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Ethnobiological kinds and material grounding: comments on Ludwig

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Abstract
In a recent article, David Ludwig proposed to reorient the debate on natural kinds away from inquiring into the naturalness of kinds and toward elucidating the materiality of kinds. This article responds to Ludwig's critique of a recently proposed account of kinds and classification, the Grounded Functionality Account, against which Ludwig offsets his own account, and criticizes Ludwig's proposal to shift focus from naturalness to materiality in the philosophy of kinds and classification.

Keywords Grounded Functionality Account · GFA · Natural kinds · Naturalness · Material kinds · Materiality · Ethnobiological kinds · Ethnobiology

1 Introduction

In a recent article, Ludwig (2023) put forward a proposal to reorient the debate on natural kinds, as it is not getting closer to a satisfactory account of how the naturalness of kinds and classifications is best understood. Ludwig is among a growing number of authors who suggest that this persistent failure to achieve agreement on the notion of naturalness should motivate us to look for alternatives.

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Ludwig's proposal is to shift the debate from inquiring into the naturalness of kinds to focusing on their *materiality*, in its wake eliminating the technical term 'natural kinds' from the philosophical vocabulary and replacing it by 'material kind'. Ludwig argues that the notion of 'material kind' is more inclusive than the notion of 'natural kind' and therefore more adequate for its philosophical task, i.e., to account for the fact that the kinds and classifications that feature in scientific research (as well as many that we use in everyday contexts) are *non-arbitrary*. The classifications we use are not "free-floating exercise[s] of worldmaking", as Ludwig (2023: 3) aptly puts it, but are embedded in contexts of practice in which they are intended to serve specific purposes. In this sense, classifications are non-arbitrary: we search for those groupings that best further core aims of research in specific contexts, such as enabling inferences and predictions, storing information, representing theoretically relevant properties, representing common origins, representing shared functions of entities, and so on. The key question is what distinguishes kinds and classifications that perform well in relation to their purposes from those that do not. Ludwig holds that the traditional answer – "their naturalness" – is inadequate for several reasons, one being that there are many useful kinds that do not seem to have a foundation in nature. Ludwig proposes an alternative answer – "their materiality" – which he claims is more adequate to the philosophical task as it better captures what it is that makes a kind useful for a specific purpose. Accordingly, Ludwig's philosophical project amounts to "distinguishing epistemically fruitful kinds from mere linguistic constructions without material grounding" (Ludwig, 2023: 2).

We agree with the motivations behind Ludwig's project, but disagree with two points in the article. The first is his critique of an account of kinds and classification – the Grounded Functionality Account (henceforth: GFA) – that we proposed recently and against which Ludwig offsets his own account.[1] We respond to this critique in Sect. 2. The second point is Ludwig's proposal to shift focus from naturalness to materiality. We criticize this proposal in Sect. 3 and show that it is not an improvement in comparison to the GFA.

2 Ethnobiological kinds

Ludwig argues that the GFA fails to capture the full diversity of kinds and classifications in all the various corners of research and practice. It may capture some – perhaps many – cases in which practitioners consider the classifications and kinds they use to be natural, but it does not capture the full spectrum, Ludwig argues. As he puts it: "Just as its competitors, grounded functionality captures some but not all talk about "natural kind" in the empirical literature" (Ludwig, 2023: 5). Ludwig supports his argument by examples from ethnobiology, where, he argues, the GFA is both too

[1] For reasons of space, we cannot provide a detailed summary of the GFA here. The original formulation of the GFA is found in Ereshefsky and Reydon (2023), which due to circumstances was published after other papers on the GFA that were written later. Further developments are in Reydon (2021), Reydon and Ereshefsky (2022) and Cuypers and Reydon (2023).

tolerant and too restrictive. We will first address Ludwig's objection that the GFA is too tolerant and then turn to his claim that it is overly restrictive.

2.1 Is the GFA too tolerant?

Ludwig points out that much of ethnobiological research does not focus on the kinds and classifications that feature in local practices, but on a "restrictive subset" (Ludwig, 2023: 4) of kinds and classifications that are widely shared between geographically disconnected populations and between distinct cultures. Such widely shared kinds are what ethnobiologists consider to be natural kinds, Ludwig (2023: 4) argues, but the GFA fails to capture this part of scientific practice, because by focusing on local classificatory practices it acknowledges many kinds that ethnobiologists do not acknowledge as natural kinds and misses the "restrictive subset" that is of interest to ethnobiologists.

But a closer look shows that Ludwig's assessment of the GFA on this point is incorrect. To see this, recall that the task of a philosophical account of natural kinds is to help philosophers make sense of classificatory practices. For example, when scientists in a particular field of investigation group atoms into kinds according to the number of protons in the nucleus, philosophers studying this practice want to clarify how this way of classifying atoms furthers the aims of the field. There are two levels here: scientists doing the classifying and philosophers studying that particular scientific practice. But note that in the case discussed by Ludwig there are three levels, not two: classificatory practices in local communities, ethnobiologists studying these classificatory practices by focusing on kinds that are widely shared between geographically disconnected populations and between cultures, and philosophers studying both the classificatory practices in local communities and ethnobiological practice to clarify why ethnobiologists consider some kinds to be natural kinds. Ludwig's (2023: 4) objection is that the GFA fails to capture *the practice of ethnobiologists* (and not the practices of local communities) when they distinguish between natural kinds and other kinds. The classification under consideration here thus is one that employs two groups, natural kinds and non-natural kinds, in the specific context of ethnobiological research and the question is whether the ethnobiologists' 'natural kind' is a natural kind under the GFA.

We believe the GFA *does* capture this practice and does so in a way that clarifies an important aspect of ethnobiological research practice. Ethnobiologists are interested in classifications and kinds that are widely shared across cultures and across local communities because such classifications and kinds serve interests that are shared by humans generally. Ethnobiologists thus use 'natural kind' to single out kinds that can serve general interests of humans *as humans*, and to contrast them with kinds that only serve interests of a localized community. Kinds and classifications that appear in geographically disconnected communities and across cultures do so precisely because they promote practices we share as humans – and this is what motivates ethnobiologists as well as researchers in other fields to single them out as special. The GFA captures this ethnobiological practice in the following way. The GFA poses two conditions on kinds and classifications: the Functionality Condition and the Grounding Condition. The Functionality Condition says that a classification

should be judged by how well it functions in achieving the aims it is posited for; the Grounding Condition says that the grouping should depend on an aspect of the world rather than merely on human interests. The aim, as noted, is to highlight kinds that serve general human interests and the ethnobiologists' use of 'natural kind' serves this aim well, such that the Functionality Condition is met. The Grounding Condition, in this case, requires that the ethnobiologists' use of 'natural kind' depends on some aspect of the subject matter that ethnobiologists study, i.e., human classificatory practices, and not merely on the interests of ethnobiologists. This condition is satisfied: the ethnobiologists' use of 'natural kind' depends on aspects of the human species and not merely on what ethnobiologists happen to be interested in. The GFA thus tells us – in this case philosophers studying how ethnobiology works – why the distinction between natural kinds and other kinds in this particular context of scientific practice is successful.

Ludwig's mistake is to think that the GFA only accounts for local classificatory practices by "allow[ing] for natural kinds that serve the aims of very specific classificatory programs *rather than* restricting the notion to those that serve a variety of unrelated programs" (Ludwig, 2023: 4; emphasis added). But the GFA does both. It focuses on the foundations of classificatory practices of local populations, allowing these to encompass natural kinds if the Functionality and Grounding Conditions are met, *and* it focuses on the classificatory practices in ethnobiological research, allowing these to encompass natural kinds when the two conditions are met. The case of ethnobiological kinds thus shows the versatility of the GFA.

2.2 Is the GFA too restrictive?

Ludwig also accuses the GFA of being too restrictive. Here, Ludwig objects to the GFA's requirement that the community that employs a particular classification should provide a well-supported account that shows how the way in which the classification latches onto the world (i.e., is grounded) furthers the aims for which the classification was constructed (i.e., is functional). But in many cases studied by ethnobiologists, Ludwig argues, their interest is not in grounding. Ethnobiologists are not only interested in kinds and classifications that feature across cultures and communities, as discussed above, but also in kinds and classifications that are unique to local communities. In this latter context, Ludwig claims, ethnobiologists try to understand "whether community categories support local practices and livelihoods by capturing relevant property clusters in the biological world" (Ludwig, 2023: 5). Ludwig (2023: 4–5) here claims that ethnobiologists are not interested in the question whether local classifications and kinds are grounded or whether local communities actually have well-supported accounts about the classifications and kinds they use.

In our view this shortchanges both ethnobiology as a field of research and the local communities that this field studies. An objection to the GFA may be that it cannot be expected that a local community *itself* provides an in-depth account of how the functionality of a classification is grounded in the world. Indeed, for many classifications outside the sciences the community of users will not have such an account readily available. This is not only so for the local communities ethnobiologists study, but also for everyday classifications in the Western world. People in everyday contexts rou-

tinely use kinds like 'acid' or 'protein' without themselves having – or needing – an account of how these kinds connect to the world. But the successful use of such kinds in everyday contexts would be utterly mysterious if no account whatsoever would be available of how the classification anchors in the world. In the case of kinds like 'acid' or 'protein' it is common to defer to science for the required account. Users of classifications in everyday contexts themselves thus do not need an account of how the kinds they use are anchored in the world, as long as such an account is available *somewhere*. The GFA acknowledges that there can be a division of labor between the community of users of a kind and the community that provides an account of the kind's success.

Similarly, understanding whether the classifications and kinds used by local communities support local practices and livelihoods should involve asking the question what supports the success of these kinds and classifications, i.e., inquiring into how these kinds and classifications are anchored in the world. We agree with Ludwig (2023: 5) that ethnobiologists should not demand that local communities themselves have well-developed classificatory programs that account for the success of the kinds and classifications they use. But ethnobiologists *should* ask what supports the success of local classifications and kinds – without clarifying this, local classifications and kinds are only partially understood. Our point thus is that the GFA tells us that an integral part of understanding the success of classifications and kinds is an account of how these depend on the world and it is desirable from an epistemic perspective that *someone* – a local community of users *or* the relevant academic community studying that local community – provides such an account.

In fact, local communities *do* have stories about the classifications and kinds they use, and part of the effort of ethnobiologists when trying to understand the role of local classifications and kinds in supporting local practices and livelihoods is to understand these stories. Neither for local communities nor for ethnobiologists is classification *only* about their use and about which properties are seen as relevant in the specific context of use. It is also about how and why classifications and kinds are useful in specific contexts. Part of the answer to such how- and why-questions may indeed be given in terms of property clusters: picking out the right superficial properties for one's purposes ('edible' vs. 'inedible'; 'dangerous' vs. 'harmless'; and so on) is a major step towards achieving a livelihood or carrying out a particular practice. But it is important to see that property clustering is always only part of the answer, because humans are an inquisitive and storytelling species. We tell stories (often wrong, sometimes entirely fictitious, occasionally somewhat right) about how it came to be that some things in the world are edible and others not, and why some creatures are dangerous and others perfectly harmless. Even in cases in which a purely phenomenological classification is being used successfully in some context of practice, i.e., entities are grouped according to property clusters that are seen to occur in the world and that are simply taken as givens, there still is a metaphysical background story without which the classification cannot be fully understood (a point made forcefully by Kendig & Grey, 2021).

Consider an ethnobiological example that Ludwig (2023: 17) provides. Ludwig describes a classificatory practice of an indigenous population in Papua New Guinea, the Kalam, who do not classify cassowaries as birds, but instead treat them as closer

to humans than birds. This classification, Ludwig describes, is embedded in a complex system of spiritual and normative practices that is part of Kalam culture. Ludwig claims that the philosophical tradition of natural kinds would quickly dismiss '*yakt*' (the Kalam kind of birds) "as not reflecting joints in nature but contingent cultural and ritual conventions" (ibid.). An account of kinds and classification based on materiality, in contrast, would acknowledge '*yakt*' because there are material differences between cassowaries and other birds, as well as material similarities between cassowaries and humans, that support the Kalam classificatory practice. Ludwig mentions size (cassowaries are close to humans in size) and leg bone structure as relevant factors in this respect. Moreover, he writes that

> "[a] lot of research questions about the interaction between these features and classificatory practices emerge. For example, the exclusion of cassowary from *yakt* may be hypothesized as adaptive in preventing overhunting of these easy (large and terrestrial) targets and therefore as a crucial part of indigenous expertise for the purpose of sustainable engagement with a local ecosystem." (Ludwig, 2023: 17).

But these are precisely the kind of supportive accounts that the GFA requires! In this case, ethnobiologists rather than the Kalam themselves are prompted to provide an explanation why the Kalam classificatory practice – encompassing the kind *yakt* plus the associated Kalam narrative – is successful. Such an explanation would mention size and bone structure, which Ludwig highlights as material aspects of the entities being classified, and possibly the factor of prevention of overhunting (if correct) or other ecological and evolutionary factors that underpin the usefulness of *yakt* as a kind in the specific context of Kalam culture. The GFA thus fully accommodates Ludwig's example by highlighting the questions that ethnobiologists should ask about Kalam classificatory practices.

3 Material grounding

Let us now turn to Ludwig's proposal to replace naturalness by materiality as the basis for a philosophical account of classification and kinds. Recall that such an account should address the phenomenon that many successful kinds (and the classifications in which they feature) are non-arbitrary in the sense that some kinds fulfil their purpose better than others. The notion of naturalness is often cited as the answer to the question what it is that makes kinds and classifications non-arbitrary – an answer that Ludwig deems inadequate and for which he suggests materiality as an alternative.

Ludwig does not provide a detailed explanation of his notion of materiality. He takes the material turn in feminist theory as a starting point and clarifies the notion of materiality by pointing out that material kinds identify something "real in the material world" (Ludwig, 2023: 11), that his account focuses on "the material constitution of kinds" (ibid.) and that it involves "engaging with material structures and processes" (Ludwig, 2023: 8). He further refers to "empirically discovered structures of the material world" (Ludwig, 2023: 2) and "material features such as property

clustering" (ibid.). He also explains that "categories can fail to identify any real material structures" (Ludwig, 2023: 10) in which case they do not count as material kinds.

While it does not become entirely clear what exactly materiality encompasses in Ludwig's account, it seems clear that Ludwig uses the notion of materiality in a similar way as the GFA uses the notion of grounding. Consider his example of phrenological kinds. Ludwig points out that even though phrenologists recognized many kinds that failed "to identify anything real in the material world" (Ludwig, 2023: 8), some phrenological kinds *did* have a material basis: "the cranium is real and so are at least some of the anatomical and morphological features that phrenologists described" (Ludwig, 2023: 7). However, the kinds that did have a material basis, Ludwig points out, were "rather superficial kinds without much predictive or otherwise epistemic function" (ibid.). The problem with these latter kinds thus was not so much that they weren't anchored in the world, but that they did not perform any epistemic role. Phrenology failed as a science not only because many groupings that it relied on failed to identify anything real in the world, but also because some groupings that *did* have a basis in the world failed to perform the epistemic functions they were supposed to perform.

Ludwig's analysis of phrenological classification strongly resembles the approach taken by the GFA. On the GFA, for a given grouping the first step is to assess whether the Functionality Condition is met, i.e., whether it successfully performs its epistemic or non-epistemic functions within the context of the classificatory practice in which it features (Reydon & Ereshefsky, 2022: 18). This step merely identifies candidate natural kinds. In the second step the Grounding Condition is used to identify those kinds from the set of candidates of which the successful use can be explained by their being grounded in aspects of the world. Those kinds would count as natural kinds under the GFA. Both the GFA and Ludwig's account, then, do not merely ask whether groupings are anchored in the world, but only consider groupings that perform an epistemic or non-epistemic function in a particular context of research or practice, and then move on to inquire how these groupings are anchored in the world. In this respect, the GFA is not fundamentally different from Ludwig's proposal. But the latter also does not make progress beyond the former because of its lack of specificity regarding the notion of materiality.

Moreover, there are important differences that we believe make Ludwig's account perform less well than the GFA. For one, the accounts differ in how the grounding requirement is met: Ludwig wants kinds to be grounded in material aspects of the world, while the GFA considers any aspect of the world – material or not – to be acceptable. The GFA wants to remain metaphysically neutral by not assuming that all useful kinds and classifications are grounded in the world in the same way. When inquiring into the constitution of a grouping, on Ludwig's account, we ask about its "real material structures" (Ludwig, 2023: 10), whereas on the GFA we ask about its constitution in a much broader way without making specific metaphysical assumptions about what the world is like or a priori restricting the basis of kinds to material structures. Kinds may, for instance, be grounded in behavioral patterns, shared functions (Ereshefsky, 2018; Reydon, 2021), and so on. In this respect, the GFA is more naturalistic and less restrictive than Ludwig's account by avoiding a priori assumptions about how kinds are anchored in the world.

Ludwig (2023: 11, 13) claims that materiality contrasts positively with naturalness by supporting a more inclusive account of classifications and kinds that is not biased

towards "mature" sciences but acknowledges kinds in many other contexts, such as ethnobiological kinds and groupings that feature in everyday practices. However, the GFA offers an account of kinds and classifications that is both more inclusive and more informative than Ludwig's account. The GFA is more inclusive as it does not restrict grounding to materiality, as Ludwig does, but allows non-material grounding as found in the social and human sciences. In this sense, the GFA is more naturalistic than Ludwig's account. Furthermore, which aspects of the world serve the role of grounding in the GFA is determined by the classificatory project at hand. That is, which aspects of the world provide grounding crucially depend on what is the function of that classification, whether the classification be material or non-material. In contrast to Ludwig's proposal, the GFA makes this dependence on function explicit by focusing on the interplay of the Functionality and Grounding Conditions. The GFA, we believe, thus provides a more informative account of kinds and classification than Ludwig's materiality proposal.

A case in point is the example of 'planet' that Ludwig mentions as a kind that is difficult to think of as a natural kind but (he claims) is covered by the concept of material kinds. This kind performs epistemic functions in astronomy and other contexts and clearly is a kind that can be investigated and over which inferences can be made. But by only looking at the materiality underlying the kind one cannot achieve an adequate understanding of the kind, because materiality by itself does not explain why certain aspects of the materiality of stellar objects (but not other aspects) are deemed relevant for how they are grouped. Consider the reclassification of Pluto from planet to dwarf planet (Basri & Brown, 2006; Bokulich, 2014; Slater, 2017). Astronomers and astrophysicists use a variety of criteria to distinguish between kinds of stellar objects, which often (but not exclusively) are physical properties, such as mass, size or luminosity (Basri & Brown, 2006: 196). While there is ongoing debate in the relevant scientific community about the criteria for classification of stellar objects, according to a widely accepted definition an object must meet three criteria to be classified as a planet: it must orbit a star, it must be sufficiently large for gravity to cause it to have a spherical shape, and it must have cleared away any objects of a similar size near its orbit. When Pluto was demoted from planet to dwarf planet, it was because Pluto met only the first two criteria but not the third. Even though these criteria, strictly speaking, do not identify material *structures*, they are material criteria in a broad sense such that materiality covers an aspect of this issue. But what is not covered is the question why these criteria, rather than others, such as size or luminosity, were chosen as defining the kind in the first place.

To understand this aspect, we must explicitly consider classificatory aims. The classification of stellar objects is to a considerable extent driven by the discovery of new stellar objects that resemble known kinds of stellar objects but still differ from these in important ways. For instance, the discovery of exoplanets (planets orbiting other stars than our Sun), free-floating planets (planet-like objects not orbiting a star) and brown dwarfs (objects that with respect to their mass fall between giant planets and small stars) gave rise to the need to distinguish between these three kinds and to distinguish them from the kind 'planet' (Basri & Brown, 2006). In the case of Pluto, the discovery of the fact that Pluto was a member of a large group of similar objects that all were located in the Kuiper Belt rather than an object moving in a cleared orbit of its own entailed the need to fine-tune the kind 'planet' to clearly distinguish it from

the kind 'Kuiper Belt object', with Pluto's reclassification as a consequence (Basri & Brown, 2006; Bokulich, 2014; Slater, 2017). The epistemic role of the kind 'planet' thus explains why the three material criteria were chosen. The key to understanding this case is not the material underpinning of the kind as such, let alone the "real material structures" of planets as distinct from Kuiper Belt objects, exoplanets, and so on, but the functional reasons why that material underpinning (rather than another one) was deemed important by the relevant scientific community. The GFA captures this crucial aspect of the kind 'planet', whereas Ludwig's account does not.

Finally, Ludwig (2023: 17) highlights that his account of material kinds "creates space for addressing the social and political negotiation of kinds without reducing it to processes of linguistic construction." It does so via the notion of "restricted malleability" (Ludwig, 2023: 7–8) – meaning that even though kinds have a material basis, they come into being when humans single out certain material structures as important. Kinds thus result from the interplay of the world and human practices.[2] But by acknowledging that kinds are posited for specific aims while having a grounding in the world the GFA is similarly open to the social and political aspects of kinds without reducing these to linguistic construction (Ereshefsky & Reydon, 2023). And by also allowing non-material grounding, the GFA is more inclusive and naturalistic than Ludwig's account.

4 Conclusion: replacing naturalness by materiality

In the preceding sections we have responded to some of Ludwig's criticisms of the GFA and criticized Ludwig's proposal to shift attention from the naturalness to the materiality of kinds. We have also attempted to show that while Ludwig's account and the GFA align in some key aspects, the GFA performs better in some respects: it is more naturalistic and inclusive than an account that focuses on the "real material structures" that are assumed as the foundation of kinds.

To conclude, let us voice some more general worries about Ludwig's proposal to replace the notion of natural kinds by a notion of material kinds. One worry is that in our view Ludwig has not made a good case that replacing the notion of naturalness by a notion of materiality will resolve the natural kinds debate. The problem in the debate is finding an adequate account of what a kind's naturalness consists in. Many proposals exist: essences, property clusters, featuring in laws of nature, and more. Materiality as understood by Ludwig, i.e., "material structures and processes" (Ludwig, 2023: 8) or "real material structures" (Ludwig, 2023: 10), seems just one further proposal of what naturalness consists in. We believe Ludwig has not shown convincingly that this proposal will finally resolve the debate, especially because it contravenes successful classificatory practices in the human and social sciences. Another worry is practical: attempts at replacing entrenched terminology by new terminology often fail, as the case of 'species' shows (Ereshefsky, 2010). The terms 'natural' and 'natural kind' are deeply entrenched in both philosophy and science, such that very strong arguments are required to convince most members of the relevant academic

[2] Ludwig's approach here resembles Reydon's (2016) notion of co-creation of kinds by humans and the world.

communities to abandon these terms and adopt the notion of materiality instead. We do not think Ludwig's arguments are sufficiently strong in this respect.

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