With Enemies Like These, I Don't Need Friends: Words, Concepts and Entities

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ABSTRACT

A number of clarifications and some corrections are made of the target article. I clarify which concepts the thesis was intended to be about, what "descriptionism" means, the difference between "concepts" and "conceptions", why extensions are not determined by conceptions. I make clearer what "substances" are, how one knows what inductions to project over them, the connection with "basic level categories", how it is determined what substance a given substance concept is of, how equivocation in concepts occurs and the role of language in conception of substances. Finally, I make clearer exactly why I said that concepts of individuals, real kinds and stuffs "have a common structure", showing that, rightly understood, this view is not in conflict with data on infant concepts.

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Writing a paper for people in other fields and trying to interpret their reactions is a deep study in communication. There is a quip in Italian, "With friends like you, I don't need enemies." A number of excellent commentaries evoke the converse of this thought (e.g., Boyer, Müller and Kelter, much of Keil, last paragraph of Waxman and Thompson), treating as objections claims or suggestions I had tried to make myself. Then there is warmly proclaimed agreement that I don't completely understand (ter Meulen). And there are the very many objections based on misunderstandings of what I anyway intended, whatever I managed to say. Indeed, disappointing perhaps to those spoiling for a fight, there is not all that much here with which I fully disagree. And happily, in the midst of all this communicative confusion, very many of the right substantive questions seem to me to have been raised, offering an invaluable opportunity to clarify and extend my thought as well as my exposition. I am grateful to the commentators and grateful for the BBS medium.

I will begin with clarifications that concern the general project of the target essay, and some of the terminology. Then I will take up more specific issues.

I. The Overall Program and some Comments on Terminology

In Philosophical Investigations, Wittgenstein said, "Think of the tools in a toolbox: there is a hammer, pliers, a saw, a screwdriver, a glue pot, nails and screwsSSThe functions of words are as diverse as the functions of these objects" (para. 11). There is a use of the word "concept," indeed, Wittgenstein helped to found this tradition, that equates a "concept" with whatever it is you have to learn in order to use a certain word correctly. So we can talk of the concept or and the concept of and the concept hurrah and the concept the and also the concepts because, and necessarily, and ouch, and good and true and two and exists and is. You can do that, but then remember Wittgenstein's warning. There will be little or nothing to be said in common about any two of these various "concepts". You mustn't expect a theory of how the tape measure works to double as a theory of how the glue works.

I have proposed a thesis about the nature of one and only one kind of concept, namely, concepts of what I have called "substances." It is legitimate to ask me to be more exact about what I mean by a "substance", as van Brakel, Carlson, Nelson, and Mandler (my "natural units in nature" are substances) have done. But it is not legitimate to ask me about any other kinds of concepts (Hauser and Fitch, Hampton, Nelson, Perner). (Allen has other work of mine in mind where I make more general claims about empirical concepts. I am sorry there is not room to explore those issues here.) By no means am I claiming that all concepts are substance concepts, hence not claiming, for example, that no concepts are classifying concepts (Gauker). But I will try later to explain some relations I think substances and substance concepts have to some other ontological categories and some other psychological abilities. The world and thought are both vastly complicated. There is no Gordian knot waiting to be cut.

Equally important, the theory of substance concepts that I have proposed is not

in the first instance about words for substances (Murphy, Mandler, Schröder, Franks and Brainsby). Rather, it belongs to the theory of cognition, in exactly the same way that theories of perception do. Thus Colin Allen rightly asks about the substance concepts that language less animals have, and Cangelosi and Domenico would supply even computers with substance concepts. A reasonable comparison might be between the proposal made here and David Marr's proposed first level of analysis in the theory of vision. I have attempted a task analysis for substance concepts, a description of what their function is, why we need to have them. Marr claimed (rightly or wrongly) that the task of vision is to construct representations of three dimensional objects starting from retinal images. I claim that the task of substance concepts is to enable us to reidentify substances in such a way that we can accumulate practical skills and theoretical knowledge about them and use what we have learned. I identify a substance concept with such an ability. (An ability is not a process, incidentally, though of course abilities are usually implemented through processesSSKomatsu.) Perhaps this ability will be best understood as equaling the ability appropriately to token and process or use a mental word such that it thereby constitutes the thought, a representation, of a substance (re: Gauker, Komatsu, Mandler), or perhaps some less harsh image of representation than mental words is more suitable (see "Images of Identity", Millikan 1997.) (What kind of entity does Mandler take a "concept" to be?) A mental representation is a representation at all, and a representation of this rather than that, because of its function. It is concerning the functions of mental representations of substances, hence concerning what it is that makes them be representations of substances, that I have made my initial claims.

This claim is on (something like) Marr's first level of analysis. To fill in the higher levels of analysis is a job primarily for psychologists: how do we manage to perform this conceptual task and what are the details of the development of this sort of skill? I take it that all of the traditional work in experimental psychology on substance concepts has implicitly been addressed to these higher levels, but that work on these levels should be interpreted and given direction in the light of an understanding of the function of substance concepts. I have made some tentative suggestions about how to do this.

An important one of these suggestions (as ter Meulen notes) is that, typically, multiple means are used conjointly and alternatively for identifying any given substance. This gives rise to the distinction between a "concept" and a "conception". The conception one has of a substance is the ways one knows to identify that substance plus the disposition to project certain kinds of invariances rather than others from one's experiences with it. I take it that what psychologists have typically studied is "conceptions" in this senseSSthe conceptions that people have of substancesSSand that this is exactly what they should be studying. The fear that I am advocating the general abandonment of traditional ways of studying concepts (conceptions) is not warranted (Hampton, Murphy, Schröder, Keil). Nor is there a "paradox that what people know does not count as meaning" (Murphy). Without conceptions no substances would be conceived of; "conception" is one of the things that "meaning" means. On the other hand, in so far as it has traditionally been assumed that for each thing that might be conceived of or meant there corresponds but one possible conception (in my defined sense), or that for each univocal word in a language there corresponds just one

conception, I am disagreeing. There is no such thing as "the" conception of a substance nor as "the" conception that corresponds to a public language term for a substance. Different people competently speaking the same language may have quite differentSSindeed, non-overlappingSSconceptions corresponding to the same substance term, and a single person may have quite different conceptions corresponding to the same substance at different times. (Certainly I am not saying there is no such thing as conceptual change, change in conceptionsSSKeil) This is why I say we should not be seduced into disputes about "what gets to count as 'knowing the meaning'" of a certain substance term (Nelson, Murphy). And this is one of the reasons why the "content of concepts varies according to context and pragmatic constraints" (Franks and Brainsby; compare also Schröder).

An embarrassment in terminology results from this divergence from a more traditional position, however. What I am calling a "conception" is in many ways much like what tradition has called a "concept". But then tradition speaks of "the..." not of "a...concept dog," and I think this is wrong if what is meant is a conception. I reserve the term "concept" then for what we do have only one of per person per substance, and only one of per word for a substance, namely, for abilities to recognize these substances and to know something of their potential for inductive use (Murphy). Or, since these abilities are what lend thoughts of substances their referential content, their representational values, we can also think of substance concepts as corresponding to mental representations of substances, say, to mental words for substances <u>but</u> <u>qua meaningful</u> *[copy editor: please leave that underlining in place]* (Komatsu, Gauker).

"Descriptionism" is another word that has caused trouble (Hampton, Hauser and Fitch, Keil, Komatsu, Mandler). Some commentators seem to have assimilated my central claim against descriptionism to my quite independent claim that it is possible to identify substances without using mental descriptions of them, without employing prior concepts of properties, and/or to my claim that recognizing a substance, even such a substance as mouse(kind), is not mentally describing something. Perhaps because of this assimilation, some thought that I was also claiming that substances are never identified by means of knowing descriptions of them. I am not certain exactly to which of these assimilations to attribute which problems seen by which of the above authors, but let me clarify my position on each of these points (but in reverse order).

Gopnik, and also Xu, Tenenbaum and Sorrentino, have my position exactly right that early tracking mechanisms tend eventually to be replaced, certainly to be supplemented, by others (I no longer recognize my mother by smell) and may eventually be almost entirely determined by beliefs about the ontological structure of the world and, more mundanely, by beliefs about what <u>properties</u> tend to be diagnostic of what substances. (See also Murphy, and Hauser and Fitch.) Conceptual tracking is not equated with perceptual tracking (Blum?); ""reidentification" is not, in general, "cognitively impenetrable" (Komatsu); and certainly it is not claimed that infants recognize instances of kinds because they "look alike" (Mandler). It is just that some fundamental kinds of conceptual tracking begin with tracking perceptually, especially, by recognizing object and property constancy. But I also take it, for example, that the

disposition to make an explicit inference from "the stuff has gone green" to "there's copper in it" (Quine 1960) constitutes a paradigm conception of copper that helps to effect the conceptual tracking of that substance. Recall my reference to the tool bag of tricks used by the chemist.

That recognizing a substance as such is not describing or classifying something follows from the claim that a substance does not equal merely a set of properties, nor is the concept of a substance shorthand for a set of concepts of properties. But "does not equal" does not of course imply "has no connection with." Recognizing Mama by smell certainly is not classifying her nor is it conceiving of her as whatever bears that smell. More accurate to imagine it as a tokening of the mental term "Mama" in response to a smell. The thought is of Mama, not of smells, but it arises in response to a smell. Similarly, recognizing copper by the fact that the stuff has gone green is not conceiving of it as being, just, a green turning thing. One tokens a mental term for copper in response to the knowledge it has gone green. What makes it a mental term for copper is, roughly, that it serves as a repository for incoming information about copper and that its tokenings are controlled by previous experience with copper including explicit knowledge previously gained about copper.

In claiming that substances can be identified without necessarily employing prior mental descriptions (concepts of properties) (Allen, Hauser and Fitch, Hampton) I assumed that a property concept would involves more than the property's causing a difference to one's generalized response dispositions. In support, see MacLennan's very instructive commentary on the neurological primacy of the concrete. (Müller and Kelter will like this too, re: how "attributes are 'constructed'".) I had in mind that concepts of properties would involve representations of properties, which would imply the capacity to recombine these properties in thought with other subjects. Certainly a mere response to a presented property, such as a discriminating reflex response, requires no concepts (Murphy).

But none of these claims was what I had in mind in rejecting "descriptionism." The descriptionist holds that the conception one has of a substance determines its extension. That is, the methods one uses for reidentifying, for determining applications of a substance concept, determines what the concept is of. I am fully in charge of the extensions of my substance concepts; whatever I am disposed to apply them to is what they are concepts of. I called this view "decriptionism" since the extant views of substance concepts in the psychological literature uniformly take the conceptions we have of substances to be governed by descriptions. But since I spent considerable time arguing that certain of our most basic conceptions of substances are not governed by descriptions, this was inaccurate and misleading terminology. For I intended, equally, that conceptions of substances based merely on abilities to track them perceptually do not determine the extensions of those substances either. This is my "externalism".

Franks and Brainsby are mistaken that I use Putnam-Kripke style "counterfactual" arguments to defend my externalism. As ter Meulen remarks, I eschew possible world semantics and the Kripke interpretation of rigid designation. And as Gopnik remarks, I am not advocating an "internalist psychological essentialism". That is, it is not my claim that substance concepts have the extensions they do because that is how people intend or believe them to refer, or because that is the way people

proceed with the usage of words for substances. Slater has asked exactly the right question here, wanting to know exactly what then, since not the thinker's intentions, makes it the case that the reference of substance terms is determined as I say?

The answer is that it is not the purposes of individuals but the biological functions of their inborn concept-tuning mechanisms that connects their substance concepts with certain extensions. No one supposes that the function of vision is determined by the intentions of the individuals who happen to have eyes. Similarly, the function of substance concepts is not determined by the intentions or dispositions of individuals who happen to have them. I have proposed a theory telling what the function of substance concepts is. It is their job to make contact with substances as these are objectively defined in nature. Only in so far as they manage to do this can they help us to proceed with successful inductions. You can call whatever a certain conception happens to corral part of its "extension" if you like. But then "extension" becomes a notion with very little interest, and we will need to coin another term for the thing it was the real purpose of the conception to capture. A parallel would be to label whatever a frog happens to snap up with its tongue reflexSSsay, a BeebeSSas one of its "prey," and then have to coin another term to designate the things its reflex snap was designed to capture.

Franks and Brainsby are right, however, that under stress, words can vacillate between continuing to be names for substances and taking on a more classificatory function. See also Carlson. (More on this soon.) They are also right, of course, to ask about the old chestnuts, empty names and informative identity statements. I refer them to (Millikan 1984 chapter 12, 1993 chapter 14, 1997).

Gopnik and Schröder suggest that the interest displayed here in biological function or evolutionary purpose rather than current dispositions of the thinker may be irrelevant to psychological explanation. This opens a well known can of worms about what it is psychology's job to explain. I discuss the issues fully in (Millikan 1993, especially chapters 7, 8 and 9), arguing for a widely ecological psychology that understands itself as a branch of biology, where the central concept is function understood as determined by natural selection.

Another confusing term seems to have been "pointing", which was taken by a number of commentators far more literally than I intended. "Pointing" is a metaphor having nothing to do with ostentation (Nelson, Franks and Brainsby), and not implying inarticulateness or lack of descriptive "content" in the conception that does the pointing (Keil). Nor are substance concepts literally "indexical"SSthat was a rather unfortunate metaphor of Putnam's. The idea is just that the relation of the conception to the extension of the concept is not a logical one but, in the broad sense, historical. It is a causal-order relation, a relation in the actual space-time world. (Xu, Tenenbaum and Sorrentino have asked, if I understand them correctly, well, <u>precisely</u> <u>what</u> relation? I will get to that.)

II. <u>What</u> <u>are</u> <u>Substances?:</u> <u>the</u> <u>Ontology</u>

The ontology is supported by arguments in (Millikan 1984, chapters 14-17). Here I make only assertions.

There is not one set of ontological "elements", one unique way of carving the ontology of the world, but a variety of basic patterns to be discovered there. The

category of substances, as I have defined it, is at root an epistemological category, and Ghiselin is quite right that it cuts straight across many more familiar distinctions in ontology. All that is required for an entity to be a substance is that it can be encountered on different occasions and that it remain invariant in certain respects over these encounters not by accident but for a cause or reason, that is, in accordance with some kind of natural necessity. Beethoven's Fifth has many properties that are more or less the same from performance to performance (you can recognize it and know what is coming next), places have properties many of which remain the same over time, dinnertime and siesta time have pretty definite properties in many cultures, war has certain properties that remain the same over the ages, squares and cubes of material are things one can learn to recognize and learn a number of stable things about such as how they fit together, how they balance, that their sides, angles and diagonals are equal, and so forth. As Cangelosi and Parisi remark (correcting me) white gets dirty easily and, I now add, shows up easily in dim light, stays cool in sunlight but also tends to blind us, and forth. (Note the naturalness of noun forms here: "a square", "a cube", "white gets...".) (It is not so clear that individual events or processes can be understood as substancesSSGhiselin, NelsonSSalthough one can of course encounter the same event from various perspectives, for example, filtered through the medium of records made in various humans' memories or other recording media.) What makes a substance a substance is that it can be appropriated by cognition for the grounded, not accidental, running of inductions, or projecting of invariants. This will be possible in different cases for very different reasons, due to very different sorts of causes, which is, of course, exactly what interests me about substances. It is their variety, considered from other ontological perspectives, that makes it easy to overlook their similarity relative to the project of cognition.

Ghiselin objects to my treating biological species as kinds rather than individuals, thus "concealing" the fundamentally different causes of the properties held in common by members of species and members of natural kinds: "laws of nature on the one hand and history on the other". I say bravo to the distinction, which I have generalized in (Millikan forthcoming) where I discuss "historical kinds" as indeed special, important and neglected. The majority of our everyday substance kinds are historical kinds, their members being alike, typically, not because of some common inner essence, but in part because some form of copying has been going on in what is, relevantly, the same ongoing historical environment: Beethoven's Fifth, architectural kinds, living species, social kinds, professional kinds, the most common artifact kinds, automobile models, and so forth (Murphy, Nelson). (For Nelson: that is how doctors constitute a real kind. They are an actual-world group, not a set of possible properties in a set of possible worlds. That is why their attitudes and practices can be studied empirically.) But that a distinction is important in many contexts does not show that a similarity is not important in others. Natural kinds, historical kinds, stuffs and individuals are very different indeed, but they also have something in common.

Substances vary greatly both in the number of inductions they support, and in the reliability of these inductions. (The latter gives rise, I suppose, to typicality effects. It seems natural that people should work with a stereotype taken from knowledge of the most stable properties of substances when asked to describe the substance, in making

guesses about category membership, when asked to make inferences about unobserved members, and so forthSSSchröder.) Thus there is no line between what is and what is not a substance. Rather, some things are, as it were, better substances than others, some are worth understanding as substances, others are too marginal or uninteresting (Müller and Kelter, van Brakel, Cangelosi and Parisi, Nelson). What holds a substance together, making it more than a mere set of similar items or encounters, is that the uniformity of its properties over encounters is not a coincidence. There is a reason why different encounters with the substance yield results as uniform as they do. But many substances have vague boundaries, indeed, some shade at the edges, in one or more dimensions, into other substances. Then the concepts (and words) that denote them may be equally vague. White shades into black and water shades into mud; these substances have natural paradigms, not natural boundaries. It does not follow you cannot learn stable things about each. When is it really a war? Who is really a member of the working class? In the latter cases, the principle or principles that cause or tend to cause the members to be alike catch up some members more squarely than others.

But the interesting question is not so much which are the substances, but what is it for something, rightly or wrongly, productively or unproductively, to be understood as a substance? Red sulphur is not just sulphur that is red, but an allotrope of sulphur with its own suite of properties different from other forms of sulphur. (Müller and Kelter: compare bearded women.) One might, however, have a merely classifying concept of red sulphur, capturing exactly the same extension, understanding it just as sulphur that is also red. Alternatively, one might have a concept of red sulphur as a substance but without knowing either that it was always red or that it was a form of sulphur. One might use quite other means to identify this same substance. Concepts that classify are analytical concepts. They are composed of conjunctions (or disjunctions or other functions) of prior concepts. Substance concepts are synthetical. They may rest wholly or in part on prior concepts used in the process of identifying, but they are not equivalent to any mere function of prior concepts. The substance concept is distinguished by the role it is ready to play, accumulating additional means of identification, and anticipating certain kinds of inductions as likely to hold. (For Hauser and Fitch: this is one reason ants don't have substance concepts of dead ants. But mother Vervets may well have substance concepts of their infants.) It is as if a substance concept made an inarticulate claim that there is some substance out there it is hooked into.

Identifying and classifying are different things to do and they have different purposes (see the target article). Still, concepts can be partly identificatory and partly classificatory, or they can vacillate between these two functions. Any substance concept or term can be used for classificatory purposes, and where substance boundaries are vague in nature, the purposes of classification may be served by drawing artificial boundaries around the extensions of these substances. For certain purposes, what counts as war and what counts as the working class may be quite sharply but artificially defined. Also, when confidence is lost in the reality of a substance or in the univocity of a substance term, it may begin to be used in a strictly classificatory way (Franks and Brainsby, Carlson). This is one reason not to attempt a

list of words for substances (von Brakel, Nelson).

III. Substance Templates

A substance concept anticipates the validity of certain kinds of inductions. But how can one know ahead of time what kinds of inductions may hold? How does the child know, for example, to expect different constancies in a new uncle and a new piece of furniture (target article)? This must be done by having a grasp of more general categories within which substances can fall, the member substances having determinables in common. Determinables are not (determinate) properties like red or square, but rather disjunctions of contrary properties like colored (equals red or blue or green or...), and shaped (equals square or triangular or circular or...). Call categories of substances that correspond in this way to sets of determinables "substance templates". Possibly Physical object is a pure substance template. To be a physical object in the broadest sense, a thing need have no particular determinate properties, but it has to have some mass, some position and velocity at each time, some extension, some charge. But with rare exceptions, concepts of substance templates are not pure. They capture substances that bring substance templates with them.

Animal and vehicle are such substances (Mandler). There is very little to be learned about either of these classes as such. What is most interesting about animals, for example, is that they divide into species, and that roughly the same sorts of questions can be asked about each of these species, and answered once and for all after one or a few observations. The main interest of the category animal is as a substance template. Since animal is not something there is much to find out about, there also is not much to say about it, and it is not surprising that the word "animal" enters the child's vocabulary rather late. But since recognizing the substance template animal is crucial to learning about the various species of animals, it is equally unsurprising that animals might be recognized as such very early, indeed, as Boyer suggests, the ability conceptually to track animals may have a strong boost from endogenous factors. As Xu, Tenenbaum and Sorrentino suggest, however, there is no reason to suppose that the infant's differential response to animals indicates a substance concept of animal, no reason to suppose the infant is busy collecting information about the character of animals as such. (For Boyer: the "understanding that is not necessary to having the concept of a substance" is an explicit theory about what holds the substance together.)

A grasp of rough substance templates is a prerequisite to having genuine substance concepts. That is the requirement on substance concepts that one have an idea what to use them for (target article). Paradigm substances are those that fall squarely under rich substance templates, such as animal, mineral, vegetable, and vehicle (for real kinds) and person (for individuals). Within each of these categories it is easy to find many substances, for each of which much the same questions can be asked: how big does it grow, how does it move, what organs are inside, or what is its melting point, does it burn, how hard is it, how dense is it, does it corrode, does it conduct, or what is it like inside, where does it grow, is it edibleSSand so forth. I intended agreement here with Boyers that we may have built into us ways of conceptually tracking in a variety of different substance template domains, a boost toward conceptual tracking in each as well as a boost toward knowing why to bother

tracking. (That a particular method of conceptual tracking is always used for some particular purpose is what Müller and Kelter seem to have missed, plus the claim that boosts of the kind Boyers suggests must be built in.)

Real kinds nearly invariably bring with them substance templates covering their various members. Thus the ability to identify cats is easily applied to discovering what sorts of questions can be asked about individual cats. What color is this cat (it won't change as with chameleons), is it tame or wild (not applicable to flies), and does it have feline leukemia or a loud purr (not applicable to dogs)? For Slater: if "me" conceived as a substance begins with perceiving my body, then there is no particular problem about how a self concept begins. It rides on grasp of the substance template for persons, who are tracked in the first instance by their bodies. The peculiarity is only how I recognize certain "inner" properties, since I have such a peculiar perspective on them. (I think I was wrong in (Millikan 1984) that perceptual representations are indexical.)

IV. Basic Level Categories?

Making reference to the notion "basic level categories" in the target article was a mistake (though van Brakel may be less embarrassed to note that I gave references on the cross-cultural claims). Certainly I did not mean they are the only substances (Carlson), or that they are fundamentally different from other substances in some way (Komatsu). Nor was I thinking of basic-level categories as defined by "where perceptual similarity among exemplars is high" (Mandler), but had in mind more what Komatsu says about them. I was trying to make contact with current psychological terminology and theory, but Komatsu's question shows how I failed. Hereby do I disclaim any opinion about why certain substance categories tend to be learned first cross-culturally. There may well be different reasons for different ones. Also, as noted above, there is reason to think that the most important substance template categories a child knows have no cause to manifest themselves in early speech. But more important, Komatsu is right that the transition from thinking of all categories as classifiers to recognizing that many name substances radically challenges the more traditional framework in which many have theorized about "basic-level" categories, the framework that posits a "horizontal" and a "vertical" level of kind distinctions.

This traditional framework assumes a hierarchial structure among categories, so that they form a logical tree. This framework, the doctrine of "real definition", or of natural ordering, by genus and differentia, originated with Aristotle (which may be the best reason to believe it). Tree structure is what a good classification system must have, but it is not the structure of the logical space of substances nor of most if any sub-spaces of this space.

Consider stuffs on the one hand and people on the other. Clearly there is no way to hang these on the same logical tree. They are neither beside one another (horizontal) under some higher substance, nor is one included in the other (vertical), nor is there some more inclusive substance covering them both. (Aristotle might have said they are both subsumed under substance and under Being, but substance is not a substance and neither is Being.) When we look within domains rather than across them, matters are no tidier. Susan is a mother and a professor and a diabetic. Each of these is a rough substance category, but there is no logical tree on which they all hang. Heated modern debates among biologists about principles of classification (phenetics,

cladistics, evolutionary classification) reflect exactly this: there is no way to organize the substances that are of interest to the zoologist or botanist into a single hierarchy above the level of species, and in certain subdomains, even that level is problematic. The demand for biological taxonomy to settle on a single hierarchy is of course quite rational. A good classification system is needed for information storage and retrieval among the various biologists. The actual systems of classification used by biologists are compromises between good classification and respect for natural substance boundaries (Compare Mayr 1981). In the natural domain of substances there is a confusing crisscrossing, every which way. On the other hand, the existence of real kinds that bring with them substance templates for their members does indeed impose a degree of hierarchy and order on the domain of substances.

Komatsu speaks of "sacrificing inductive richness" and of "variation in number of inferences supported" as one moves up a classification hierarchy to more inclusive categories. Indeed, categories lower down have all the properties of those above plus more, so there is more that is true of them, but how does this make them more "inductively rich"? Two different dimensions of induction are relevant here. There is the question how many inductions, if I knew to venture them, would yield correct conclusions, and there is the question, how many do I know to venture? The more interesting question of inductive potential concerns how many determinables you know you can find stable values for, not how many stable properties the substance actually has. Hence the good substances are the ones for which there are rich, known, substance templates, for example, the chemical elements and compounds, the various living species, and also individual members of these species and most ordinary individual physical objects. These are things we know how to learn about without wasting time on dozens of observations verifying the stability of each trait. If one were to recognize only the lowest level substances, say, only the individual animals or only the species, although it is true that these have the greatest number of properties, learning about these properties would be a hopelessly inefficient process. One would have to start all over with each individual object or species, exploring its individual features, with no contribution from prior knowledge of higher substances, either about its properties or its relevant determinables. The question, which level of categories are inductively the most fertile, appears not to be a well-formed question.

V. Concept Individuation (Xu et al) and Focusing Reference (Perner)

There are multitudes of crisscrossing substances, very many more, surely, than we have ideas of. The ones that are picked up by thought and by language are those that have properties of interest to us (Livingston, Müller and Kelter, Mandler on the "meaning" of concepts), but that they are interesting does nothing, of course, to make their status as substances less than fully objective (Livingston is lucid on this). The need for conceptual choice from among the multiplicity of substances does introduce another problem, however. If the substance I am thinking of is not distinguished by my having a disposition to track it correctly, if I can make mistakes in tracking, what exactly does determine or "individuate" what substance my concept is of (Xu, Tenenbaum and Sorrentino)?

Many believe that what a substance concept is of is determined by what fits the features or properties one represents it as having. Any more direct route from the mind

to the substance would be mysterious. But what determines what features or properties are the ones one is representing? Surely no one is infallible at recognizing properties either, so how can prior thoughts of properties help us out here? A standard reply is that we recognize properties infallibly "in normal conditions". How then do we define "normal conditions", such that they are, for example, appropriately different for seeing the shapes of big things like mountains and the shapes of small things like fleas, appropriately different for hearing loud sounds and soft, and different for hearing sounds and for seeing colors and for tasting foods, and so forth (consider how tea tasters prepare themselves)? We must take care that "normal conditions" do not turn out, just, to be the conditions under which one perceives each of these various properties correctly, for that would be marching in place. On the other hand, if there is some non-circular way of defining "normal conditions" for perceptions of various properties, why can't we use the same technique to define "normal conditions" for the tracking of substances? The two problems are parallel.

Now biologists are usually concerned, first, to understand normal function. They may be interested in disease or other abnormal functions, too, but these are defined relative to normal function. I take it that normal function itself, in this context, is best defined relative to a history of natural selection (Millikan 1984 chapters 1 and 2, 1993 chapters 1 and 2), but you supply your own favorite theory of normal function if you have one and it will serve the argument as well. My claim is that cognitive psychologists too are, or should be, interested in normal function. But for the most part, biological items require to be in certain conditions in order to perform normally. My preference is also to define normal conditions relative to selectionist history, as conditions under which that function was performed historically such as to be selected for (Millikan 1984,1993), but if you have a better definition, I have no objection. The point is that if we can give a definition of normal biological function and normal conditions for performance of this or that function, we can apply it also to performance of psychological functions, such as the development of substance concepts and their application.

Grant then that there is a normal way or normal ways for development of substance concepts to occur (perhaps different for different substance domains). That is, grant that normal developmental psychology is a viable field. There will be a normal way or ways that the child or adult first recognizes the manifestations of a substance impinging on their perceptual organs, a normal way that they attempt to track that substance, normal conditions for their success in tracking and for their success in building conceptions adequate to it. There will also be normal conditions for application of the concept so built, these being described, in part, relative to the conditions in which the concept was built. When everything goes exactly, then, there will be no question what the concept is of, even if there is a disposition to apply it incorrectly in conditions abnormal (specifically) for it. The problems arise when things do not go exactly, when they deviate from the ideal.

Biological items, in general, are defined relative to an ideal. A diseased or damaged or malformed heart is a heart none the less because of the relations it has to hearts that perform normally. Once again, I leave you to define that relation yourself, or adopt the one I describe in (Millikan 1984 chapter 1). The important point here is that,

having described how normal hearts are structured and how they function, it is of no interest to biologists how far away from that ideal a thing has to be before one stops calling it a "heart." There are no exact borders of the substance heart in nature, and the biologist is concerned with nature. Similarly, I suggest, to press the question, in sufficiently abnormal cases, "But please, really, what is the referent of this person's substance concept?" is useless.

On the other hand, there may be common and interesting abnormalities, divergences from the ideal, that are well worth studying. An obvious one is a substance concept that hovers between two or more substances, each of which played part of the role normal for development of a concept but unfortunately got mixed together. Indeed, it is likely that normal development of many kinds of concepts involves a process of differentiating between substances originally confused togetherSSPerner says, a process of "focusing reference". It is tempting to interpret much of the history of science as an attempt to focus reference, for example, distinguishing weight from mass and oxygen from other oxidizers. Where referential concepts have unfocused references they are equivocal. For example, if I should have twins confused together in my mind, thinking there is only one person out there not two, my concept would be equivocal. I see no reason to suppose, however, that disambiguating my concept would require that I focus on some one specific set of features defining each twin (Perner).

For Xu, Tenenbaum and Sorrentino, and Allen: does what my concept is of have to be any more "empirically viable" than whether I am really remembering something? Answers to both questions are objective but rooted in the past. For Allen: assuming that baby vervet monkeys are designed by natural selection to develop, specifically, certain predator calls, then there is no ambiguity in the baby vervet's inept call. It is an immature signal for predators.

VI. Words and the Depth of Perception

Learning words for substances is in part a matter of focusing reference. Substances are tracked through words and also in other ways. If a subject of information that arrives through language, tracked by a word manifesting it, is then merged under the same concept with some different subject of information arriving through other perceptual media, there will be equivocation in the resulting concept. We say in such cases that the person does not know the meaning of the word. The case would be exactly similar, however, had they mixed a person known to them only through phone calls with someone else known from glimpses at the beach. One could just as well say, using the same sense of "meaning", that they did not know the meaning of the voice over the phone. Thus Ghiselin's child who calls the whole genus Felis by the name of "kitty" does not yet know the meaning of "kitty", but it also has an equivocal concept. The child's word "kitty" hovers between referring to felines generally and house cats specifically. The child will be putting all information gleaned through language and specific to house cats in the same bin as information gleaned about tigers and lions at the zoo. I think that what Keil intended to say (!) was that one can intend to refer to something completely different from that to which one actually refers? The paradigm case, I believe, would be where one's concept was very strongly and clearly channeled outside of the linguistic medium to something other than what one's

word generally carries information about in the public language. Still, there is a bit of ambiguity in such word usage, so long as the speaker is ready to confuse information gathered via the word with information about his outside referentSSso long, that is, as he didn't just misspeak.

Ghiselin's child's conception of "kitty" is equivocal because part of it is channeled through the method of tracking that is understanding language. Because it is possible for a conception to be channeled completely through this method of tracking, it is possible to have a substance concept through nothing but a word plus a grasp of its substance template and enough relevant grammar. Perner finds this unintuitive, and I sympathize. But my point is that filling out the concept into a more and more adequate one happens in degrees. There is no special thing that gets added at some later point that suddenly makes it into a "real concept". It can be filled out more; it can get better and better. But there is no magic moment when it has attained some essence required for true conceptpthood. That, as Perner notes, is what caused the analytic/synthetic distinction to die.

I did not at all mean to suggest that "language serves as just another source of evidence about objects and object categories" (Waxman). I take it that new words serve in huge numbers as seed crystals around which fuller concepts are then quickly formed. That is why poor Helen Keller was, as she later described it, pretty much unable to <u>think</u> until Sullivan taught her some language. And it is why there can be such differences between the concepts available in cultures not historically related.

The view of language proposed is quite different from Kripke's "causal chain of reference borrowing" (Franks and Brainsby) and quite different from the view that children or anyone else takes out loans on concepts knowing there are experts out there to pay up (Keil). Both these images have someone out there who "really" has the concept while the rest of us don't. But even if we soften this just to the claim that some people out there have (or hadSSconsider our concept of Socrates) the concept in a way that was different because focused without any reliance on public language, still the image is wrong. Thus Gauker wants to know how the "very content of a person's thought" could "depend on aspects of usage that person has not personally detected," and Hauser and Fitch have me supposing that "language provides a medium for conceptual exchange." No. Let me try it again.

The child comes into the world without any knowledge of how minds work, any knowledge of what goes on inside people when they speak. (Indeed, we ourselves seem to be a bit short on such knowledge). For the child, language serves simply as another medium through which to perceive the world, just as the child perceives the world through its eyes without knowing anything about light, and through its sense of touch and smell without knowing anything about physical forces or chemicals. (Keil asserts that language does not transmit structural isomorphisms. Wittgenstein argued that it does. Compositional semantics assumes that it does. Keil's argument?)

How can that be, you may say, since Mamma's words are right here while the dog she talks about is way over there? Well, how do you perceive yourself in the mirror? What's funny about language, I have said, is that it does not show your relation at all to the things you perceive through it. How can that be, you say, since a lot of what is said may not be true. Well, in water, oars look bent and the reflections of the trees

show them moving in ripples. Gendler objects that "I'm dying" uttered by a laughing 8 year old does not present "the appearance" that someone is dying. Of course one is not tempted to believe it, nor is one tempted to believe the oars are bent in the water.

But the main barrier lies here. The philosophical tradition, and the psychological tradition following after, resolutely hold that for each of the physical senses there is just one layer of the world that it perceives directly; all other layers are known only through inference. This is the premise I am denying. There is no single "given" layer of perception (again, see MacLennan). What you perceive depends on where you focus your mind.

So my answer to Scharer is that it is neither words nor phoneme strings nor sounds that the young child perceives when it is learning language. It is, in the first instance, the world. (Nor do children learn many words by ostentation. They learn them by hearing complete sentences containing themSSe.g., Gleitman 1990, Pinker 1994, Grimshaw 1994). For Mandler: I don't believe there is any such thing as a layer of "perceptual properties", and certainly there is no such thing as a "perceptual category". For Gendler: the opposite side of the coin of their being no perceptual level of givenness is that all levels of perception are "theory laden", that is, fallibleSSthough "theory" is not spelled here in traditional 20th century empiricist terms. There is no necessary involvement of deductive inference norms or inference dispositions in this kind of "theory".

VII. A Common Structure for Concepts of Substances?

As I interpret Blum, Keil and Schröder, all require a clearer statement on what "common structure" I intend.

First, let me be clear that my thesis is not Quine's. Quine thinks that language both inspires and creates the principles that "individuate" the various substances. I think neither of these things. I used Quine's words "more mama" in describing the child's thought of its mother. I should have just said "Mama again", for whatever Quine had in mind, I certainly did not intend that the child cannot differentiate between individual objects and stuffs, and certainly did not intend that the child thinks individuals are stuffs! Begin with this comparison. The child differentiates between dogs and cats, but it does not follow that his concepts of these don't have a common structure. The child differentiates between animals and vehicles, but it does not follow that his concepts of things in these two domains don't have a common structure. Similarly, the child differentiates among individuals, stuffs and real kinds, but it does not follow that his concepts of things in these domains do not have a common structure. What counts as a common structure obviously depends on your interests.

So what was the point of my title? The fact is that tradition has implicitly claimed there is nothing common to the structures of concepts of individuals, kinds, and stuffs (let alone of "here's Beethoven's 5th again" and "here's white again".) I am claiming that the most important fact about the structure of each of these concepts (in so far as it operates as a substance concept) is something they all have in common. Namely, each contains some means or other of tracking its appointed substance and a grasp of how to project some of the invariants defining this substance to new encounters with it. This is the most important fact about the structure of these concepts because it defines their function, explains what we have them for. Moreover, I am claiming, against a long

tradition at least in philosophy (this is an interdisciplinary journal), that "explicit understanding of the ontological principles that ground substance tracking" definitely is not "needed for a substance concept"(Keil). (Ghiselin: notice that it was not until very recently that anyone had an explicit understanding of the ontological principles that ground tracking of the various biological species, and we still don't have many details in the case, for example, of asexual animals and easily hybridized plants.) Thus I claimed that the concepts of individuals, of real kinds and of stuffs do not have to differ from one another in the way many have assumed is essential.

We can contrast these similarities among substance concepts with some very important differences (Blum). There are two important dimensions to any substance concept, first, a method of tracking and second, a projection of invariants. The child has, perhaps, a concept of Mama and also a concept of women. It uses different methods to track these, and it projects different invariants over encounters with them. Tracking Mama is one of the means of tracking women. If it's Mama again it's a woman again. But the concepts are entirely separate, not at all confused together. Similarly, knowing what to expect of a connected physical object and knowing to expect something different of a pile of sand shows that the child is capable of distinguishing between the domains of application of certain substance templates. It's methods of conceptual tracking surely are different for objects and stuffs. Similarly, its method of tracking cat may allow it to generalize from the cat now seen on the left to a cat now seen on the right, whereas its method of tracking individuals, hence Tabby, does not. These are real differences. But they do not erase the samenesses I was interested in.

Xu et al reflect on experiments suggesting that infants less than a year don't have "sortal concepts", for example, of cup and ball, proposing that this may not show they don't have concepts of these as substances. This seems right to me, but I would rather express it by saying they don't yet have the idea of a certain substance template covering a much wider range of objects than cups and balls. The idea that certain concepts bring with them "criteria for individuation and identity" (see also Waxman) should be suspect to a realist, for it suggests (as Wiggins intended) that the mind not the world decides such things.

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