tion that a child may hear words to herself is no less plausible than the suggestion that she may see objects to herself, but the latter plays a role in Horne and Lowe's theory, whereas the former seems to be excluded. Looking more broadly, voices heard to oneself may have some important roles to play in understanding human behavior (Chadwick & Lowe, 1994; Jaynes, 1977). The general point here relates to the difficulty of identifying exactly which of the many possible relations between objects, words heard, and words said are actually functional in the development of naming. Observational data are notoriously difficult to interpret, but difficulties persist even with the elaborate methodology of training studies.

It would, however, be a mistake to overestimate these problems. We are not dealing here with processes of biological evolution but with the way in which their products interact with environmental contingencies, so there is no need to be forced back to paleontological methods and just-so stories, however well grounded and convincing. Through a set of behavioral interactions that take place in plain sight, almost every human on the planet acquires the ability to name in the first 24 months of life (those who don't can tell us something too). Given this, it is hard to understand why, to date, so important a process has been so little researched by behavior analysts. The mystery deepens when one considers that naming, if not equivalence, is a prerequisite for rule-governed behavior—a central focus of human operant research in recent years. One can only concur with Horne and Lowe's desire for a systematic program of experimentally driven developmental behavioral research. To achieve this, however, behavior analysts will need to talk to developmentalists. It would be more than a little ironic if discussion of an issue as important as the origins of naming did not find a wider audience than the aficionados of stimulus equivalence.

EQUIVALENCE RELATIONS, NAMING, AND GENERALIZED SYMMETRY

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In charting in detail the development of speaker-listener behavior in children and the fusion of speaker-listener functions that they term *naming,* Horne and Lowe provide an enlightening account of why the concepts of verbal behavior and stimulus equivalence have become so interwoven in the contemporary literature. A central idea in their provocative paper, however, is that naming is the primary unit of behavior that occasions the behavioral effects usually interpreted as reflecting the emergence of equivalence relations: "Naming should not be viewed as *mediating* the establishment of stimulus classes: Naming *is* stimulus-classifying behavior" (pp. 226–227) (emphases in original).

Of particular interest in Horne and Lowe's account is their discussion of how intraverbal naming might effect an equivalence relation. The key process here is said to be self-echoic repetition related to each trained combination of stimuli (e.g., "up green up green; up triangle up triangle"). This gives rise to "intraverbally produced bidirectional relations" between each of the trained pairs (p. 220). It is clear from Figure 17 that without this prop-

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erty of bidirectionality the cycle is no longer self-perpetuating; therefore, other relations necessary to the demonstration of equivalence relations would fail to occur. Such an account, of course, highlights the pivotal role of symmetry (i.e., bidirectionality) in studies of equivalence relations, by describing how naming could introduce this element of symmetry. However, it does not exclude the possibility that an equivalence relation might appear without naming if the principle of symmetry is introduced in another way.

Such a view has been articulated by Hayes and Hayes (1992, p. 1389), who suggested that symmetrical responding might emerge through the acquisition of the name → object/object → name relation and then generalize to other situations. Horne and Lowe's main reservation about this view is that the sequence of responses proposed in the Hayes account does not appear to be symmetrical: They observe that hear /Z/ → look at Object Z is not reversed symmetrically in the emergence of look at Z → say "Z." Further, Horne and Lowe are skeptical of a proposed amendment to this account that asserts that the child may first look at Z and then hear /Z/ before uttering "Z." They maintain that there is no evidence in the literature that this sequence occurs. However, in their own account Horne and Lowe suggest that once echoic behavior has been acquired, first at an overt and then at a covert level, "new echoics may be acquired solely at the covert level of responding" (pp. 198–199). This suggestion implies that covert echoics may hold the same function for the listener as do overt echoics, and if this is the case, Hayes' amendment might be justified by establishing that when a child utters the name "Z," she is merely responding to her own covert echoic.

A more fundamental concern expressed by Horne and Lowe relates to the notion that the concept of sameness or substitutability, which is essential to two major theories of equivalence (Hayes & Hayes, 1992; Sidman, 1990) cannot be applied to objects and to words. We cannot argue that we would eat the word *cake* as we would the object cake. However in their discussion of the maintenance of naming (p. 214), Horne and Lowe suggest that naming is reinforcing because uttering the name of an object produces listener behavior; this in turn may produce the kinds of sensory and emotional effects produced by the object itself. In other words, we react in the same way to an object's name as we do to the object itself at all but the skeletal level. Might this not perhaps constitute the required degree of sameness or substitutability between objects and words?

Nevertheless Horne and Lowe are not alone in their reservations about the concept of generalized symmetry. Sidman (1994, pp. 453–454) has observed that what may appear to be an equivalence relation that has emerged as a result of symmetry training might in fact be no more than a series of independently related pairs of stimuli. This might be the case, for example, with the performance shown by Schusterman and Kastak's sea lion (1993). It is not difficult to identify a logical instance in which this might be said to occur: A and B are cousins because their mothers are sisters, and A and C are cousins because their fathers are brothers—but this does not entail that B and C are cousins, although they are related to each other by reason of their mutual cousin relationship with A. In this case, clearly A, B, and C do not form an equivalence class of cousins. The possibility of such an occurrence therefore deserves to be taken seriously by investigators who are attempting to expand on the existing but sparse literature relating to the emergence of equivalence classes as a result of symmetry training.

Current research focusing on this issue is both sparse and ambiguous. For example, Schusterman and Kastak's (1993) study is open to a number of interpretations, of which generalized symmetry is but one (see Horne & Lowe, pp. 223–224). Other work, however, suggests generalization at a more abstract level. For example, 2 autistic subjects studied by Eikeseth and Smith (1992) reliably displayed equivalence between upper and lower case Greek letters and their written English representations once verbal naming had been introduced. Later in this study, an entirely new set of unnamed stimuli was shown to form an equivalence class. One possible explanation for this finding is, of course, that, having learned to name the original stimuli, the subjects simply named the new stimuli independently. However, is it realistic to suppose that these subjects, chosen for their severely limited linguistic performance, would

do this with such complex and abstract stimuli? Such a question is especially pertinent given that the subjects could not have been aware that their original performance was improved after naming was introduced, because testing of new relationships was not reinforced. An alternative suggestion may be that, as a result of the introduction of naming, certain contingencies became established so that the subjects applied them to the new set of stimuli without having to name these stimuli.

Research on this issue has not been developed sufficiently to provide unequivocal answers to these questions. Without fully exploring the matter, we should be wary of accepting the Horne and Lowe view *tout court* that naming is in itself the paradigmatic case of stimulus classifying behavior to the extent that it obviates the usefulness of a construct of stimulus equivalence.

LISTENER BEHAVIOR AND OSTENSIVE LEARNING

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Three conclusions of Horne and Lowe's impressive article should be mentioned: It acknowledges the essential dependence of speaker behavior on previously acquired listener behavior, it shows that the transfer of listener to speaker behavior is primarily based on echoic behavior, and it argues that stimulus equivalence plays no role in the acquisition of verbal behavior. In my comment, I will concentrate on the first issue, because I largely agree with the last two points (Stemmer, 1995). My account uses some ideas of Catania and Cerutti (1986) and Cerutti (1989).

Because they view the learning of listener behavior as a crucial precursor to the development of linguistic behavior, Horne and Lowe describe it in some detail. They specify the following conditions: (a) The caregiver produces a vocal stimulus in the presence of an object and the child; (b) concurrently, the caregiver teaches the child how to perform conventional behavior in relation to the object; and (c) the caregiver's vocal stimulus increasingly precedes and becomes discriminative for the child's performance of these object-related kinds of conventional behavior. This is the first stage of the process by which children learn object names.

However, a more precise analysis of listener behavior will show that Horne and Lowe's account has a serious shortcoming. It ignores the most important learning processes by which object names (and many other lexical items) are learned: ostensive processes. These processes do not satisfy the three conditions given by Horne and Lowe. On the other hand, the number of object words learned in processes that do satisfy these conditions is extremely low.

Notice first that in the earliest stages, children usually do not learn object names. Rather, they learn action names such as "come here," "drink," "more," "give me," "don't," "drop it," or "bye-bye" (e.g., Benedict, 1979; Dromi, 1987; Smith & Sachs, 1990). To be sure, sometimes the vocal stimuli have two (or more) elements, such as "listen to the music," "go to sleep," "go to the corner," "drink the milk," "walk slowly," "give shoe," or "drop sock," and some of these elements

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