Anthropic concepts

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Abstract: Natural kind concepts have the function of tracking categories that exist independently of our beliefs and purposes. But not all ways of tracking categories in the natural world involve conceiving of them as natural kinds. Anthropic concepts represent groups of natural, mind-independent entities that are apt for serving various human interests, goals, and projects. They represent the natural world under a practical mode of presentation, as a set of material resources that can be transformed to further a host of functions and ends. I argue that cross-cultural studies of traditional ecological knowledge provide evidence that many chemical, mineral, and biological concepts that are frequently taken to be natural kind concepts turn out on closer inspection to be anthropic concepts. Anthropic concepts are distinguished from artifact concepts, and a form of realism about the anthropic kinds that they refer to is defended.

1. Having nature in mind

The world, it is widely thought, contains natural kinds, scientifically discoverable categories that participate in substantial bodies of empirical regularities and therefore constitute stable loci of inductive potential. This metaphysical thesis is often paired with a semantic one, namely that there exist special classes of natural kind (NK) terms and concepts that track these kinds.[1] Paradigm examples include PLATYPUS, NEUTRINO, G-TYPE STAR, DOPAMINERGIC NEURON, and GOLD. These concepts are among the most valuable elements of the cognitive toolkit we use for representing and reasoning about the natural world. Indeed, the search for natural kinds and the attempt to stabilize NK concepts is sometimes said to be central to human life and thought. As the anthropologist Brent Berlin has argued, "human beings are drawn by some kind of innate curiosity to those groupings of plants and animals that represent the most distinctive chunks of biological reality" (Berlin, 1992, p. 290).

[1] In what follows I will collapse this distinction, choosing to speak primarily of natural kind *concepts*. While concepts are semantically prior to terms, the points made for one should hold of the other as well.

NK concepts exemplify this realist stance towards the categories they track (Fodor, 1998, pp. 146–162). They treat kinds as being objective, in the sense of existing independently of our beliefs and purposes. What makes neutrinos a natural kind, for instance, is not a matter of how we name, represent, or reason about them, nor about any socio-cultural or technological functions that they serve, but rather the commonality in properties among all neutrinos, in virtue of which they obey the same causal and nomic roles in the Standard Model. These mind-independent facts set the standard for when the NK concept NEUTRINO is applied correctly.

Not all concepts of natural kinds are NK concepts. For instance, one might track liquid H_2O via an appearance concept that represents it only in terms of a certain "watery look", with no comprehension that being water might involve anything more than having this look. A necessary condition of something's being an NK concept is not just that it tracks a natural kind but also that it does so in a way that treats membership in that kind as something that is independent of human perceptions, beliefs, and purposes. Membership-determining properties are normally not obvious ones: they may take the form of a hidden essence, a certain microstructural composition, or any other theoretical property that scientific investigation uncovers. This point derives from Putnam's early discussion of the logic of natural kind terms, which highlighted the fact that these terms are introduced with the intention of picking out whatever bears an empirically determined sameness relation to the initial samples encountered (Putnam, 1975).

NK concepts are implicitly committed to the existence of such relations, and such commitments often guide everyday categorization judgments. A large body of research suggests that people are so-called psychological essentialists, disposed to posit unseen properties that cause things to look and act the way they do, and that ultimately determine category

membership. This disposition manifests most strongly with NK concepts, a fact that leads developmental psychologist Susan Gelman (2003) to propose that these concepts embody "a doggedly realist view of the world" on which essences provide "a 'truer' representation of reality than can be observed" (p. 11). These essential properties are frequently taken to be internal and intrinsic ones, which further indicates that there is a powerful tendency to view categories in the world as centering on these mind-independent structures (Gelman, 2003, pp. 122–128).

NK concepts undoubtedly deserve the attention they have received, but the narrow focus on them in recent decades has, I suggest, distorted our understanding of other ways that we habitually classify nature. In particular, it has led to neglect of how natural classifications are shaped by pragmatic factors. Here I'll argue that our ordinary thinking about the natural world is often mediated not by NK concepts, but rather by what I will call *anthropic concepts*. These concepts track classes of plants, animals and other living things, chemical and mineral substances, and types of material stuff such as timber, soil, stone, and clay. However, unlike NK concepts, they represent these categories in terms of how well they can fulfill practical needs for food and medicine, building shelters, cultivation and landscaping, crafting clothing, tools, and other artifacts, pure ornamentation, and participation in ritual and religious practice.

In short, anthropic concepts depict parts of nature in human-centered terms, which are often (but not always) utilitarian ones. They are situated at the boundary where we come to regard nature not just as something existing in its own right, but as something that can be used, transformed, and shaped in various ways. Because anthropic concepts represent parts of nature in terms of how they further our interests and projects, I will say that they represent them under a *practical* mode of presentation.

In what follows, I will argue that anthropic concepts are cross-culturally prevalent (Section 2), as well as psychologically and semantically distinct from NK concepts (Section 3). Given the connection between anthropic concepts and practical utility, I suggest that they have deep affinities with abilities for perceiving affordances in the environment as well as with artifact concepts (Section 4). Finally, I will argue that anthropic concepts are capable of picking out kinds, when these are understood in a suitably restricted sense, and that this gives us grounds to be realists about the categories that they represent (Section 5).

2. Locating anthropic concepts

The main characteristics of anthropic concepts can be brought out by re-examining well-worn philosophical examples and from research into what is called "Traditional Ecological Knowledge" (Pierotti, 2011). These studies range widely across cultures and ontological domains, and they collectively show that an anthropic way of conceptualizing the natural world is a recurrent pattern in human cognition.

2.1. Revisiting water

Instances of anthropic concepts are ready at hand: the everyday concept WATER is a prime example. This may seem counterintuitive, since philosophical tradition maintains that WATER is a paradigm NK concept, one that picks out the ahistorical, purpose-independent chemical compound H_2O. While the deployment of concepts within scientific chemistry is not the main focus here, doubts have surfaced in recent years concerning how to understand the relationship between WATER and H_2O (Abbott, 1999; Needham, 2000; Weisberg, 2006). But in any event, ordinary people's understanding of water does not seem to represent it in a purely natural light.

In a seminal series of psychological studies, Barbara Malt (1994) showed that substances that are considered water by non-specialist participants tend to, but *need* not, have greater H_2O content than substances not considered water. Some things that are called "water" actually have less believed H_2O content than other things that are not called "water." This indicates that H_2O content does not determine how the concept functions, since the likelihood of something's being classified as water fails to increase monotonically with the percentage of H_2O it is believed to contain.

Still more decisively, in judgments of typicality (that is, those having the form: "Is this a good example of water?"), less than half of the variance in people's judgments is accounted for by the H_2O content of the substance. The remainder is accounted for by the fact that the substances in question serve crucial human functions: they are drinkable, they can be used for washing, they can be procured from the expected places such as the tap, etc. Both everyday uses and other important criteria such as where the substance comes from and its typical location are significant influences on categorization, in addition to facts about structural composition.

What this suggests is that being water, to most people, is in part a matter of chemical makeup, but not entirely. Composition undeniably matters in Malt's studies: while some non-waters were rated as having more H_2O in them than some waters, nothing completely lacking H_2O was rated as being water. But other things matter as well: what you can do with the substance, particularly in terms of importance for human life and commerce, as well as facts about origin and location. These latter facts seem irrelevant if the question is whether something falls under the natural kind *water*, but they nevertheless have a demonstrable effect on how we conceptualize water in everyday life.

This suggests that the ordinary concept WATER is not purely a detector that tracks a pre-existing kind, but rather has a hybrid structure that represents a kind of substance that plays a particular role in human practices. Neither component can be eliminated: it matters both that water is a certain kind of stuff, and that certain things can be done with it. This is characteristic of anthropic concepts, which incorporate essential reference to human ends and purposes in how they carve up the world (see Section 3).

Drawing on the same studies, Paul Bloom (2007) has argued that WATER has both a natural kind sense and an artifactual sense. In the NK sense, something is construed as water if it meets the right compositional criteria. But these criteria can be overridden by facts about where a substance comes from and what functions it is serving. Sometimes these are more important: given two substances with the same composition, one might be judged water and the other not depending on what one can be used for.

I disagree with Bloom on two central points. First, I do not think that there are two different senses of water at work here. There is just the everyday notion of water, which is anthropic in that composition facts and purposive facts *interact* in determining its use and extension. The second point of disagreement is that I don't think that water is an artifact concept in *any* sense. Anthropic concepts shouldn't be confused with artifact concepts; I will address this point in Section 4, but for now the most notable difference between the two is that artifact concepts represent things as having their origins in some maker's plans or intentions, whereas anthropic concepts represent them as naturally originating parts of the world. Seeing water as being tied to certain purposes that we have is not the same as seeing it as having been created by someone *for* those purposes, or having the relevant intentions as part of its etiology.

2.2. Chemical and mineral concepts

The humble origins of anthropic concepts are evident from the fact that they include everyday concepts of stone, soil, clay, and mineral substances (Boivin, 2008; Boivin & Owoc, 2004). This is unsurprising, since the earliest human technologies involve reshaping the material environment through knapping stones into axes, marking walls and human bodies with soil- and plant-derived pigment, and making textiles and pottery.

Consider the ordinary concept CHALK. We may acquire this concept as children through encountering chalk sticks in classrooms or art supply stores. But what falls under its extension? It is not straightforwardly a natural kind, since chalk *per se* has no chemical formula. Commercial chalk originally was made of calcium carbonate, extracted from limestone ultimately formed from the compacted shells of countless mollusks and corals. Now, though, many blackboard and pastel chalks are made from calcium sulfate, which also occurs as gypsum. Chalks that serve specific purposes are more different still, e.g., tailor's chalk used for marking clothing is magnesium silicate, and the chalk used to lay down lines on sports fields is titanium dioxide.

Chalk is not a single chemical substance, but these various minerals all fall under CHALK in virtue of being usable, as we might say, for our chalk-relevant purposes, namely making marks of varying permanence on a variety of surfaces. These purposes are the ones that calcium carbonate was originally mined and recruited for, but as it has been replaced by a range of practically equivalent materials, the concept CHALK (and the accompanying term "chalk") has stuck to all of them as well.

This illustrates the way that anthropic concepts can be semantically broadened by a historical chaining process. When chalk and its useful properties were discovered, its extension might have been limited to a few mineral substances—the ones that were known to be usable for

the same set of tasks. However, as new substances are recruited for the same purpose, or relevantly similar ones, they come to be added to the extension of the concept as well. This sort of functionally mediated chaining has been proposed as a mechanism of reference expansion for artifact concepts, which have important similarities with anthropic concepts. For instance, the concept of a juice bottle initially picked out manufactured objects of a certain size, shape, and composition, but over time it has broadened to cover physically heterogeneous objects that serve the same functional purposes (Malt, Sloman, & Gennari, 1999).

Analogously, CHALK groups things in its extension in part by their practical, artistic, and commercial applications, and in part by their composition—the latter because not *any* kind of substance, or indeed any kind of mineral, can be chalk. What counts as chalk is not something that is fixed once and for all from the time of the concept's inception. The initial extension of the concept neither determinately includes nor excludes these other entities; whether they become members of the extension depends in part on how the concept is actually applied and whether these applications become entrenched or not. Anthropic concepts are characteristically *open-textured*: their extension depends on the contingent possibilities of their use in the future, on decisions yet to be made and techniques yet to be discovered. Depending on their history of use, many things could come to fall under them. In this way they are unlike NK concepts, which hold onto their extensions no matter what roles they play in possible future human practices.

This point can be illustrated using JADE, which has figured so prominently in philosophers' discussions. As Joseph LaPorte (2004) persuasively recounts, the historical classification of jade demonstrates both the phenomenon of open texture and the importance of anthropic considerations in fixing the boundaries of a concept. Jade mined in China, as most now know, was predominantly the mineral nephrite. Later, in the 18th century, jadeite began to be

imported from Burma. While there was initially debate and some dissention about whether to count the new mineral as being jade, eventually Chinese speakers came to count it as falling under "yü," the term applied to the indigenous jade, i.e., nephrite. The grounds for this grouping were that while there were some evident phenomenological differences between the "old jade" and the "new jade," the new mineral could be worked and shaped in broadly similar ways to the old jade, and hence served the same functions in ornamental design. Collectors, dealers, and the imperial court treated the two minerals as equivalent, hence for all commercial, aesthetic, and ceremonial purposes it seems that both fall under JADE. As with CHALK, this is a case where anthropic properties lead us to co-classify what are, according to their microphysical composition, different substances.

The same holds for agricultural and construction materials. Studies of indigenous soil terminology show that a small number of factors (texture, hardness, moisture content, smell, etc.) are used to generate named soil classes, but all of these converge on the aim of sorting soils that are suitable for agriculture from those that aren't (Wilshusen & Stone, 1990). In rural Rajasthan, villagers building mud houses use several types of soil that are anthropically distinguished (Boivin, 2004). Bright red soil, or *pili mitti*, is used to decorate interior walls and is desirable because of its association with the goddess Lakshmi, while *kali mitti*, or black soil, is inauspicious and linked with impurity, in contrast with pure white *safed mitti*. These religiously inflected soil types correspond poorly with geoarchaeological classifications; e.g., *pili mitti* is split between being composed of clay loam and calcitic silt loam. As Boivin puts it, soils are functional, technological, and symbolic resources, with these aspects being indivisible from one another (Boivin, 2004, p. 181).

Finally, there are similar anthropic patterns of classifying the mineral world. One striking example derives from ancient Mesopotamian sources. Mesopotamian craftsmen, builders, and jewelers were keenly interested in stones and minerals, and many surviving lapidary texts name and describe the appearance and properties of various stones in ways that are shot through with anthropic aspects (Postgate, 1997). One text, the *Abnu Šikin-Šu*, which has been attested as early as 1000 BCE, explicitly classifies types of stones according to their "nature," which includes not only appearance but also the functions they serve in measurement, medicine, and magic.

While the idea of something's nature might suggest a style of classification that is objective or purpose-independent, this scheme treats it as explicitly including what is good for humans: repelling demons, bringing health, revealing the purity of gold, being a reliable weight, and so on. Summarizing this research, Postgate says that "because of the clear correspondence between what we would recognize as their natural properties on the one hand and their functions in human society on the other, stones provide an ideal case for seeing property and function as two different facets of the same inherent essence" (1997, p. 214). That the earliest information recorded concerning stones and minerals centers on functional characteristics suggests that such properties were central to how these materials were conceived of.

2.3. Biological concepts

Biology has often been thought of as the paradigmatic domain of NK concepts, but even here anthropic classifications flourish. In ordinary talk, as John Dupré (1993) has noted, terms for the living world often don't extend over what biologists regard as natural kinds. Lilies, for instance, map onto only part of the genus *liliaceae*, which also includes garlic and onions. But aside from those possessing this bit of botanical knowledge, few people would say that a bulb of

garlic is a lily. Lilies are cultivated for their aesthetic qualities as flowers, whereas garlic is cultivated for its flavor and culinary properties. You could put lilies (the flower) in a stew, or plant garlic for decorative purposes, but this reverses the normal ends we put them to.

Interestingly, non-*liliaceae* are also included under the folk concept LILY: Easter lilies are *zantedeschia aethiopica*, torch lilies are *kniphofia uvaria*, and other lilies belong to the genus *zephyranthes*. So LILY does not merely exclude parts of a particular genus, but also includes parts of others. This motley collection does not pick out a biological kind, but a category defined in part by a set of anthropic properties. Among these are appearance, but also other biological qualities such as growth and reproductive cycle, nutritional needs, ease of cultivation, and so on. LILY presents a biological analogue of the case of JADE, in which anthropic considerations lead to lumping of distinct natural kinds.

Similar remarks go for botanical concepts that name superordinate life form categories like SHRUB (Brown, 1977). Shrubs have a morphologically defined bioplan (they are short and have multiple woody stems), but this fails to delimit a biological kind. Instead, plant species count as shrubs when they manifest a mixture of appearance and functional qualities (Randall, 1987). The role of shrubbery in refined pursuits such as gardening and landscape architecture attests to this fact: decorative shrubs are required to have certain aesthetic and practical properties, as well as the right sort of growth and life cycle (Ferrari, 2010).

Shrubs can also have more widespread and specific cultural utility. Clément (1995) argues that the named category of shrubs among the Montagnais Indians has its membership determined primarily by whether a plant has an interior layer of potentially medicinal bark. The remaining non-medicinal shrubs are included in the category because of their morphological similarities to these medicinal prototype members. This dovetails with the earlier suggestion that

anthropic factors sometimes form the referential core of a concept that can then be broadened through various types of chaining, in this case mediated by relationships of physical similarity.

Clément's model of ethnobiological taxonomy reveals similar patterns across botanical and zoological domains. His Montagnais and Cree informants were highly skilled in naming living creatures, explaining the basis for their classifications, and articulating everyday inferences and practices involving those creatures. Botanical classification is, in his terms, *partonomic*: people conceptualize plants in terms of their major functional components (roots, wood, bark, leaves, berries), and they map those parts onto their ecological role, including the main technical, medical, and nutritional uses people have for them. So bark is medicine, berries are a food source, and there are particularly tight linguistic and conceptual links between trees and wood, which is unsurprising since trees are a source of timber that can be burned or used to build canoes (see also Ellen, 2006a, pp. 142–144; Randall & Hunn, 1984).

Another conceptual divide is between animals, plants, and fungi that are edible versus those that aren't. In studies of traditional mycological knowledge, the Chewa people of Malawi (Morris, 1984), Zapotec speakers from Oaxaca (Garibay-Orijel, Caballero, Estrada-Torres, & Cifuentes, 2007), and highland Mayan speakers of Tzeltal and Tzotzil (Shepard, Arora, & Lampman, 2008) are able to name actual mushroom samples and photographed exemplars and to draw them and list their most common locations, properties, and uses. Within this robust knowledge base, what makes a mushroom worth attending to and classifying is overwhelmingly determined by edibility (Shepard et al., 2008, p. 449), to the extent that Mayan speakers dismiss inedible or poisonous mushrooms as a group as being *bol lu'*, a "stupid" or "crazy" mushroom.

None of this implies that biological classification is *entirely* driven by pragmatic value. The ethnobiologist Brent Berlin has argued that there are pan-cultural patterns in taxonomy that

reflect immediately observable morphological discontinuities in the natural world (Berlin, 1992). Whether these correspond perfectly to scientific categories or not, Berlin proposes that they are mostly independent of practical purposes aside from that of the inquiring desire to comprehend the structure of the natural world.

Scott Atran, building on Berlin's work, makes the still stronger claim that the universal structure of folk biology is produced by an innate modular cognitive faculty. Within this structure, the living world is organized into a taxonomic structure of ranks. At the top are folk kingdoms (plant, animal), followed in descending order by life forms (tree, bird), generic species (oak, robin), folk specifics (white oak, tabby cat), and folk varietals. While the existence of this taxonomy has often been cited as evidence against anthropic theories of classification, even Atran and colleagues' studies reveal significant evidence of practical influences on folk biology.

These influences are clearly present at the level of folk specifics and varietals. The Itzaj Maya distinction between "red" and "white" mahogany, for example, seems to have less to do with color (these terms only loosely capture the actual hue of the wood) and more to do with "cultural distinctions that language and perception alone do not suffice to explain" (Atran & Medin, 2008, p. 34), particularly the symbolic role of colors in Mayan cosmology.

The internal organization of generic species categories is also culturally inflected, as shown by a set of studies comparing judgments of typicality made by American and Itzaj participants. Whereas Americans pronounced squirrels and raccoons to be highly typical animals, the Maya favored bobcats and lynxes. The animals and mammals judged to be the "truest" or "best" ones for Itzaj informants were those that are "large, perceptually striking, culturally important, and ecologically prominent"; all of these conditions seem necessary though none are individually sufficient. As Atran puts it, "typicality for the Itzaj appears to be an

integral part of the human (culturally relevant) ecology. Thus, the Itzaj say that wherever the sound of the jaguar is not heard, there is no longer any 'true' forest, nor any 'true' Maya" (Atran, 1998, p. 561). That is, the typicality ordering of taxa within a given rank is shaped by anthropic factors.

This phenomenon within the domain of birds is known as the "passerine effect" (Atran & Medin, 2008, p. 88). In comparisons between biologically naïve American participants and Itzaj, the Americans take passerines (small songbirds) to be highly exemplary instances of birds, while the Itzaj take the most representative birds to be either large game birds or the raptors that prey on them, which are in competition with the Itzaj hunters (p. 91). Similarly, among knowledgeable fishermen (including Menominee and non-indigenous Wisconsin residents), the strongest predictor of whether a species of fish is typical or not is how desirable it is—whether it is good for game or eating (p. 98). Naïve participants in these studies tended not to have any practical ecological aims or deep knowledge to fall back on, so their judgments of typicality reflect only vague statistical impressions.

Many other studies point to an interaction of more objective or purpose-independent characteristics such as morphology and ecological role with anthropic characteristics. This "many mechanisms" hypothesis was explicitly tested in studies involving the Irula people of southeast India (Newmaster, Subramanyam, Balasubramaniyam, & Ivnoff, 2007). Irula informants' botanical classifications correlate with four factors: (1) two major forms of utility (technical and ritual uses of plants versus nutritional and medicinal ones); (2) plant morphology; (3) ecological relationships of a plant to its environment; and (4) personally experienced qualities such as taste, texture, and smell. This supports the notion that many traditional classification

schemes represent a compromise among a set of practical demands that don't necessarily converge.

3. A theory of anthropic concepts

Summarizing this evidence, it appears that many concepts of natural categories do not track natural kinds particularly well, nor do many of the inferences they are involved in reflect an interest in uncovering the core properties of such kinds. If they are NK concepts, they seem to be badly made ones that systematically misperform their functions. A more generous interpretation, however, is that these are not defective NK concepts but instead concepts that are, by and large successfully, being driven by anthropic concerns.

We can now distill the main theoretical characteristics of such concepts. The first is their distinctive *purpose*. NK concepts function to capture how things are independently of our thought and practice. They embody the maximum degree of abstraction from human interests. Anthropic concepts aim to classify according to human-centered functions, but this must be interpreted widely to include immediate material needs for food, shelter, and the like, and also for longer term projects like constructing tools, dwellings, and earthworks, as well as broadly symbolic cultural aims such as aesthetic satisfaction and spiritual, religious, or ritual achievements. Spanning the material and the symbolic, these aims are understood to be connected with all forms of *practice*, and hence are more inclusive than the merely utilitarian as it was conceptualized in older debates in cultural anthropology.

The second characteristic is their distinctive *mode of presentation*.[2] In NK concepts, the kind being picked out is represented as existing apart from our attitudes and intentions. Anthropic concepts represent natural categories as having or being suited to certain functional roles. Taking WATER as the model, the subset of H_2O that falls under the anthropic concept may seem gerrymandered from a suitably cosmic point of view. Not every H_2O collection counts as anthropic water; rather, the subset of H_2O that plays the *appropriate role* falls under its extension.

The water-role involves where you can find some (from the faucet, in bottles and streams), what you can do with it in roughly the form you find it (drink it, bathe in it), and how you can manipulate it (freeze it into cubes, heat it to make tea). The concept specifies what this role is, but it is a matter of how things are in the world whether the relevant local substance can actually *do* the things that water is supposed to do for us. The same goes for the selection of a grouping of plants as falling under LILY, where the unities have to do with the reasons for cultivating flowers at all, and for the case of JADE, where they have to do with traditional means of mining, shaping, and working with stones. These all involve an interplay between the structure of the pre-existing stuff in the world, our interests in manipulating it, and the capacities and techniques we have available for doing so.

Generalizing from these examples, anthropic concepts can be thought of as having two core representational components:

[2] For present purposes I treat concepts as having, at a minimum, both an extension (or reference) and a mode of presentation. I want to stay neutral on how best to theorize what MOPs are, beyond the fact that they make a difference to the cognitive role that a concept plays. Different MOPs can be roughly modeled as differences in how a person represents a category to themselves, where these differences have an influence on how they think and act with respect to that category.

Material: a specification of the type of natural category, entity, or substance that the concept picks out;

Function: a specification of that material or substance's role in human practices.

These elements comprise the practical mode of presentation of anthropic concepts. This mode is a way of representing certain sorts of things in nature as being useful to us in certain sorts of ways. Since how something is represented partially determines the role it plays in thought, each element of this practical mode contributes to its role in categorization and inference.

Given our familiar epistemic limitations, the material component need not be represented fully and explicitly, but is often only a placeholder. In a chemically knowledgeable culture, WATER might be thought of as H_2O that can be found in faucets and streams, can be used for drinking and bathing, and so on, while in China before the advent of modern chemistry JADE might be merely those greenish minerals that can be mined and shaped in the following traditional ways, etc. This captures the idea that only certain sorts of materials—specifically, only stones—can be jade, but leaves open what their microcomposition is.

Different patterns of reasoning can be produced by varying the weights assigned to these hybrid components. There are three possibilities: functional dominance over material (F>M), equal weighting (F≈M), and material dominance over function (M>F).[3] The joint influence of material and functional properties can capture many of the patterns of categorization and inference that anthropic concepts manifest.

[3] The notation here indicates the relative weight that these two factors receive in classification and inference. All anthropic concepts are hybrids that achieve a compromise or trade-off on these two factors, but how that compromise is achieved through weighting them may differ from case to case.

In the first case, if function is given a high degree of importance and material constraints are weakened or loosened then an anthropic concept may cross-cut the boundaries of natural kinds. This is the case with jade and many soil types. Here what matters most is what something does, with its "natural" or purpose-independent classification being secondary.

In the second case, material constraints can be held to have approximately the same weight as functional ones in determining category membership. In the example of WATER, Malt's studies suggest that neither aspect is dispensable. This results in a concept whose extension is only a locally useful subset of a natural kind, rather than the whole of it.

Finally, in the third case, material constraints can dominate, with functional properties relegated to a lesser role. The concept represents a particular natural grouping in terms of its possible uses, and these drive inferences about group members but are not fundamentally extension-determining. This may be what occurs in many folk-specific biological categories such as the bird examples discussed in Section 2.3, where functional role governs many of the central inferences made about the category, such as what things are its most typical members or what properties are most important to it.

A third and final characteristic has to do with *open texture*. As noted, reference determination for anthropic concepts is sensitive to historical factors in ways that NK concepts are typically not. If we are tracking a pre-existing natural kind, then the extension of that kind determines the appropriateness of any new use of the NK concept, no matter what the history of its use might be. But anthropic concepts can have their reference broadened or narrowed by the contingent pattern of use that we have made of the concept, as well as by the various things that fall under it thus far.

For example, the extension of JADE neither included nor failed to include jadeite until it had been encountered and worked in various ways that made clear how it could conform to the relevant purposes and needs. Its extension was simply indeterminate at earlier times. And even in that case, there was room for decision; the judgment could have gone the other way without any obvious error having been made. But once jadeite was co-classified with nephrite in virtue of its having satisfied the jade-role, it fell under the relevant extension. The same could be said of the various forms of chalk. Prior to having been found useful in the right way, these materials are at best *potentially* chalk, or *potentially* jade, but not yet determinately either.

Similarly, types of adhesives were once distinguished not only by their functional properties but also by their material origins: "paste" was a mix of flour and water, "cement" was rubber dissolved in solvent, "gum" came from trees, and so on (Ellen, 2006b, p. 25). When synthetic substitutes were introduced, it was a matter of decision whether to accept them as falling under the same pre-existing conceptual label. Nothing in the practice of boiling bones to make glue dictates that petroleum-derived epoxy resins will be treated as equivalent, although the fact that they are indicates that function has come to trump material in this case. Historically situated open texture is a consequence of the tight integration between these concepts and the sociocultural needs and technological capacities of their possessors.

4. Affordances, artifacts, and teleology

Given their practical orientation, anthropic concepts draw on our abilities for reasoning about functions in the natural and human environment. This suggests an analogy between anthropic concepts and theories of perception that emphasize affordances (Gibson, 1979). In ecological psychology, affordances are part of what we perceive immediately: the ambient visual

array contains information not only about the location and intrinsic qualities of objects, but also what they afford. When we perceive a mug, we perceive not only its shape, volume, and so on, but its being *graspable-by-us*, and a broom is perceived as something that can be held and used for certain activities: it *affords-sweeping*. Affordances can be understood either as relational properties of objects, or else as facts concerning how we as agents relate to objects (Chemero, 2003; Scarantino, 2003).

This is closely tied to the notion of an anthropic way of seeing the world. In fact, anthropic concepts can be seen as a kind of cognitive extension of affordances: when we represent something under an anthropic mode of presentation, we also represent it as being usable in certain ways. This connection is explicitly made by Boivin: "Desert bushes afford the building of tents because humans have hands that can bend branches, not to mention minds that can envision creating a shelter as protection against the elements and a means of privacy" (2008, p. 167).

Despite their resemblances, though, anthropic concepts and affordances should not be identified with one another. One disanalogy is that affordances are picked up using the information available to the perceptual system. They are therefore typically tied to the kinds of actions that can immediately be performed using one's body or other objects available in the context at hand. Anthropic concepts, on the other hand, can represent entities as being suitable for a wider range of purposes and activities. JADE is seen as being workable in various ways that involve tools and processes of refinement beyond what an individual may be in a position to perform at the moment of perception. These properties are not immediately afforded, in Gibson's sense, by a sample of jade. Anthropic classification may make reference to large-scale

techniques of manufacture and production, as well as to uses that go well beyond the current perceptual context.

Moreover, whereas the affordances of an object are more or less fixed, given its physical makeup and the bodily capacities of the perceiver, the list of activities that can be anthropically represented is extraordinarily open-ended. As new uses for an object are discovered they are folded into the anthropic representation of the category it belongs to, whereas an object's affordances are more implastic, given that they are tied to the bioplan, body scale, and abilities of the organism.[4]

Like anthropic concepts, artifact concepts also accrete around a nexus of functional properties, though there are competing views about which ones matter (Houkes & Vermaas, 2013). According to *original* or *historical intention* (OI) accounts, artifact concepts pick out entities that, at the time of their manufacture, were meant by their makers to be used for a specific purpose or to have a specific function. A related version of the original intention theory says that intended category membership is what matters: the entities in question were intended to *be* a certain kind of thing (Bloom, 1996). There are also *present intention* (PI) views according to which artifact concepts pick out things that are *now* intended to be used for a certain purpose, no matter what they were intended to be at their inception (German & Johnson, 2002). On either account, though, the central functional property of artifacts is their link with *intended use*, whether original or present.

This might seem to push artifact and anthropic concepts close together, since anthropic concepts also pick out entities that are known to be usable for various purposes. This suggests

[4] Some, such as Scarantino (2003), take the notion of an affordance in an expansive sense, so that a number may afford being divide-by-two-able, or a flying ball may afford being score-with-able. These actions are relatively space and time bound, and hence not all the way to being fully anthropic properties, but they come closer to the notion than do the sorts of "basic" affordances more commonly posited.

the possibility that anthropic concepts are just a form of artifact concept: ones that pick out *natural artifacts*. There are several reasons, however, to resist reducing the anthropic to the artifactual. First, as Amie Thomasson forcefully puts it: "it is not just a causal fact but a conceptual truth that artifacts must be the products of human intentions, indeed of intentions to produce something of that very kind" (Thomasson, 2007). Anthropic categories are not the products of our intentions; they are not made at all, but discovered through laborious and often hazardous investigation. The material component of their mode of presentation captures the idea that anthropic categories are ones whose intrinsic physical structure is determined by natural processes. However, in the context of certain crafts, tools, and technology they can be adopted to suit the goals and intentions of various agents.

As Maurice Bloch notes, the realm of the anthropic bridges the natural and artifactual: "One cannot but be struck by how important, literally vital, these 'awkward' conceptual bridges between living kinds and artefacts are for the survival of human beings, who, after all, rely on the transformation of living kinds into artefacts for their food and much more" (Bloch, 1993, p. 113). This point cuts significantly against the OI view of anthropic concepts, but has less force against PI views. Suppose we weaken the condition that all artifacts must be made or manufactured, allowing that some of them may simply be found objects. Furthermore, suppose that we allow that some artifacts gain their status through the present intentions of their users rather than any original intentions on the part of their makers. In this case, some anthropic categories will turn out to be artifactual. Indeed, anything *found and used* will be a kind of artifact on this conception. Simple, unmodified (or lightly modified) tools are useful examples: the rock that is exactly the right shape for cracking nuts, the stick that affords fishing for termites.

These cases, though, are poor models for the general run of anthropic concepts. When bark is stripped and boiled to make medicine, soil turned and seeded, mushrooms gathered for food, or flint knapped into an axe, these natural objects themselves are less like artifacts than raw materials for *transformation*, which may, but need not, result in their becoming incorporated into an artifact. Medicine is an artifact, the bark it is made from is not.

More generally, artifacts might come in a spectrum of cases. A paradigmatic artifact is one that has multiple material components arranged or manufactured intentionally to serve a function or produce a certain effect. The most rudimentary found tools would then be unparadigmatic artifacts, since they are naturally occurring, mostly unstructured entities that can be used with little or no modification. Natural materials that must be substantially transformed in order to be useful, or that are more like resources, components, or ingredients, are less artifactual still.[5] While there are affinities between artifact concepts and anthropic concepts, neither should be assimilated to the other.

These examples show that humans are able to detect and manipulate many types of environmental functional relations. But there is also direct evidence from developmental studies supporting the idea that young children are "promiscuously teleological" when regarding the natural world. Deborah Kelemen (1999) found that 7-year olds are willing to explain the properties of inanimate natural objects (such as the pointiness of rocks) in terms of both self-serving teleology (it's good for the rocks somehow), and also social teleology (it serves a helpful purpose for certain animals). This tendency persists until age 8 and decreases thereafter. Kelemen calls this a "quasi-artifactual" attitude towards the natural world, which is to say, in

[5] In one of the few studies that directly compares categories of food with artifacts, both young children and macaque monkeys apply different inferential patterns when forced to generalize about the two, suggesting that food is not initially thought of as just another sort of artifact (Shutts, Condry, Santos, & Spelke, 2009).

present terms, that it is anthropic. Moreover, until around age 9, children are willing to assert that if a vacuum stops sucking up dirt, a cloud stops making rain, and a tree stops giving shade, then all three of them are "broken" and need to be replaced (DiYanni & Kelemen, 2005). They draw this inference slightly more often with artifacts, but nevertheless do so with both living and non-living natural kinds. The early presence of this promiscuous teleology suggests that the notion of function is initially applied widely and narrows with time. Another virtue of the theory of anthropic concepts is that it expands the range of phenomena that a complete model of teleological thinking needs to account for.

5. Anthropic realism

Thus far I have argued that many everyday concepts of natural categories are in fact anthropic. Moreover, the categories these concepts track constitute kinds insofar as they belong to causally and explanatorily interesting unities that share a significant set of inductively projectible qualities.[6] The existence of these causal unities is sufficient to warrant realism about anthropic kinds. I will adopt a defensive strategy in support of this claim, by aiming to rebut three possible objections to it.

First, one might object that the kinds in question are mind-dependent, and hence fail an important objectivity test for real kinds. Jadeite and nephrite, for instance, are grouped together under JADE only because they satisfy our practical intentions to work them in various ways.

[6] This is a weak notion of kindhood by some standards, but anything stronger would be question-begging. For instance, views on which kinds must share common microstructure are incompatible with anthropic concepts picking out kinds, since many such concepts are microstructure-insensitive. The same goes for views on which kinds require ahistorical and purpose-independent essences. Theories of kindhood need to go beyond merely the natural kinds in these senses.

But the fact that our concepts, intentions, and plans are implicated in singling out these categories does not show that they are not real. Our intentions to do certain things with chemical or mineral substances, or to use plants in various ways, can be satisfied only if those things have the causal features needed to do what we intend. The causal features that are picked out *interact* with our intentions and projects in certain ways, and these categories become salient to us in virtue of such interactions. But it is because they have their mind-independent causal properties that they are apt for exploitation in this way. So being picked out as suitable for a certain anthropic purpose is not an invidious form of mind-dependence (see Boyd, 1999 for extensive discussion of this point).

Second, one might object that these causal powers are merely parochial. They are of significance only because they relate to our species. More pointedly, they are relative to detailed culturally given needs and projects, as well as to the state of the relevant technology for manipulating and making things. This might also undercut the objectivity required of kinds. Even if they are not mind-dependent, they are still highly contextual. The properties that make them causally and inductively interesting are not the subject of universal laws or generalizations, but rather, at best, of generalizations having to do with how they interact with sociocultural groups at a particular point in history. Kinds, on the other hand, are supposed to have greater universality than this.

However, the notion of kind as it applies in many domains is similarly local (Millikan, 1999). Generalizations about biological mechanisms are one example—these are notoriously limited to particular historically delimited regions of space and time. Yet there may be real kinds of mechanisms in biology. Species themselves are a further example. If species count as biological kinds, they do so despite the fact that they have historical (and highly contingent)

defining properties. What it is to be a member of a particular species essentially involves reference to a particular location in history.

Similar relational kinds occur in ecology. The notion of a species' niche, or its evolutionary environment, are both relational notions that play a key explanatory role in ecological generalization and explanation. However, what counts as part of a niche or an environment is something that cannot be specified independently of the properties of the organism. Properties of environments cannot be specified independently of the capacities of creatures to interact with those environments in productive ways, and for those environments to help or hinder such creatures. Similar comments go for kinds such as *predator*, which can only be defined relative to an ecological backdrop of prey species. Anthropic kinds, then, can be at least as real as biological kinds such as species, niche, environment, predator, and so on. And this is not surprising, given that anthropic kinds are part of the same package of relationally constituted properties.

Finally, one might argue that because these kinds cross-classify the world relative to the epistemically better-grounded taxonomies of the sciences, they should be viewed as ultimately superficial. The principle here is something like this: where we have two candidate classificatory schemes, one of which permits much better modeling, theorizing, and induction, we should prefer the taxonomy implied by the better scheme. Our commonsense concepts and the anthropic kinds they pick out will thus forever be consigned to second-rate status relative to these better schemes.

This objection is often raised in the context of debates over ontological pluralism (Dupré, 1996; Ereshefsky, 1998; Ludwig, 2017) However, we should resist it. It is not relevant that there might somewhere be a better classificatory scheme available, since that is true of *every* scheme

we employ, including the ones in our best science. What matters is that these groupings serve the relevant ends for which they are posited. Since the ends of anthropic kinds are relatively modest, having to do with control and manipulation in local contexts of use, this bar is readily cleared. There is, then, no reason to consign anthropic categories to any sort of ontologically secondhand status relative to natural kinds.

6. Conclusions

The theory of anthropic concepts presented here unifies a robust set of phenomena involving how people conceptualize parts of nature. The motive to uncover natural kinds is deeply entrenched, and shouldn't be downplayed, but, as this discussion shows, it invariably co-exists with other projects. As an example, consider one nuanced description of life in the Yucatec Maya communities of Quintana Roo, where mastery of natural classification is often prized not just for its own sake, but also as a source of prestige, for how it can help position individuals socially, and for how it can help facilitate practical needs like hunting, as well as for satisfying sheer curiosity and alleviating boredom (Anderson & Tzuc, 2005, p. 112). The Maya attitude is "indeterminate" (p. 100) between a utilitarian and an objective classificatory scheme: "[c]lassification is a social construction, but one that must take account of real natural differences if it is to be of any use at all" (p. 101). This is precisely the balance that an anthropic account aims to strike.

Anthropic conceptual schemes, then, can co-exist with those organized by natural kind concepts. The anthropic image of the world depicts it as stained, marked, and inscribed with human purposes, but not simply *made* by those purposes. While the natural kinds are creatures of the various sciences, anthropic concepts are connected with craft, manufacture, cultivation,

commerce, and practical activities more generally. Insofar as these concepts are linked with successful activities, realism about the kinds that they pick out is both warranted and consistent with our attempts to sharpen the worldviews given to us by science and everyday life.

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