation to conceptual structure and to the structure of subjectivity is what it means for *us* to understand something, this is merely a contingent fact about our cognitive set-up. If we are not allowed to take our essentialist bias as a basis for the selection of a preferred interpretation of science, we should not base such a selection on facts about what it means for us to understand something either.

By way of response, it should be emphasized that nothing in the Hegelian account of understanding entails that it is limited to the actual cognitive set-up of human beings. Rather, the account aims to uncover what understanding is *as such* —hence, it claims validity for all possible subjects who engage in explanatory projects. This claim to general validity is supported by the following consideration: the form of understanding that Hegel's account deals with is understanding-*why*. A mind (be it human or not) that possesses understanding in this sense needs to know the answers to relevant why-questions. Both why-questions and the answers to them have *propositional* contents, and grasp of propositional contents requires the possession and application of *concepts*. Moreover, we have already noticed that any mind that attempts to gain understanding in the relevant sense will need to engage in some form of (at least mental) *agency*. Hence, any mind that works towards the understanding of an explanandum in the relevant sense needs to share with us at least those features (namely, agency and conceptually structured thought) that define for Hegel the structure to which explananda need to be assimilated.

VIII. Natural Kind Essentialism and the possibility of understanding

We now need to turn to the question why, for Hegel, NKE is the best candidate to fulfil these two conditions on an adequate metaphysics of explanation.

(a) On Hegel's account, natural kinds with essences display a structure that is isomorphic to *conceptual* structure in at least two ways. First, they are ordered in hierarchies that support inferences (e.g., from something being a tiger, to

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it being a mammal).[31] Second, Hegel describes the explanatory relations between a natural kind and its instance in terms of an analogue of conceptual structure. Thus, he writes: '*All things* are a [sc. *universal*] *genus* … in an *individual* actuality with *particular* features' (*E*: §179, 8:330). The relation between kind, individual instance and particular features is presumably to be understood in the sense that membership in the kind *entails* (directly or indirectly) the particular features of the object. This consequence relation between kind membership and determinate properties, too, supports inferences (e.g., from an individual being a tiger, to it striving to realize the properties that make up the kind-specific standard of tigerhood).

(b) While we saw that alternative metaphysical frameworks could satisfy the need for a quasi-conceptual structure of reality, Hegel's form of NKE is also able to fulfil the second constraint: the need for an analogon to the agency that characterizes subjectivity. To see why, consider first Hegel's version of NKE for *biology*—a version on which, as we have seen, biological kinds have teleological essences. In the case of such kinds, the essence of the kind fixes a specific standard that members of the kind necessarily strive to realize. Hence, the essence of the kind grounds an *activity* that brings about the particular properties of the organism. There are two reasons why this activity can be seen as an analogon of self-determining agency. First, like the self-determination of subjects, it is rooted in a dimension of *universality* or relative indeterminacy—namely, the dimension of the organism's kind—and brings about more concrete properties of the organism. Second, and more importantly, the organism's activity is analogous to self-determining agency because it has its root in the organism's *own nature* (as member of its kind), rather than being imposed by an external source (even though, like the self-determination of subjects, it is an activity that is sensitive to external influences and conditions). As we saw, physical and chemical kinds are not teleologically structured for Hegel. Nevertheless, physical and chemical kinds can be seen as *approximations* to the structure of biological kinds, and as a consequence, to the structure of subjectivity. Even though no proper activity takes place at these levels of reality, we can find here the structure of a universal nature—the essence of the kind—that grounds a form of *behaviour* of the individual object (the manifestations of the dispositional properties which it possesses qua member of its kind), such that the particular categorical features of the object result from that behaviour (under the given circumstances). Again, this is a behaviour that is rooted in the universal dimension of the individual, its kind, and brings about more determinate properties; and it is based on the individual's *own nature*, rather than being imposed from the outside.[32]

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By contrast, rival accounts of the metaphysics of explanation do not simultaneously fulfil the two constraints that have resulted from Hegel's account of understanding. Laws, for example, satisfy the need for quasi-conceptual structure, as they support inferences (e.g., predictions), but not the need for self-determining activity. Causal relations, by contrast, can be seen as displaying (at least on some accounts) a form of activity. But either this activity is governed by causal laws. In that case, the causal relation displays quasi-conceptual structure, too (because of its participation in a law); but since the causal activity is 'imposed' on the causal relata by something outside of them, namely the law, it is not analogous to self-determination. Or the causal relation is anomic, as in singularist causation. In this case, the causal activity would be analogous to self-determination, but it would not display quasi-conceptual structure, as it would not support inferences.[33]

IX. The result of Hegel's argument

If successful, Hegel's argument, as we have reconstructed it in the previous sections, shows that *if* a genuine understanding of some part of reality is possible, that part of reality is ordered in natural kinds with essences—i.e., NKE is true. A full argument for NKE results if this conditional conclusion is combined with Ellis's version of the miracle argument. For the conditional conclusion of Hegel's argument suffices to motivate the premise P1 that we found unwarranted in Ellis's argument: the view that scientific explanation is ultimately essentialist. (While Ellis had restricted P1 and the conclusion of his argument to physics and chemistry, Hegel's argument supports these claims for biology also.) I had objected to Ellis's argument that this premise presupposes an essentialist interpretation of science. What Hegel's argument, if it is successful, establishes, is precisely that we should, as long as possible, adopt such an essentialist interpretation of science. It may ultimately turn out that such an interpretation is not feasible, and this would be sufficient reason to reject NKE; from Hegel's viewpoint, this would mean that it is, after all, not really possible to gain proper comprehension of reality. But as long as an essentialist interpretation of science is at least possible, Hegel's argument gives us reason to prefer it over its rivals. In this case, we will postulate the existence of natural kinds with essences as theoretical entities. If we combine this with Ellis's premise P2 (scientific realism about the entities postulated by causal theories, based on a miracle argument), a complete argument for NKE results.[34]

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Notes

[1]E.g., *Met.* Z 17, 1041[a]20f. with 1041[a]28f. for essences of kinds, and *An. Post.* B 13, 96[b]2f. for necessity. See also Charles 2000 and 2010. Strictly speaking, the essence of a kind consists for Aristotle in only one of the necessary features of a kind, namely the feature that is explanatorily basic and responsible for the further necessary features of the kind (Charles 2010: 296–300). Abbreviations used:
An. Post. = Aristotle, *Analytica posteriora*, in *Analytica priora et posteriora*, ed. W. D. Ross (Oxford: Clarendon Press, 1964).
KrV = *Kritik der reinen Vernunft*, in *Kant's Gesammelte Schriften*, ed. Königlich Preußische Akademie der Wissenschaften et al., 29 vols. (Berlin: Reimer [later de Gruyter], 1900–), vols. 3 and 4.
E = *Enzyklopädie der philosophischen Wissenschaften*, in *Werke in zwanzig Bänden*, ed. K. M. Michel and E. Moldenhauer (Frankfurt: Suhrkamp, 1970), vols. 8–10.
GPR = *Grundlinien der Philosophie des Rechts*, in *Werke in zwanzig Bänden*, ed. K. M. Michel and E. Moldenhauer (Frankfurt: Suhrkamp, 1970), vol. 7.
Met. = Aristotle, *Metaphysics*, ed. W. D. Ross, 2 vols. (Oxford: Clarendon Press, 1997).
WL = *Wissenschaft der Logik*, in *Werke in zwanzig Bänden*, ed. K. M. Michel and E. Moldenhauer (Frankfurt: Suhrkamp, 1970), vols. 5 and 6.
All translations are my own.

[2]E.g. *An. Post.* B 2, 90[b]16; B 10, 93[b]29; and see Charles 2000 and 2010.

[3]See also Knappik 2016a for more on the historical background to Hegel's NKE.

[4]See the literature cited in footnote 21.

[5]I think that this is only one of several arguments that Hegel offers in defence of NKE. See Knappik 2016a for a reconstruction of another such argument. Moreover, there is strong textual support for a reading in which the *Science of Logic* culminates in a version of the ontological argument, with the Idea as the ontological principle that underlies all reality and that exists with necessity (see Knappik 2013a: 173, 491). Since the Idea is itself defined as a 'unity of *concept* and *reality*' (*WL*: 6:466), and the structure of the Concept is realized, on the reading that I pursue here, by individuals that instantiate essentialistically-understood natural kinds, this version of the ontological argument implies that there is necessarily a reality that is articulated by natural kinds with essences, and hence a fortiori that NKE is true.

[6]Unlike most modern advocates of NKE, Hegel uses a unified essentialist framework for *all* dimensions of reality, including mind and society (Knappik 2016a and b). But, for the sake of simplicity, my focus will be on NKE about kinds in natural sciences.

[7]In Knappik 2016a: 770, I suggested that Hegel does not understand the essences of natural kinds in terms of necessary and sufficient properties. I now think that he actually does, but that the properties in question are basic dispositional properties for him (as opposed to, e.g., the phenotypical properties that Linnéans saw as constituting essences of biological kinds).

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[8]NKE is logically distinct from the view that all or some individuals have essences (cf. LaPorte 2004). Both views are often combined (and Hegel is plausibly read as doing so), but I will exclusively focus on NKE in the following.

[9]See Beebee 2013: 144–47, who discusses Ellis, LaPorte and Dupré as examples.

[10]But see Beebee 2013 for a recent attack on this common view.

[11]The term 'Psychological Essentialism' is sometimes also used to refer to the bias itself. The following discussion is much indebted to Leslie 2013. My argument differs from Leslie's in that she takes Psychological Essentialism to create a need for an epistemological re-examination of essentialist intuitions, and the empirical problem cases to refute NKE, while I argue that the problem cases can, in principle, be accommodated by NKE if there is a motivation for doing so, and that Psychological Essentialism shows that essentialist intuitions cannot provide such a motivation.

[12]While some authors, including Ellis, think that laws of nature are based on essences (and hence, metaphysically necessary) (e.g., Ellis 2001; Bird 2005), many accounts see laws of nature as not based on essences and, correspondingly, as metaphysically contingent. Such accounts include Lewis's neo-Humean account of laws as deductive systems (Lewis 1973), Armstrong's view of laws as non-logical entailment relations between universals (Armstrong 1983: esp. ch. 11), and views of laws as ontologically primitive such as Maudlin's (Maudlin 2007).

[13]See, with further literature, Leslie 2013.

[14]See the literature reviewed in Leslie 2013. A similar point applies to biological species: their members do not share a single a genetic code, as advocates of NKE sometimes suppose. See Leslie 2013: 134–38.

[15]Ellis 2001: 20 allows for overlap between kinds, as long as there is a higher genus of which the overlapping kinds are subkinds. Tobin 2010 argues that the proteins/enzymes example does not fulfil this weaker criterion, either.

[16]See Khalidi 2013: 39 for a related point.

[17]I am not claiming, however, that Hegel would subscribe to the way I have criticized the appeal to such intuitions in section 2.

[18]Applied to physics and chemistry, but also to biology—and indeed also to psychology and the social sciences, but these I bracket in this article.

[19]See Kreines 2006 for an overview of the recent debate on whether Hegel was a metaphysician or not, and a powerful defence of metaphysical readings.

[20]The view of Hegel as seeing reality articulated into objective kinds is shared by Stern 1990: esp. 58f.; 2009: 25f.; deVries 1991: 63–65; Kreines 2015; cf. also Westphal 1989: 144.

[21]It is nevertheless legitimate to combine Hegel's and Ellis's arguments for NKE as I propose to, because Ellis's argument does not presuppose or support any particular version of NKE. (Correspondingly, the resulting argument supports Hegel's, not Ellis's, version of NKE; but as I will explain presently, this version is still a viable option today.)

[22]Following the terminology of his time, Hegel refers to such kinds here by the term '(chemical) body'. (See, e.g., *E*: §329 A, 9:300, where Hegel mentions nitrogen, hydrogen, oxygen etc., as examples of 'chemical bodies'.)

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[23]In addition to the discussion of comprehension in 'Of the Concept in General', other texts, too, are relevant to his account of comprehension, including §§465 and 467 of the *Encyclopedia Philosophy of Subjective Spirit*, the *Introduction* and §§19–25 of the *Encyclopedia*, and the chapters on Judgment and Inference in the *Science of Logic*. I discuss Hegel's account of comprehension in these texts at greater length in Knappik 2013a: esp. 226–32, 374–79. For the present purpose, I focus on 'Of the Concept in General' because the points that are relevant for the argument I am reconstructing are clearest there.

[24]In the following discussion, I further develop an interpretation of Hegel's remarks on comprehension, the Concept and self-consciousness at *WL:* 6:255 that I have proposed in Knappik 2013b.

[25]See *E*: §§21–23, 8:76–80 (where this point is made about 'reflective thought' (*Nachdenken*); but the latter notion is explained in *E*: §21A, 8:77 in terms of comprehension).

[26]See *WL:* 6:255: '[T]he Concept is therefore itself nothing else than the nature of self-consciousness, has no other moments or determinations than the "I" itself'.

[27]When Hegel describes at *WL:* 6:279 concepts such as 'life' and 'finite spirit' as not being ordered in a genus/species hierarchy, I read him as rejecting, in the case of such concepts, the technical Aristotelian account of a genus/species hierarchy. This account excludes that co-ordinate species can be mutually connected and form an ordered series (Lloyd 1962). Instead, concepts like life and finite spirit are specified by various 'determinations' (*WL:* 6:279) that are steps in the realization of the respective concept as their *telos*; moreover, such concepts are also themselves steps in the realization of a higher concept, 'infinite spirit' (6: 279). But this logical structure can still be described as hierarchical, and it does support inferences—e.g., from an individual being an instance of 'finite spirit' to its being also an instance of 'infinite spirit'.

[28]For a more detailed treatment of Hegel's theory of judgements and inferences, see Knappik 2013a: ch. 4.

[29]See, e.g., McDowell 1996; Brandom 2009: 97f.; Knappik 2011; Knappik 2013a: ch. 5.

[30]Cf. Kant's famous claim at *KrV*: B133: 'So only through this, that I can combine a manifold of given representations *in one consciousness*, is it possible that I represent the *identity of the consciousness in these representations* itself, i.e. the *analytic* unity of apperception is possible only under the presupposition of some *synthetic* one'.

[31]Hegel assumes such hierarchies also for physical and chemical kinds. See *E*: §329A, 10:301 for higher-order kinds ('classes') in chemistry (metals, acids/bases and salts) which are still used nowadays. In physics, Hegel sees, e.g., terrestrial and celestial bodies as belonging to qualitatively different kinds of 'corporeality' that are themselves subkinds of the kind 'matter' (*E*: §269A, 9:85, and §264R, 9:65). A modern example of a hierarchy of physical kinds would be the kinds of elementary particles (quarks, leptons, bosons) together with their respective subkinds, and 'elementary particle' as common genus. Hegel is not aware of the problem of cross-cutting kinds. Since hierarchical structure is essential to his argument for NKE, and since he sees hierarchical natural kinds everywhere in reality, it seems that he would have to reserve natural kindhood for all but one among overlapping divisions (the last option discussed in section III).

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[32]Kreines 2015 and Bowman 2013 are more skeptical about the extent to which inorganic nature (Kreines) or nature in general (Bowman) are open to genuine understanding for Hegel. See Knappik 2016b and Knappik 2016a: 779 for discussion.

[33]A Hegelian can still allow that non-essentialist explanations may have a *partial degree* of explanatory power; for causal, nomological and other non-essentialist explanations manage to give the explanandum a *part* of the relevant structure of the subject, and hence make some understanding of it possible.

[34]I am indebted to audiences in Paris and Bergen, to Erasmus Mayr and to the anonymous referees for their valuable comments.

Bibliography

Armstrong, D. (1983), *What Is a Law of Nature?*. Cambridge: Cambridge University Press.

Beebee, H. (2013), 'How to Carve Across the Joints in Nature without Abandoning Kripke-Putnam Semantics', in S. Mumford and M. Tugby (eds.), *Metaphysics and Science*. Oxford: Oxford University Press.

Bird, A. (2005), 'The Dispositionalist Conception of Laws', *Foundations of Science* 10: 353–70.

Bowman, B. (2013), *Hegel and the Metaphysics of Absolute Negativity*. Cambridge: Cambridge University Press.

Brandom, R. (2009), *Reason in Philosophy. Animating Ideas*. Cambridge MA: Harvard University Press.

Cacchione, T., et al. (2016), 'Are Apes Essentialists? Scope and Limits of Psychological Essentialism in Great Apes', *Animal Cognition* 19: 921–37.

Charles, D. (2000), *Aristotle on Meaning and Essence*. Oxford: Oxford University Press.

Charles, D. (2010), 'Definition and Explanation in the *Posterior Analytics* and *Metaphysics*', in D. Charles (ed.), *Definition in Greek Philosophy*. Oxford: Oxford University Press.

Devitt, M. (2008), 'Resurrecting Biological Essentialism', *Philosophy of Science* 75: 344–82.

deVries, W. (1991), 'The Dialectic of Teleology', *Philosophical Topics* 19: 51–70.

Ellis, B. (2001), *Scientific Essentialism*. Cambridge: Cambridge University Press.

Ellis, B. (2002), *The Philosophy of Nature. A Guide to the New Essentialism*. Chesham: Acumen.

Goldman, A. (1979), 'What Is Justified Belief?', in G. Pappas (ed.), *Justification and Knowledge*. Dordrecht: Reidel.

Hempel, C. (1965), *Aspects of Scientific Explanation and Other Essays in the Philosophy of Science*. New York: Free Press.

https://doi.org/10.1017/hgl.2017.29 Published online by Cambridge University Press

Hendry, R. F. (2006), 'Elements, Compounds and Other Chemical Kinds', *Philosophy of Science* 73: 864–75.
Khalidi, M. A. (2013), *Natural Categories and Human Kinds. Classification in the Natural and Social Sciences*. Cambridge: Cambridge University Press.
Kitcher, P. (1989), 'Explanatory Unification and the Causal Structure of the World', in P. Kitcher and W. Salmon (eds.), *Scientific Explanation*. Minneapolis: University of Minnesota Press.
Knappik, F. (2011), 'Idealismus als Metaphysik der Freiheit: Hegel und Brandom', *International Yearbook of German Idealism* 9: 215–44.
Knappik, F. (2013a), *Im Reich der Freiheit. Hegels Theorie autonomer Vernunft*. Berlin: de Gruyter.
Knappik, F. (2013b), 'Hegel on Consciousness, Self-Consciousness and Idealism', *International Yearbook of German Idealism* 11: 215–44.
Knappik, F. (2016a), 'Hegel's Essentialism: Natural Kinds and the Metaphysics of Explanation in Hegel's Theory of "the Concept"', *European Journal of Philosophy* 24: 760–87.
Knappik, F. (2016b), 'And Yet He is a Monist: Comments on James Kreines, *Reason in the World*', *Hegel Bulletin*, first view, doi: 10.1017/hgl.2016.30.
Kreines, J. (2006), 'Hegel's Metaphysics: Changing the Debate', *Philosophy Compass* 1: 466–80.
Kreines, J. (2015), *Reason in the World. Hegel's Metaphysics and its Philosophical Appeal*. Oxford: Oxford University Press.
Kripke, S. (1980), *Naming and Necessity*. Cambridge MA: Harvard University Press.
LaPorte, J. (2004), *Natural Kinds and Conceptual Change*. Cambridge: Cambridge University Press.
Leslie, S.-J. (2013), 'Essence and Natural Kinds: When Science Meets Preschooler Intuition', in T. S. Gendler and J. Hawthorne (eds.), *Oxford Studies in Epistemology* vol. 4. Oxford: Oxford University Press.
Lewis, D. (1973), *Counterfactuals*. Cambridge MA: Harvard University Press.
Lloyd, A. (1962), 'Genus, Species and Ordered Series in Aristotle', *Phronesis* 7: 67–90.
Maudlin, T. (2007), *The Metaphysics Within Physics*. New York: Oxford University Press.
Mayr, E. (1982), *The Growth of Biological Thought. Diversity, Evolution, and Inheritance*. Cambridge MA: Belknap Press of Harvard University Press.
McDowell, J. (1996), *Mind and World. With a New Introduction*. Cambridge MA: Harvard University Press.
Meyer, M., et al. (2013), 'Essentialist Beliefs about Body Transplants in the United States and India', *Cognitive Science* 37: 668–710.
Putnam, H. (1975), 'The Meaning of "Meaning"', *Minnesota Studies in the Philosophy of Science* 7: 131–93.

https://doi.org/10.1017/hgl.2017.29 Published online by Cambridge University Press

Salmon, N. (1982), *Reference and Essence*. Oxford: Blackwell.
Salmon, W. (1984), *Scientific Explanation and the Causal Structure of the World*. Princeton: Princeton University Press.
Stern, R. (1990), *Hegel, Kant and the Structure of the Object*. London: Routledge.
Stern, R. (2009), *Hegelian Metaphysics*. Oxford: Oxford University Press.
Stern, R. (2016), 'Kreines on the Problem of Metaphysics in Kant and Hegel', *Hegel Bulletin*, first view, doi: 10.1017/hgl.2016.29.
Tobin, E. M. (2010), 'Crosscutting Natural Kinds and the Hierarchy Thesis', in H. Beebee (ed.), *The Semantics and Metaphysics of Natural Kinds*. London: Routledge.
Walsh, D. (2006), 'Evolutionary Essentialism', *British Journal for the Philosophy of Science* 57: 425–88.
Westphal, K. (1989), *Hegel's Epistemological Realism. A Study of the Aim and Method of Hegel's Phenomenology of Spirit*. Dordrecht: Kluwer.

https://doi.org/10.1017/hgl.2017.29 Published online by Cambridge University Press