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# *Bare Projectibilism and Natural Kinds: A Defense*

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*Projectibility has traditionally been given a prominent role in natural kind theories. However, where most of these theories take projectibility to be a necessary but insufficient feature of natural kinds, this paper defends an account of natural kinds according to which the naturalness of kinds is to be identified with their degree of projectibility only. This view follows thus the path opened by Häggqvist (2005), although it goes significantly further on two main respects. First, I develop and discuss two important dimensions of projectibility that are overlooked in Häggqvist's work. Second, I address two recent important objections (Magnus 2012 and Spencer 2015) against projectibility-based accounts.*

**Keywords:** Natural kinds; projectibility; bare projectibilism; inductive power.

## 1. *Introduction*

The goal of this paper is to engage in the natural kind debate, and to put forward a projectibility-based account of natural kinds according to which the naturalness of kinds is to be identified with their degree of projectibility.

This view is congenial to a tradition of natural kind theories that has ascribed a central role to projectibility in the characterization of natural kinds. The current proposal, however, departs from other views in singling out no condition for naturalness other than projectibility itself. As such, where other theories have often taken projectibility to be necessary yet insufficient for naturalness, I propose, instead, to identify naturalness with projectibility alone.

This move does not constitute a complete novelty as it follows a path opened by Sören Häggqvist (2005) who, in his proposal "Radical Projectibilism", already argued in favor of this move. The current proposal, however, updates significantly Häggqvist's theory, I contend, by addressing important objections, as well as by emphasizing two important dimensions of projectibility that are not considered by Häggqvist: *graduality* and *abundance*.

Identifying naturalness with a gradual property such as projectibility, I argue, constitutes a significant departure from a tradition of natural kinds that has focused on drawing a demarcatory line between natural and non-natural kinds. Far from being a shortcoming of a projectibility-based account, I will show that understanding naturalness in a gradual way is the most appropriate way to counter the relevant notion of arbitrariness and, moreover, brings significant advantages over dichotomic approaches.

The paper is structured as follows. In section 2, I identify two desiderata that have constrained natural kind theories and which underpin Bare Projectibilism too. I will call these desiderata the *contrast desideratum* and the *science constraint*, respectively. The first of these states that a natural kind theory ought to explain the intuitive contrast between blatantly arbitrary categories (e.g. *discovered-on-a-Tuesday*) and those that seem to, following the classic metaphor, carve nature at its joints (e.g. *water*). The second desideratum states that a natural kind theory ought not to exclude scientifically legitimate categories. Having introduced these desiderata, in section 3, I give an overview of some of the most important natural kind theories and highlight that, while these theories have generally succeeded in meeting the contrast desideratum, all of them have, in some way or another, violated the science constraint. Then, in section 4, I introduce my updated version of Bare Projectibilism and focus on its two most distinctive features: *graduality* and *abundance*. I argue that the abundance of projectibility constitutes an advantage of Bare Projectibilism *vis à vis* alternative accounts of naturalness, insofar as it makes the theory extremely inclusive and thus, unlikely to violate the science constraint. Interestingly, though, the abundance of projectibility, which is so useful for meeting one of the desiderata, is the source of an important challenge for Bare Projectibilism. For the abundance of projectibility would seem to prevent Bare Projectibilism from meeting the contrast desideratum, as most categories can be said to be at least slightly projectible. I introduce this challenge in section 5, where I argue, not only that Bare Projectibilism meets the contrast desideratum, but more significantly that, by identifying naturalness with a gradual property, Bare Projectibilism meets this desideratum in a more appropriate way than its dichotomic rivals do. In section 6, I defend Bare Projectibilism from views that consider projectibility to be unnecessary for naturalness. More precisely, I discuss two counterexamples from Magnus (2012) and Spencer (2015) respectively, who argue that some scientifically legitimate categories are projectibly weak. In section 7, I conclude.

## 2. *Two desiderata for a natural kind theory*

One, if not *the* central motivation of natural kind theory is to explain the intuitive contrast that exists between categories that seem clearly arbitrary[1] and those that, following the classic metaphor, carve nature at its joints. Indeed, some groupings seem to correspond to specific anthropocentric concerns or perspectives (e.g. *pet*), while others have often been assumed to correspond to kinds that pre-date our classificatory practices or, at least, that are constrained by the way the world is, rather than by our particular interests. Trying for now not to make any strong commitment, we can identify the first desideratum that a satisfactory account of natural kinds should meet. Let us call this the *contrast desideratum*.

> *Contrast desideratum:* A natural kind theory should explain the intuitive contrast between kinds such as *discovered-on-a-Tuesday* and kinds such as *water*, *tiger*, and *electron*.

In trying to account for this contrast, natural kind theories have often taken *projectibility* to play a central role. Although this notion will be further fleshed out below, the basic and common idea is that alleged natural categories seem to be particularly projectible, meaning that they exhibit a distinctive capacity to support many inductive generalizations (Mill [1843] 1974). A kind such as *tiger*, for instance, which has often been considered a paradigmatic natural kind,[2] can figure in numerous generalizations regarding its behavior, morphology, lineage, etc. As such, upon observing a member of this kind we will be able to *project* onto it many as yet unobserved properties. We will be able to predict, for instance, that it will likely engage in predatory behavior, that it can run as fast as 65 km/h, or that it is a carnivore. Similarly, projections can also be made in the other direction. That is, from particulars to the kind. When zoologists, for instance, observe for the first time a morphological feature or behavior of a not very well-known species, they will often rightly assume that their discovery is not restricted to the observed organism but can, instead, be *projected* to all the members of its kind.

[1] I take the notion of "arbitrariness" to be the best candidate for appropriately contrasting with the philosophically relevant notion of naturalness. Other potential alternatives such as *social* or *artificial*, in contrast, do not seem to be apt. Indeed, the fact that certain entities are the result of human activities does not seem to mark a significant difference. What the notion of naturalness is supposed to capture, instead, is the fact that certain groupings seem to reflect objective differences in the world (social or otherwise). This, in turn, contrasts with those groupings that are the result of anthropocentric interests, or which are simply random collections.

[2] As it will be discussed below, the natural kind-status of biological species is no longer taken for granted. Additionally, some authors argue that species are individuals, not kinds (see Ghiselin 1974 and Hull 1978). This parallel debate, however, will not be addressed here as I am using these examples for expository purposes only, without intending to endorse any position on this specific matter.

In contrast, some categories do not seem to have that sort of inductive power. For instance, there is little we can predict or project by knowing that a particular is a member of the kind *discovered-on-a-Tuesday*: there do not seem to be many things unifying the members of this kind, beyond their membership of the kind itself.

On the face of it, it seems clear that some sort of *contrast* needs to be articulated and that the notion of projectibility can be a good starting point. As said above, this idea is far from original, as many have considered projectibility to be central to the characterization of natural kinds (Boyd 1999: 146; Magnus 2012: 10; Khalidi 2013: 18; Chakravartty 2023: 68).

While projectibility has tended to play a central role in the discussion of natural kinds, it has often been considered insufficient for characterizing naturalness. Indeed, most natural kind accounts do not identify naturalness simply with projectibility, but instead impose further conditions that kinds need to fulfil in order to count as natural. This attitude, often implicitly assumed, is explicitly endorsed by Khalidi (2018: 1381).

One of the reasons why natural kind theorists have considered projectibility to be insufficient for characterizing natural kinds is, I contend, the fear of being *overly inclusive*. For projectibility is arguably *abundant*, in the sense that most of the categories we employ, both within and outside of scientific discourse, exhibit a certain degree of projectibility. If you are not convinced about this abundance, notice that basic categories from ordinary language (e.g. *stone*), and even apparently arbitrary categories (e.g. *things heavier than my head*), allow for certain projections, useless as they might be.

As such, identifying natural kinds with projectible kinds could be considered to violate the contrast desideratum, as categories on both sides of it are at least minimally projectible. Magnus voices this concern when he suggests that one problem with identifying natural kinds with those kinds that support inductive inferences is that non-natural kinds such as *jade* also support many inductive generalizations.[3] He says:

> So it is typical to say that *jade* is not a natural kind. The problem is that there *are* general facts about jade. Both varieties are fairly hard minerals, which makes them *inedible* and *suitable for making stone tools*. These and many other predicates are projectible for jade *simpliciter*. (Magnus 2012: 12, original emphasis)

Although I will ultimately defend a projectibility-based approach, there is a sense in which this "over-inclusiveness fear" is well-founded. Indeed, as I will argue below, the abundance of projectibility is the source of an important challenge for a projectibility-based approach to natural kinds, as it is not immediately clear how such an account would meet the contrast desideratum.

[3] See Bird (2009: 502) for a similar point.

Before confronting the challenge for projectibility-based accounts, though, it is important that we emphasize another element that has played a key role in the development of natural kind theories. For a common assumption throughout the discussion of natural kinds has been that scientific inquiry is particularly well-suited to carve nature at it joints and that, in this sense, scientific categories are particularly good candidates for natural kinds. Although the more precise nature of the relation between natural kinds and scientific categories can take different forms, most authors within the literature have, implicitly or explicitly, endorsed views along these lines (Franklin-Hall 2015: 932; Khalidi 2013: xi-xii; Ereshefsky and Reydon 2015: 972–973).[4]

On the face of it, we can articulate the second desideratum for a natural kind theory as follows. Let us call this the *science constraint*:

> *Science constraint*: an account of natural kinds should not exclude legitimate scientific categories.[5]

As we shall see, the science constraint has played a decisive role throughout the development of natural kind theories. For, in attempting to articulate the contrast desideratum, most natural kind theories have been accused of violating this constraint in some way or other. That being so, this desideratum is responsible for a significant tendency towards inclusiveness that has characterized the development of natural kind theories. The following section considers some of the most important proposals and focuses on their difficulties in respecting the science constraint.

## 3. *Failures to preserve the science constraint: Towards inclusiveness*

### 3.1. *Natural kind essentialism*

The most significant, and likely the most discussed violation of the science constraint comes from Natural Kind Essentialism (NKE hereafter). Given that this case has been widely discussed in the literature and that NKE has become a minority position (see Ellis 2001, 2008; Wilkerson 1988), I will not delve far into these ideas here. It is im-

[4] Brian Ellis (2001) can be considered an exception to this attitude, as he is willing to concede that biological categories are not natural kinds. He says: "If evolution occurs in the gradual way that Darwin supposed, or if small changes in genetic constitution can be brought about artificially, then the distinctions between adjacent species—living, dead or yet to be created—must ultimately be arbitrary" (Ellis 2001: 169).

[5] Notice that a more radical version of this constraint might have it that scientific categories—at least in the ultimate stage of inquiry— *perfectly* correspond to natural kinds and, as such, that an appropriate natural kind theory should not only include all legitimate scientific categories, but also exclude non-scientific categories (e.g. folk categories). The alternative presented in this paper is more permissive and, in this sense, only requires natural kind theories *not to exclude* scientific categories, while allowing that some non-scientific categories might count as natural.

portant for our purposes, though, to emphasize that it is precisely its violation of the science constraint that has made NKE a marginal view among philosophers. Chakravartty puts this idea as follows:

> The most obvious and compelling sources of resistance to an exclusive commitment to kinds with essences are the sciences themselves. The kinds of objects investigated by the sciences are sometimes describable in terms of essences, but often resist this sort of description. The traditional view that kinds are ontologically distinguished by essences has a storied past, but many of the kinds one theorizes about and experiments on today simply do not have any such things. (Chakravartty 2007: 157)

As has often been pointed out, the most notorious failure of NKE comes from its incapacity to accommodate biological categories. Indeed, the standard view among philosophers of biology is that biological categories do not fit in a strict essentialist framework, as there is no single genotypic or phenotypic property that would serve to individuate species (Dupré 1981, 1993; Ereshefsky 2007; Khalidi 2013; Magnus 2012; Kitcher 1984).[6]

Given the status of biological species as paradigmatic natural kinds and legitimate scientific categories, essentialism's failure to accommodate them is likely the strongest instance of a violation of the science constraint that we can think of.

### 3.2. *Homeostatic Property Clusters*

The limitations of NKE in the biological domain constitute the main motivation for Boyd's (1991, 1999) account of natural kinds as Homeostatic Property Clusters (HPC). With this in mind, Boyd's proposal can be read as an attempt to provide a more flexible and inclusive framework that is able to accommodate biological categories, and thus able to preserve the science constraint.

According to the HPC view, natural kinds are clusters of properties whose stable co-occurrence is maintained by homeostatic mechanisms. That is, mechanisms responsible for preserving the properties of the cluster in a state of equilibrium. HPC theory thus departs from NKE in dropping many of its most controversial requirements, and by explaining the inductive potential of natural categories without positing essences.[7]

[6] Notice that although *intrinsic* biological essentialism has been for the most part abandoned (see Devitt 2008 for an exception), some authors have defended an alternative version of biological essentialism which individuates species in terms of extrinsic properties such as ecological or phylogenetic relations (see Griffiths 1999 or Okasha 2002). Still, it is crucial to keep in mind that contemporary biologists work with multiple species concepts, many of which do not individuate species in terms of intrinsic or extrinsic essences. As such, the claim that natural kind essentialism violates the science constraint still holds. I thank an anonymous reviewer for raising this point.

[7] Notice that certain authors consider HPC to be a more relaxed form of essentialism (see, for instance, Kornblith 1993) as the property clusters are playing

This flexibility makes HPC more inclusive than its essentialist predecessor, and arguably a better alternative for accommodating biological categories. Indeed, not only do species lack any good candidate to play the role of an essence, but also, the properties that biological kinds share are often the result of various mechanisms involving environmental pressures, interbreeding, developmental processes, and genetic descent, among other factors. HPC theory thus provides a compelling alternative account of the non-accidental co-occurrence of properties that ground our inductive practices involving biological categories.

Just like its predecessor, however, HPC has been accused of violating the science constraint and excluding legitimate scientific categories. Several authors (Ereshefsky and Reydon 2015; Khalidi 2013; Slater 2015) have argued in this direction and have suggested, with varying degrees of emphasis, that not all natural kinds constitute homeostatic property clusters. While some of these critics concede that HPC accommodates biological kinds, while failing to accommodate other kinds whose equilibrium does not seem to be sustained by homeostatic mechanisms (e.g. chemical elements, fundamental physical particles), some go as far as to insist that HPC does not even fit all biological species (Ereshefsky and Matthen 2005).

Be that as it may, many theorists agree on the idea that, in some way or another, HPC is still too restrictive, as it cannot accommodate the vast heterogeneity of scientifically legitimate categories.

Wary of the difficulties of providing a general theory of natural kinds that is able to encompass this heterogeneity, a recent trend in natural kind theory focuses on the epistemic utility characteristic of natural kinds and avoids making any metaphysical commitment as to what grounds this epistemic utility. More precisely, these views attempt to characterize the clustering of properties while remaining neutral about any specific metaphysical grounding for it. Let us consider these views, which, following Conix (2017), we may refer to as Bare Property Cluster accounts of natural kinds.

### 3.3. *Bare Property Clusters*

Bare Property Cluster (BPC) accounts of natural kinds constitute a significant departure from previous approaches to natural kinds insofar as they focus on the robust clustering of properties in virtue of which inductive inferences are reliable, without committing to any specific account of this clustering.

This departure is motivated by past failures on the part of previous natural kind theories, which, as we have seen, always seem to violate the science constraint in some way or another. Indeed, BPC defenders

the same epistemic role that essences are taken to play. For the purposes of this work, however, I will be using the label "essentialism" to refer exclusively to the view that identifies essences with necessary and sufficient conditions. I thank an anonymous reviewer for raising this point.

believe that no general grounding claim will be able to account for all natural kinds, and thus that the only way for a notion of natural kinds to be appropriately inclusive is for it to remain neutral regarding the metaphysical grounding of this robust clustering.

Matthew Slater (2015), for instance, claims that natural kind theories have focused too much on the "grounding claim" and should instead turn their attention to the epistemic usefulness of categories, without committing to any specific metaphysical story about essences or homeostatic mechanisms.

Slater argues directly against the HPC view and puts forwards an original proposal (*Stable Property Clusters*) that attempts to articulate more systematically how to understand the *stability* in virtue of which clusters of properties can support inductive generalizations and inferences.

To convey the relevant notion of *stability*, Slater presents the picture of a clique of friends with three members: Peg, Ralph, and Quinn. These individuals form a *stable* clique and like hanging out together. As such, spotting any of these three in the mall is generally a good indicator that the others will be there as well. This is, very roughly, the sense of stability that Slater wants to capture; the instantiation of a property of the cluster reliably indicates the presence of the other co-occurring properties of the cluster.

Similarly, Chakravartty (2007) suggests the metaphor of "sociability" to refer to all the ways in which properties enter into systematic relations and thus ground our inductive practices. As Chakravartty explains, the distribution of properties, or property instances, is not random in space-time. They have a tendency to group together in various ways, showing a degree of *sociability*. The strongest sociability is seen in essence kinds where certain sets of properties are always found together, whereas in other cases, the sociability is less strong and forms looser associations seen in cluster kinds. In this sense, the metaphor of sociability is intended to be neutral about, yet compatible with, more specific grounding accounts of these systematic patterns of sociability.

Interestingly, despite their attempts at inclusivity, it could be argued that even certain BPC accounts end up being too restrictive and violate the science constraint. In this line of thought, Manolo Martínez (2020) has suggested that Slater's SPC account could fail to include what he calls "synergic kinds". Let us flesh this out.

### 3.4. *Beyond Bare Property Clusters*

Martínez argues that some kinds (i.e. synergic kinds) ground inductive inference not, as in the case of co-occurring property clusters, because the instantiation of a property of the cluster is indicative of the instantiation of other (co-occurrent) properties of the cluster, but instead because "the joint instantiation of all or many of those properties […] plays the explanatory role for which the natural kind is recruited"

(2020: 1935). To illustrate the point and convey more vividly what is different about synergic kinds, Martínez makes use of Slater's clique example, as presented above, while incorporating some modifications.

Martínez suggests that we think of Peg, Ralph and Quinn not as a clique of friends that like each other's company, but instead as a rather tense love triangle. In this case, spotting only one of the three at the mall is not indicative of the presence of either of the other two, while spotting two of them together is a reliable indicator that the third one is *not* going to be there. The idea that this metaphor is meant to convey is that, when it comes to synergic clusters, the instantiation of properties, *individually*, is not a reliable indicator of the instantiation of other properties of the cluster. Instead, it is the joint instantiation of properties that allows for reliable inferences. This type of inference is *synergic,* Martínez argues, because the information gained from observing the instantiation of multiple properties is greater than the sum of the information obtained from each property's separate instantiation.

Martínez makes clear that this discussion is not otiose, as some scientific categories and inferences seem to have this synergic structure. More precisely, Martínez (2020: 1943–1944) suggests that this is the case with some categories involving *epistatic* interactions—the phenomenon in genetics where the effect of one gene on a phenotype is modified by one or more additional genes[8]—and categories from *brain connectomics*—a research program in neuroscience that seeks to uncover how neural connections ("connectomes") give rise to cognitive functions as well as how they are altered by various neurological and psychiatric disorders.[9]

What this discussion reveals, I wish to argue, is that even some BPC views such as Slater's, despite their attempted inclusiveness, seem susceptible to violating the science constraint. On the face of these successive failures, a more promising alternative, I suggest, is to focus exclusively on the inductive power of categories; that is, on projectibility. Indeed, if a recurrent problem of natural kind theories is that they fail to be appropriately inclusive, identifying projectibility with naturalness appears to be a good solution.[10] For not only is

[8] Martínez argues that the sort of non-linear relationships between genes and their effects on traits that characterize epistatic relations are often better described in terms of synergic kinds rather than HPC kinds. For instance, he suggests that fruit-fly wings, whose shape is known to be underwritten by epistatic effects, form a synergic kind (i.e. *fruit-fly wing*) and not a traditional HPC kind (2020: 1942).

[9] Martínez argues that current knowledge about the human connectome highly suggests that an accurate description of the human brain will require more than a characterization in terms of mere aggregation of co-occurrent properties in a cluster. As such, he claims that *human brain* can be considered a highly informationally synergic natural kind (2020: 1943).

[10] It could be argued that identifying naturalness with projectibility runs the risk of conditionalizing the existence of natural kinds to the presence of cognitive agents such as humans capable of drawing such projections. This worry, however, is misplaced as a kind being projectible or not does not depend on an agent drawing

projectibility, as mentioned above, abundant among categories; it is also neutral with regard to specific metaphysical grounding claims. A projectibility-based account, then, will stand out from the rest because of its inclusivity and, as such, will have no trouble in subsuming both Slater's Stable Property Clusters and Martínez's synergic kinds (along with kinds with essences, HPCs, etc.).[11]

As we will see, however, this inclusivity will be the source of a potential problem for this approach that will need to be properly dealt with. In the following section I present the approach. Then I introduce the challenge.

## 4. *Bare Projectibilism: an update*

As we have seen, most natural kind accounts, while taking projectibility to be *necessary*, rarely deem it to be *sufficient* for naturalness. A notable exception to this tendency, however, is provided by Sören Häggqvist (2005), who has argued for a projectibility-based approach to natural kinds.[12]

My proposal, then, follows the path opened by Häggqvist, but takes two significant steps further, as follows. First, I elaborate the account in response to a serious challenge that is overlooked by Häggqvist. Then I develop some implications that follow from identifying naturalness with projectibility, and which make the proposal depart radically from most traditional approaches to natural kinds. Let us consider each of these ideas in turn.

Häggqvist rightly assumes that a significant benefit of a projectibly-based account of natural kinds is its inclusiveness. As mentioned above,

projections with it but, instead, on whether the properties of the kind tend to co-occur together or not. I thank an anonymous reviewer for raising this worry.

[11] More particularly, when it comes to Martínez's synergic kinds, notice that despite exhibiting a different inferential structure than HPC kinds do, they also ground inductive inference. Indeed, Martínez's main goal when identifying synergic kinds is precisely to expose the limitation of HPC theories to account for the success of our inductive practices. In this sense, an account such as Bare Projectibilism, which identifies naturalness with projectibility, will have no trouble in subsuming synergic kinds too. This discussion is indebted to an anonymous reviewer.

[12] Although Häggvist's view is sometimes included among Bare Property Cluster accounts (see Lemeire 2021; Conix 2017), it is important to highlight an important difference that might set it apart from these views. For, although Häggqvist's view fits in among BPC accounts regarding its neutrality *vis-à-vis* any specific metaphysical grounding for the robust clustering of properties, it departs from these views in incorporating the possibility of certain robust clusters being *brute*. That is, having *no ground*. More precisely, Häggqvist (2005: 82) claims that there is no principled reason to assume that there will always be a causal explanation (be it in terms of essences or more loose causal mechanisms) to account for the clustering of properties. Some of these robust clusters, he claims, might simply be a brute matter of fact. He suggests that this could be the case with certain kinds from fundamental physics, when there does not seem to be any causal explanation for the perfect clustering of properties (2005: 81).

the abundance and neutrality of projectibility makes it difficult for it to exclude any potential natural kind candidates. Häggqvist, however, does not seem to notice that this abundance is a double-edged sword, as it might make the account *overly* inclusive. More precisely, identifying naturalness with projectibility threatens to violate the contrast desideratum and fail to account for the intuitive difference between categories such as *discovered-on-a-Tuesday* and *water*, insofar as categories on both sides of the contrast seem to be, at least, minimally projectible. The challenge for a projectibility-based approach to natural kinds, then, is not to preserve the science constraint—which seems easily satisfied[13]—but to meet the contrast desideratum.

The other aspect that differentiates this proposal from Häggqvist's is its emphasis on an aspect of projectibility that Häggqvist does not consider: *graduality*. For, crucially, projectibility is not an on-off feature of kinds, but, quite to the contrary, a *gradual* property that can be instantiated in varying degrees. Although not often fully exploited, the idea that projectibility is gradual is not an original one (see Dorr 2019: 42; Griffiths 1999; Khalidi 2018; Magnus 2012: 12; Millikan 2000). Furthermore, it is often acknowledged that kinds can be projectible along two different gradual dimensions (Griffiths 1999: 217; Khalidi 2018: 1383; Millikan 2000: 26): on the one hand, the projections or generalizations in which a kind enters can be more or less *robust*. On the other hand, kinds can be more or less projectible depending on the number or *variety* of generalizations they allow for. Let us flesh this out.

Following Khalidi (2018), we can roughly characterize the *robustness* of a generalization by the number of exceptions it has. While some generalizations are universally true and hold under all circumstances, others, although not universal, hold under an exceptionally large range of circumstances, while others hold only under rather specific circumstances and require significant ceteris paribus clauses (Khalidi 2018: 1382).[14]

The *variety* dimension, instead, corresponds to the number of generalizations in which kinds can enter. Although it is generally expected that paradigmatic natural kinds can figure in numerous generalizations—Mill went as far as to hold that "Real Kinds" could enter into *infinitely many* generalizations ([1843] 1974: I vii §4)—Khalidi suggests that some paradigmatic natural kinds might actually figure in very few (e.g. *electron*). Khalidi quickly adds, though, that the latter's poor performance in the variety dimension is compensated by the great (or even universal) *robustness* of the generalizations into which they enter. As we shall see in section 6.1, distinguishing these two dimensions of projectibility will be useful for defending the strong projectibility of certain scientific categories against accusations to the contrary (Spencer 2015; Magnus 2012).

[13] I address objections challenging the *necessity* of projectibility in section 6.

[14] See Woodward (2000) for a more detailed discussion and characterization of non-accidental generalizations.

Now, identifying naturalness with a seemingly abundant and gradual property constitutes a significant departure from traditional natural kind theories that have generally focused on drawing a demarcatory line between natural and non-natural kinds. The view defended here, instead, takes naturalness to be a gradual property and, as such, presents a novel framework where the relevant question is not whether a kind is natural or not (given that most kinds, as we have seen, are at least minimally natural), but instead, its *degree of naturalness*.

As I will argue next, it is precisely the emphasis on the graduality of projectibility, and hence the graduality of naturalness, that will help Bare Projectibilism to address the challenge introduced above and meet the contrast desideratum.

## 5. *The challenge of projectibility-based accounts of naturalness: Meeting the contrast desideratum*

According to the reconstruction provided above, two main theoretical constraints have driven natural kind research. On the one hand, I have emphasized that the main goal or desideratum of natural kind theories has been to articulate an intuitive contrast between arbitrary categories and those that, following the traditional metaphor, carve nature at its joints (i.e. the contrast desideratum). On the other hand, I have shown how the main attempts to account for this contrast have successively violated the science constraint by excluding scientifically legitimate categories. We have also seen that even arguably very inclusive accounts such as Slater's Stable Property Cluster theory might exhibit this problem.

On the face of it, one sensible alternative, I suggested, is to follow Häggqvist and focus exclusively on the presumably abundant and neutral notion of projectibility. As discussed above, however, the main benefit of projectibility can also constitute a potential weakness, as it is not immediately obvious, given this abundance, how a projectibility-based account would meet the contrast desideratum.

To address this challenge, I suggest that we focus on the *graduality* of projectibility. For, although the *abundance* of projectibility threatens to blur the contrast, its graduality allows us to highlight that *not every kind is projectible to the same degree* and hence, not natural to the same degree. According to Bare Projectibilism, then, the intuitive contrast between categories such as *discovered-on-a-Tuesday* and *water*, is just the contrast between the two extremes of a spectrum. Notice that by identifying naturalness with a gradual property, Bare Projectibilism departs from the tradition of drawing a sharp demarcatory line between natural and non-natural kinds. In what follows, I argue that, far from being a shortcoming of this view, understanding naturalness as a gradual property is the appropriate way to counter the relevant notion of arbitrariness.

To elaborate, notice that if we want our notion of naturalness to stand in appropriate contrast with the notion of arbitrariness, we need a characterization that captures nuanced differences and not only extreme ones. Consider for instance, the kind *pet*.[15] Although this kind seems *more arbitrary* than the kind *tiger*, it does seem *less arbitrary* than the kind *animals-belonging-to-the-emperor*.[16] Similarly, although everything seems to suggest that the kind *tiger* is not arbitrary, we also have reasons to think that it is *more arbitrary* than the kind *gold*. The more examples we consider, the clearer it will be that it does not seem possible to separate all kinds into two perfectly discrete boxes, as the contrast desideratum would have us believe. What this suggests, instead, is that the difference considered in the contrast desideratum is but one particular *extreme* instance of a more general and ubiquitous relation: *more natural than*.

As soon as we appreciate this, we can see that Bare Projectibilism is in a better position than alternative dichotomic accounts to articulate this more general relation. For dichotomic accounts, insofar as they posit a single sharp demarcatory line, are only able to capture the particular extreme case, and not the more specific ones. In this sense, they are unable to account for the more general relation *more natural than* of which the contrast desideratum is but one (extreme) instance.[17]

That being so, a projectibility-based account which characterizes naturalness in terms of a gradual property seems particularly well suited to counter the relevant notion of arbitrariness satisfactorily, and to accommodate both extreme and nuanced contrasts. This is the sense in which I contend that Bare Projectibilism not only meets the contrast desideratum, but does so in a more appropriate way, as it also accommodates the more general cases that dichotomic accounts do not accommodate.

As an additional illustration of the potential limitations of dichotomic accounts of naturalness, consider the much discussed revision of the concept FISH which, roughly, went from tracking the kind *aquatic animal*—which included whales and certain invertebrates such as clams, starfish, etc.—to tracking the kind *cold-blooded vertebrate with gills*. Let us call the former $fish_{AQUATIC}$ and the latter $fish_{GILLS}$. Although it is uncontroversial that the current English term 'fish' refers to $fish_{GILLS}$, philosophers disagree on the "natural kind" status of these two kinds. According to John Dupré's (1993) Promiscuous Realism, insofar as both kinds stress important sameness relations and serve legitimate purposes, they should both count as natural (1981: 92). On Khalidi's

[15] Interestingly, Khalidi (2018) uses this kind as an example of a paradigmatic *non*-natural kind.

[16] See Borges's (1942) essay "The Analytical Language of John Wilkins" and the curious taxonomy of animals suggested there.

[17] See Lewis (1983) for a different view on the graduality of naturalness.

more restrictive view, in contrast, only the alleged[18] scientific category $fish_{GILLS}$ counts as a natural kind (2013: 62).

I want to use this case to illustrate that, independently of whether or not one counts $fish_{AQUATIC}$ as a natural kind, a dichotomic approach will face some significant limitations and will lead to some counterintuitive results. As such, I contend that the problem of these views does not stem from *where* they draw the natural/non-natural demarcatory line but, rather, from drawing such a line at all. Let us consider this case in more detail.

Dupré's Promiscuous Realism tells us that, provided we do not associate the notion of a natural kind with essentialist views, we have good reasons to think of $fish_{AQUATIC}$ and $fish_{GILLS}$ as equally natural. More particularly, Dupré believes that scientific categories are not fundamentally different from folk ones (1999: 462) and, as such, does not see any reason to dismiss the folk category $fish_{AQUATIC}$ as non-natural. Although Dupré is certainly right to emphasize the utility of this kind and the fact that there does not seem to be any fundamental difference between $fish_{AQUATIC}$ and $fish_{GILLS}$, his account does not tell us anything about the intuitively plausible *improvement* that has occurred in the conceptual transition from $fish_{AQUATIC}$ to $fish_{GILLS}$. While I agree with Dupré in not thinking that there is any fundamental or metaphysical difference between these two kinds, I believe, however, that it makes sense to think of $fish_{GILLS}$ as being *more natural* than $fish_{AQUATIC}$. For one thing, the kind $fish_{GILLS}$ groups particulars in a way that seems to allow for more interesting generalizations than the kind $fish_{AQUATIC}$ and, additionally, seems to provide a deeper understanding of the aspect of reality it represents. Notice that Khalidi also emphasizes this apparent contrast, and after insisting that the category $fish_{AQUATIC}$ has no inductive value (2013: 62), he suggests that the category $fish_{GILLS}$, in turn, is scientifically useful. He says:

> It is instructive to contrast this inclusive use of the term 'fish' [$fish_{AQUATIC}$] with the 'scientific one'[$fish_{GILLS}$]. […] Despite the fact that it is not a unitary taxon from the evolutionary or phylogenetic point of view, the category *fish* [$fish_{GILLS}$] has undisputed value as an epistemic kind. There are a number of branches of science, such as ichthyology and marine biology, which use this category to explain and predict natural phenomena. (Khalidi 2013: 62–63)

Although I will ultimately suggest that Khalidi goes too far in positing a fundamental difference between these two categories, a permissive dichotomic account such as Dupré's, which locates both $fish_{AQUATIC}$ and $fish_{GILLS}$ on the "natural side" of the divide, is not satisfactory either, as

[18] Dupré (1999) casts serious doubt on the status of $fish_{GILLS}$ as a scientific category. Indeed, notice that $fish_{AQUATIC}$ is not a monophyletic kind and thus, according to authors influenced by cladism, not an objective scientific category (see Boucher 2022).

it is unable to articulate this intuitive difference in terms of naturalness. To be clear, my contention against Dupré's account does not target its promiscuity or permissiveness. I am actually very sympathetic to this attitude. My complaint is, rather, that we need to complement this permissive picture with a gradual account in order to emphasize significant differences that will otherwise remain overlooked. Let us turn to consider the other side of the picture: Khalidi's more restrictive approach to the case.

Khalidi believes that "not all purposes are created equal" (2013: 62) and that kinds introduced for epistemic purposes have to be prioritized over those that serve other non-epistemic or pragmatic purposes. As such, he argues that scientific categories will tend to correspond to natural kinds, whereas folk ones will not. Unsurprisingly, then, Khalidi dismisses $fish_{AQUATIC}$ as non-natural, while insisting that $fish_{GILLS}$ is a natural kind. The problem, again, is that a single sharp demarcatory line is not enough to capture the nuanced differences that kinds may exhibit. For, while it is plausible to think that there is a contrast between $fish_{AQUATIC}$ and $fish_{GILLS}$ in terms of naturalness (as Khalidi duly emphasizes), it is equally plausible to think that a similar contrast arises when we compare the allegedly non-natural $fish_{AQUATIC}$ with a random category such as *wet creature*; a contrast which, I contend, an account of naturalness ought to capture. Khalidi, however, is unable to account for such differences in terms of naturalness given that, on his view, both $fish_{AQUATIC}$ and *wet creature* are equally non-natural.

The limitation of having only two discrete options (either natural or non-natural) also explains why Khalidi seems forced to overstress the difference between $fish_{AQUATIC}$ and $fish_{GILLS}$, and refer to the former as if it were inductively worse than it actually is. He says: "When the category fish includes aquatic animals, such as crayfish, jellyfish, starfish, and some mollusks, as well as whales and dolphins, it ceases to have value as an inductive category" (Khalidi 2013: 62). I believe, however, that Khalidi is too quick in making this assessment. Indeed, as we noted above, the abundance of projectibility guarantees that most categories, including $fish_{AQUATIC}$, will exhibit some degree of projectibility. In this particular case, a category such as $fish_{AQUATIC}$, although inductively weaker than $fish_{GILLS}$, can still have a significant inductive value. Notice, for instance, that knowing that $x$ is a member of the kind $fish_{AQUATIC}$ allows us to know, among other things, that $x$ lives in the water for all or most of its life, that $x$ requires water to survive, that $x$ has adapted to move efficiently through water, etc.

Hopefully, this discussion has served to illustrate that approaching these cases equipped with only two discrete boxes constitutes a serious limitation for dichotomic accounts of naturalness. A gradual account such as Bare Projectibilism, in contrast, seems better able to accommodate both the extreme contrasts and the more nuanced ones.

## 6. *Bare Projectibilism: a defense*

As suggested above, one of the reasons why many authors have resisted projectibility-based accounts is a fear of being overly inclusive (recall Magnus's (2012: 12) resistance to counting *jade* as a natural kind). As such, many natural kind theorists have taken projectibility to be necessary but insufficient for naturalness and have thus come up with further conditions for demarcating natural from non-natural kinds.

Interestingly, some authors have voiced concerns with projectibility-based accounts that take the opposite direction, as it has also been argued that projectibility may not, after all, be *necessary* for naturalness. More precisely, some authors have argued that some scientifically legitimate categories are not very projectible and, as such, that a projectibility-based account will fail to be appropriately inclusive. This worry is to be taken seriously; for, if these considerations were right, Bare Projectibilism would, in its own way, also violate the science constraint. I will consider two such arguments. First, I will present Quayshawn Spencer's argument regarding the poor inductive power of superheavy elements. Then, I will turn to considering a similar contention from Magnus involving polymorphic species. My strategy for resisting these potential counterexamples will consist in arguing that neither Spencer nor Magnus succeed in making the case for the poor projectibility of their respective examples. I will thus argue that both superheavy elements and polymorphic species are significantly projectible categories and, thus, (non-trivially) satisfy the science constraint.

Having anticipated this, let us consider Spencer and Magnus's potential counterexamples in more detail.

### 6.1. *Superheavy Element 117*

Spencer argues that a natural kind theory that focuses exclusively on the inductive power of kinds (i.e. projectibility) will fail to include certain paradigmatic natural kinds which, he claims, are "notoriously inductively weak" (2016: 162). To substantiate this idea Spencer presents the case of superheavy elements, and focuses in particular on element 117, also known as "tennessine". Indeed, given the seemingly indisputable status of chemical elements as paradigmatic natural kinds, it would be problematic for any theory of naturalness to exclude such paradigmatic exemplars or, in the case of a gradual account, to ascribe them the same degree of arbitrariness as categories such as *discovered-on-a-Tuesday* and the like.

I will suggest, however, that Spencer does not succeed in making the case for the weak projectibility of element 117. More precisely, I will argue that this element supports relevant inductive generalizations and that Spencer's incorrect assessment derives from conflating projectibility with other notions in the vicinity, such as our *capacity* to draw inductive inferences, or the inductive *method*. Let's consider Spencer's view in more detail. Concerning chemical element 117, he says:

> Since only six atoms of element 117 have ever been synthesized, and since the atoms that have been synthesized have existed for less than a second, nuclear chemists have not been able to get "many inductive generalizations" out of 117. Furthermore, the latter is not a temporary setback. Due to the nuclear instability of 117, it is not the sort of kind that we *can* generate many inductive generalizations with it. Thus, unlike other elements, we know nothing about 117's properties at standard temperature and pressure—such as its phase, its density, its melting point, its boiling point, its ionization energies, or its atomic radius. […] So, natural kind theories that require natural kinds to be inductively powerful fail to predict the existence of inductively weak paradigm natural kinds, such as superheavy elements. (Spencer 2016: 162)

The first thing to notice is that Spencer's claim regarding the weak projectibility of *tennessine* should not be understood merely as stating that, given its nuclear instability, we lack the *capacity* to learn as many things about it as we can about other, more stable elements. For this limitation would simply amount to us *knowing* comparatively fewer projections supported by this category, but would not be indicative of the category being projectibly poor.[19] Rather, Spencer's claim must not only be that we cannot *learn* tennessine's properties but, more radically, that tennessine *lacks* the relevant properties typical of other non-superheavy elements (e.g. melting point, density, etc.) and, as such, that there are few projections we can make about it.

With this clarification in mind, in what follows I put forward various considerations that cast serious doubt on this view. As such, I argue that we have no compelling reasons to believe that *tennessine* (along with other superheavy elements) is significantly less projectible than other chemical elements.

First of all, notice that the intrinsic instability of tennessine already constitutes a very *robust* general fact about this element; one on which the experiments to synthesize it heavily relied.[20]

Although I will also contend that tennessine has many other projectible properties, notice that having a very robust one (i.e. instability) is already a good indicator that this category is inductively powerful. For, we may recall, the projectibility of a category depends not only on the *variety* of projections that it supports, but also on the *robustness* of those projections. As Khalidi suggests, the fact that projectibility ranges over two dimensions allows some very projectible categories to be so, not in virtue of supporting *many* inductive generalizations, but instead in virtue of the (few) generalizations they support being very robust

[19] To see this through an example, consider the case of *Phobaeticus chani*, a stick insect with outstanding camouflage skills. We know very little about this insect, partly because only a few specimens have been observed to date. It seems clear, though, that it cannot be deduced from this epistemic limitation and our corresponding lack of knowledge about this insect that this category is inductively weaker than any other species category that is more easily observed and studied.

[20] Slater (2013: 147) makes a similar point concerning the "stable instability" of uranium.

(or the other way around). This could be the case, Khalidi suggests, with some kinds from fundamental physics, such as *electron*, which although generally characterized only in terms of three properties (spin, charge, and weight), is a very projectible category due to the fact that these properties are perfectly clustered. More generally, Khalidi (2018: 1383) suggests that when it comes to the utility of kinds for scientific inquiry, low performance in one of the two dimensions can be compensated by a high score in the other.

Now, apart from the robust instability of tennessine, notice that, although it is certainly the case that we cannot observe and measure the behavior and properties of this element by conventional means, we can nonetheless build models to *predict* many of its properties. This is crucial, as it suggests that, even when it comes to the *variety* dimension of projectibility, *tennessine* performs significantly better than what Spencer would have us believe. More specifically, some of these models have predicted that tennessine's melting point will be somewhere in the range of 350–550 ºC (Hoffman, Lee and Pershina 2010: 1728), that its boiling point is 610 ºC (Takahashi 2002), that it has a density between 7.1 and 7.3 g/cm$^3$ (Bonchev and Kamenska 1981),[21] and that it is *solid* at standard temperature and pressure (Bonchev and Kamenska 1981). Additionally, values for its ionization energies (Chang, Li, and Dong 2010) and atomic radius (Bonchev and Kamenska 1981) have also been predicted.

Unfortunately for Spencer, these predictions are clearly at odds with the view that tennessine *lacks* the relevant properties and, in this sense, in stark tension with his assessment regarding its poor projectibility. They suggest not that tennessine is "notoriously inductively weak" but, quite to the contrary, that it can support a significant number of inductive generalizations.

Now, while I take these considerations to be sufficient to make the case that *element 117* is significantly projectible, there is another idea that might serve to strengthen the case, and which is thus worth presenting. For, according to the standard view of quantum physics, radioactive decay—the phenomenon in virtue of which unstable elements are short-lived—is probabilistic. This is important, as it entails that there is always an infinitesimal chance of a sample of tennessine lasting long enough to be tested, manipulated, measured, etc. Although extremely improbable, the fact that this constitutes a possibility gives us further reason to believe that the nuclear instability of tennessine, although an important epistemic limitation, does not affect its metaphysical status and, as such, does not constitute a reason to doubt that this element is *as projectible as* any other chemical element.

[21] Notice that these results being presented in terms of intervals is again, due to an epistemic limitation. The idea is not that tennessine has no precise melting point or density, but rather that our current means of prediction do not allow us to go beyond predicting ranges.

Finally, one could object that the fact that tennessine's properties have been discovered through an abductive rather than an inductive method suggests that this category is not very projectible. Indeed, Spencer seems to have something like this in mind when he suggests, later on: "117's lack of inductive power does not undercut its epistemic utility in nuclear chemistry. It's just that its epistemic utility is different. It's abductive, not inductive" (2016: 162). I contend, however, that deeming element 117 weakly projectible for such reasons would amount to confusing projectibility with the inductive *method*. In conflating these two notions, one would fail to notice that the reason that projectibility is often considered distinctive of natural categories is not connected with the *method* through which we learn generalizations about them, but rather with the very fact that they support such generalizations. The distinctive feature of natural kinds—and the reason for which projectibility has generally been taken to be characteristic of them—is not that we learn things about them through any particular method (e.g. observation of particular members, followed by inductive generalization to the whole kind), but rather, that what we know and learn about them is projectible to all the members of the kind. In this sense, I conclude, *contra* Spencer, that *element 117* is significantly projectible and, accordingly, does not constitute a successful counterexample to a projectibility-based account of naturalness.

### 6.2. *Magnus's polymorphism*

A similar case against the *necessity* of projectibility for naturalness is put forward by P. D. Magnus. He contends that focusing only on the inductive power of categories to determine natural kindhood risks overlooking certain legitimate scientific categories which do not appear to be very projectible.

More to the point, Magnus suggests that focusing on projectibility ultimately leads to focusing on—and eventually overemphasizing—*similarity*. This is so, he insists, because the projectibility of a category is grounded in its members' sharing many relevant properties. He says:

> Coming at natural kinds in this way [by focusing on projectibility] leads us to suppose that members of a natural kind are connected by similarity. The reason that this *A* can be used as a proxy for other *A*s is that they all resemble one another in many respects. (Magnus 2012: 11)

With this connection in mind, Magnus goes on to complain that certain natural kind theories such as HPC have focused too much on similarity, and have therefore failed to see that scientific taxonomy does not always seek to individuate categories by stressing similarities. He refers to this alleged tendency of overemphasizing similarity and projectibility as *similarity fetishism*. He says:

> Quine is part of a tradition, going back to Mill, which assumes that membership in the same kind is a matter of having a large number of properties in common. Call this similarity fetishism. The yoke of similarity fetishism

> makes the induction assumption unable to accommodate kinds which are not joined by similarity and thus makes it insufficient to serve as a definition of 'natural kind'. (Magnus 2012: 12)

To illustrate his point, Magnus focusses on the case of polymorphic species. That is, species whose members can be grouped in different subcategories according to significant recurring differences. Although many species are polymorphic (one of the most common examples being sexual dimorphism in mammals), some species stand out from the rest by exhibiting remarkably extreme differences (in morphology, behavior, etc.). According to Magnus, a projectibility-based approach to naturalness that "fetishizes" similarity among the instances of a kind would thus have no reason to group these extremely divergent morphs under the same category. To make his case more vivid, Magnus offers the example of the highly sexually dimorphic seadevil.[22] He says:

> Take a specific seadevil species, such as *Linophryne arborifera* […]. Females and males are so dissimilar that there are few inductions one can make about the species in general from a single sample. If one were simply looking for projectible predicates, then the species would not be a relevant kind at all. (Magnus 2012: 160)

In what follows I will try to make the case, *contra* Magnus, that highly polymorphic species such as *Linophryne arborifera* are significantly projectible, or at least substantially more so than what he suggests. More precisely, I will argue that polymorphic species, despite diverging significantly in morphological and behavioral features, still share some very important diachronic properties (e.g. shared ancestry), in a way that supports many relevant inductive generalizations. Additionally, I will also suggest that polymorphic species share many relevant synchronic properties related to their impact on ecosystems, their habitat, and even their morphology.

Before getting into the details of Magnus's case, though, notice that Ereshefsky and Reydon (2015, 2021) raise a similar worry against projectibility-based views. Their contention is that biological taxonomy often focuses on highlighting *history* or *ancestry*, which, they suggest, does not always overlap with similarity. They say:

> The challenge for those that assert that natural kinds are groups of entities with numerous similarities is that classifying by similarity and classifying by history can conflict. And when they do conflict, the view that natural kinds are inductive kinds fails to capture the classificatory practices of those biologists that classify by history. (Ereshefsky and Reydon Forthcoming)

Magnus also seems to draw this contrast between *history* and *similarity* when he suggests that what unifies the members of a (dimorphic)

[22] To get an idea of how significant the differences between the female and male morphs of this species are, notice that the males, which are five times smaller than the females, were for a long time thought to be parasites attached to the females' bodies, until it was later discovered that they were essential for reproduction (these cases are known as "sexual parasites").

species is not similarity but, rather, "a common causal history over evolutionary time" (2012: 162).

I will argue, however, that Ereshefsky and Reydon (2015, 2021), and Magnus (2012), are too quick to assume that similarity amounts to "superficial similarity" or, more precisely, to *intrinsic similarity*. For there does not seem to be any principled reason not to count "shared history" or "shared ancestry" among the relevant properties that members of a (dimorphic) species *share*, and thus among the properties in virtue of which they can be considered to be significantly *similar*. Moreover, not only are these *extrinsic similarities* relevant from the point of view of evolutionary biology, but crucially for our purposes, they ground many important inductive generalizations. This point is vividly made by Chakravartty (Forthcoming: 6) who, against Ereshefsky and Reydon, insists that the focus of biological taxonomy on ancestry is not in tension with highlighting inductively powerful categories. Quite to the contrary, the aim is still to make inductive inferences.

Khalidi (2021) too, in investigating the aptness of etiological kinds as natural kind candidates, also suggests that these kinds, characterized by sharing diachronic properties—a subtype of extrinsic properties—support *retrodictions* (i.e. predictions of the past), which are a particular form of projection. He says: "For instance, if we identify a rock as a meteorite based on its fusion crust, we can infer that it had an extra-terrestrial origin and a certain causal trajectory through the earth's atmosphere" (2021: 14). Similarly, if we identify an organism as a *Linophryne arborifera,* we can infer, for instance, how closely related it is to another given organism. Faced with these considerations, I argue that we have reasons to think that *Linophryne arborifera*, as well as other polymorphic species, will support many important retrodictions involving their evolutionary history (e.g. evolutionary closeness to other species, developmental pathway, etc.).

Additionally, as if acknowledging these shared diachronic similarities were not enough to defend *Linophryne arborifera*'s status as a significantly projectible category, notice that members of this species also share relevant synchronic properties related to their impact on ecosystems, their habitat, and even their morphology. Interestingly, even Magnus acknowledges that members of this species category share important morphological traits (Magnus references Pietsch (2009: 24–30) as providing an extended account of morphological traits shared by both morphs). Somewhat surprisingly, though, Magnus does not seem to take these morphological similarities into consideration when it comes to assessing the projectibility of the category. The reason for this, he suggests, is that the "properties of males are insufficient to diagnose species" (Magnus 2012: 161). This consideration, however, even if true, does not jeopardize the projectibility of the category as a whole. For, independently of whether the morphological traits of males are enough to individuate the species or not, inasmuch as both morphs share morphological properties that are relevant from a biological

standpoint, these shared similarities contribute towards making the species category more projectible in the relevant sense.[23]

Overall, these considerations suggest that Magnus overestimates the impact of the divergent female and male morphologies on the projectibility of polymorphic species categories such as *L. arborifera*. As such, I conclude, *contra* Magnus, that it is not true that "if one were simply looking for projectible predicates, then the species would not be relevant at all" (2012: 160), and that *L. arborifera* is significantly projectible (in the specific non-trivial sense specified above).

Finally, it could perhaps be argued that Magnus's case against projectibility-based accounts is not only based on the idea that this category is weakly projectible—which, as we just saw, seems doubtful—but, additionally, on the claim that projectibility is not the relevant feature in virtue of which different domains of biology favor this category. More precisely, Magnus suggests that the rationale for grouping together the members of a (dimorphic) species is not similarity or projectibility but, instead, *explanatory* considerations. He says: "Explanatory considerations identify *L. arborifera* as a legitimate taxon, even if it is not an inductively robust category" (2012: 162). The picture Magnus presents, then, is one where explanatory considerations are in tension with, and (sometimes) prioritized over, similarity and projectibility.

This view, however, is not without controversy. As Miles MacLeod (2014) suggests in his review of Magnus's monograph, not only does Magnus provide no account of what makes a kind explanatory *qua* kind but, moreover, "it is also arguable that what grounds a kind as explanatory is similarity among its members in the first place" (MacLeod 2014: 337). Importantly for our purposes, if something along the lines of MacLeod's view is correct, then, by emphasizing the explanatory value of *L. arborifera*, Magnus would not thereby discount its projectibility but, quite to the contrary, provide further reasons in favor of this category being projectible in the relevant sense.

Notice that Magnus's own example seems to point in this direction. Indeed, we have seen that he identifies as explanatorily relevant the fact that members of *Linophryne arborifera* have a *common causal history*. But, if the above considerations are on the right track, focusing on a common causal history amounts to focusing on *similar* extrinsic properties. In this sense, his example does not involve any tension between explanatoriness and projectibility but, instead, a case where both dimensions are grounded in the extrinsic similarities of the category.

Accordingly, I conclude that Magnus's case does not succeed as a counterexample to projectibility-based accounts of naturalness. I have

[23] To draw a simple comparison, consider two important shared morphological similarities of tigers: *having stripes*, and *having four legs*. It is clear that these two morphological properties by themselves are not enough to individuate the species (i.e. *Panthera tigris*). Still, these similarities contribute towards making the tiger category *more projectible*. The same goes, I suggest, for more extreme cases of dimorphic species such as *Linophryne arborifera*.

argued that, in virtue of their intrinsic and extrinsic similarities, the categories that correspond to polymorphic species support many relevant inductive generalizations. Moreover, I have shown that even if Magnus is right in his claim that the rationale for grouping polymorphic organisms under a single species category is the explanatory potential of the resulting category, this does not pose a challenge to its projectibility but, quite to the contrary, provides further reason not to doubt it.

## 7. *Conclusion*

In this paper I have put forward an original view according to which the naturalness of a kind is to be identified with its degree of projectibility. Although projectibility has traditionally been given a prominent role in natural kind theories, the current proposal departs from other theories in singling out no other additional condition for naturalness. As such, a distinctive characteristic of Bare Projectibilism is that, by identifying naturalness with a gradual property such as projectibility, the notion of naturalness itself becomes one of degree. Rather than constituting a shortcoming of the view, I have argued that understanding naturalness in a gradual way not only appropriately counters the relevant notion of arbitrariness but, moreover, brings important advantages over dichotomic alternatives. Finally, I have addressed objections involving potential counterexamples to a projectibility-based account.

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