

goes undefined and Millikan's choice of examples for such units (cat, milk, and Mama) is unduly limited and biases her argument. The first concepts that infants form are not cat or milk, but animal and food (Mandler 1997). Animal and food fit Millikan's definition of substances as categories from which one can derive expectations about new members, but they do not have the properties Millikan needs for her argument to work.

Dogs, milk, and Mama are all categories whose instances are either highly similar perceptually or identical. Millikan uses this characteristic to claim that you do not need a defining description for them; you just need to be able to recognize an exemplar as the same thing or kind of thing you saw before. You can do that because these objects look alike, and our perceptual systems are designed to recognize them from different viewpoints and on different occasions. However, this identification ability requires perceptual similarity to work, at least for instances that appear at different times. In addition, it does not require meaning to see that this is the same squiggly pattern you saw yesterday. You do not need a concept just to identify and reidentify. To locate the core of human conceptual ability in the perceptual ability to identify instances puts the burden of concept formation on mostly unspecified but low-level perceptual processes. Millikan suggests that size and shape constancies can do some of this work, but these are *only* useful for instances of dog, milk, or Mama. Such properties will be of no use in identifying instances of animal, food, or people. Yet when it comes to meaning, as opposed to identification, it is at the latter level that infants operate. Since animals do not look alike, how is this conceptual tracking accomplished? Millikan notes that one must be able to identify a substance under diverse circumstances in order to learn its currently hidden properties (are these the true conceptual cores, then?). It is not clear how one could learn about hidden properties or conceptualize at the level of animal without some description. Millikan suggests that ways of conceptually-tracking substances emerge from insight into the ontological principles that ground them, but again she reverts to perceptual descriptions (built-in responsiveness to faces, or sensitivity to correlations among properties). In either case, since infants conceptualize at the level of animal, insight into ontological principles is unlikely to be required.

I appreciate Millikan's emphasis on developmental data in uncovering how concepts are formed. Unfortunately, her description of early concept formation and the acquisition of nouns is not quite accurate. Recent data show that 3-month-olds can indeed learn to tell dogs from cats (Quinn & Elimas 1997), and so can do the kinds of perceptual identification that Millikan describes. But they do not make conceptual distinctions among these different objects; they treat them all as the same kind of thing. The earliest conceptual distinctions infants make is at the level of animal and vehicle, not at the level of dog and cat (Mandler 1997). Since animals do not look alike in the same way that dogs do, it would seem that the only way that infants can form concepts for them is by creating a reasonably abstract description. I believe that this description is derived from perceptual information in the first place (Mandler 1992), but in itself it is not the kind of perceptual information such as shape, size, and parts (e.g., legs and fur), that we typically use to identify objects. Instead, the information that preverbal infants use in setting up concepts of kinds involves the roles that objects take in events. For example, the earliest concept of animal appears to be that it is an object that moves itself and interacts with other objects from a distance. This is not a bad first conceptual description, and it appears to be the kind of description that babies use to limit their inductive inferences (Mandler & McDonough 1996).

This description, however, is not greatly useful for tracking or identifying individual objects from one occasion to another. Moreover, it is this description that is used to comprehend the first words; hence the initial extension of many nouns is broader than that of adults. Contrary to Millikan's claims, the extensions of children's words change dramatically with development. Thus, a 2-year-old's use of the word "dog" does not necessarily point to a

Whatever happened to meaning?

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Abstract: Even in infancy, concept formation has to do with creating meaning, not with tracking substances. Preverbal infants can identify a substance such as a dog, but their first concept of this substance is not dog but animal. It is difficult to account for such global concepts by the perceptual processes involved in object identification, yet these concepts are the foundation on which later concepts are built.

Psychologists and philosophers often talk past each other, because they use the same terms in different ways. So it is quite possible that I have misunderstood Millikan. But as best as I can tell, she uses the term "concept" in the way others use the term "symbol," namely, as a pointer to something else. I have always assumed that symbols, which can be arbitrary and themselves empty of content, point to concepts, but for Millikan similarly "empty" concepts point to "natural units in nature." Unfortunately, "natural unit"

natural unit in nature. It takes many months for nouns to narrow down to the extensions of adults. Conceptual foundations are laid down before children begin to speak, and early language as an avenue into understanding conceptual structure must be explored with great caution.