

Form and function in very early word learning

Amanda L. Woodward
Department of Psychology
University of Chicago

Learning a new word is, in part, acquiring an association between the word and the object or event to which it refers, but mature word learners have honed their expectations how words are related to objects. Specifically, they understand that words are symbols that are used by speakers to communicate about referents. A critical task in development, then, is learning about this relation between a word and its referent. A second critical task is determining which kinds of behaviors and signals serve this function. Although, in principle, the forms of words are arbitrary, within a language, there is a strong regularity in the form of words. As examples, in spoken languages words are units of speech, and in sign languages, they are manual patterns. The link between form and function here – e.g., between spoken words and naming – is so obvious to adults that it is easy to assume that infants begin the language learning game with this correspondence in mind. However, consider that the infant must abstract this regularity in the context of learning many things from and about the behavior of other people, many of them with reference to objects (the sounds they make, their typical uses, etc.). It may take infants some time to sort out the forms and functions of names for things.

One-year-olds seem to understand a range of relations between sounds and objects. For example, they may know that the sound of an airplane means that if they look up, they will see the airplane. They also seem to understand the relations between some words and their referents. According to one traditional model of language development, early on there is no distinction between these two sorts of learning, in that they are both based on contiguity between the sound or word and the item. The work of Baldwin (Baldwin, 1991; Baldwin, 1995) and Tomasello (Tomasello, 1995; Tomasello & Barton, 1994), among others has provided compelling evidence that by the time babies are 20-24 months of age, this model of word learning will not work. In fact, these studies show that contiguity be-

tween name and referent is neither sufficient nor necessary for word learning in 20-24-month-olds. Instead, babies filter their word learning through their attention to and reasoning about the behavior of the person who uses the word. In particular, they seem to use behavioral cues to the speaker's referential intent to inform their word learning (see Baldwin, 1995; Baldwin & Tomasello, in press; Tomasello, 1995 for reviews). Thus, by this age, babies seem to understand something about the referential and communicative function of words.

So far, researchers have not made much progress at exploring this knowledge in babies younger than 20-24 months. However, well before this, as young as 12 months, babies seem to understand many of the words they hear, and even produce a few of them (Woodward & Markman, 1997). A common assumption is that before the productive vocabulary spurt, at around 18 months, infants lack the insight that words are symbolic (the "nominal insight"). It is argued, then, that very young word learners acquire word-object relations via slow, laborious, associative processes (which accounts for their small productive vocabularies). In prior work, my collaborators and I showed this assumption to be wrong (Woodward, Markman, & Fitzsimmons, 1994), in that 13-month-olds acquire new word-object mappings in comprehension based on brief training, as do 18-month-olds. However, this finding does not speak to the nature and specificity of these mappings. Do 13-month-olds, like older babies, understand that words are a special class of signal, that relate to objects and events in a particular way? In recent work, I have taken on this question from two perspectives: (1) I have tested whether infants distinguish between words and other sounds in contexts that are typical for word use (communication about objects) and those that are not (operant conditioning), and (2) I have begun to assess the extent to which 13-month-olds draw on behavioral cues to speaker's intent in acquiring new words.

In the first line of work, 13-month-olds were introduced to new words or to novel sounds during a joint attention episode in which the researcher showed the baby a new object. In the word condition, she would point to the object and say, e.g., "Look, it's a gombie." In the sound condition, she'd point to the object and say "Look at this." and then blow a whistle. We found that, based on a multiple choice comprehension test, 13-month-olds learned the sound-object mappings as readily as the word-object mappings (Woodward & Hoyne, in press). Given the same training, 20-month-olds do not learn these links, suggesting that as infants gain more language experience, they hone their expectations about the forms of names.

The findings from 13-month-olds might indicate that they do not understand that spoken words are a special kind of signal. However, in a second set of studies, we found that 9- and 12-month-old infants distinguished between words and nonlinguistic sounds in a non-communicative learning context—a conditioned head turn task (Woodward & Hoyne, 1997; Woodward, in preparation). Although infants found both kinds of sounds equally interesting, they turned less often to the visual reinforcer when the signal was a recorded word. This was because when they heard the word, infants turned to the people in the testing room rather than to the reinforcer. Thus, although 12-13-month-olds distinguish between words and sounds in some instances, they seem easily swayed by the pragmatic cues present in a joint attention context to interpret novel sounds as communicative.

Neither of these studies speaks directly to the question of infants' understanding of the nature of the link between words and referents. In an ongoing study, I am testing whether 13-month-olds, like older babies, attend to and use behavioral cues to communicative intent in word learning (Woodward, 1998). In this study, 13-month-olds are introduced to a new word as they are jointly attending to an object with an experimenter. The word is produced by a second experimenter. What varies is where this second person is looking. For half the babies, he looks at and points toward the object that the baby is attending to (the "joint attention" condition). For the other half, he looks at a video screen, never at the toy the baby attends to (the "discrepant attention" condition). In both conditions, babies have their attention directed to an object and then hear a label. But only in the "joint attention" condition are there clear behavioral cues that the label is intended to be about the object. As in prior studies, infants seem to learn the word-object link in the joint attention condition. In contrast, infants in the discrepant condition perform

randomly on the comprehension test, showing no indication of learning. Thus, there is some preliminary evidence that for 13-month-olds, as for older babies, behavioral cues to communicative intent matter for word learning.

In sum, there is evidence that very young word learners have begun to learn about the communicative functions of words. Many questions about the extent of this knowledge are as yet unanswered, but we have evidence that like older babies, 13-month-olds attend to a speaker's behavior when learning a new word. However, there are intriguing differences in the learning of 13-month-olds and the learning of 20-month-olds. In particular, 13-month-olds seem to be more open minded about the forms of names, accepting novel signals when they are accompanied by behavioral cues that support the interpretation that the signal is intended to be communicative. It is possible, therefore, that infants base their developing concept of a name on features of behavior that are relevant to communicative intent rather than on a particular perceptual form.

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