NAMING IS NOT (NECESSARY FOR) STIMULUS EQUIVALENCE

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Horne and Lowe's article is in many respects a tour de force. By expanding Skinner's (1957) conceptualization of verbal behavior to more fully encompass the behavior of the speaker as listener and the initial development of speaking and listening repertoires, they make a compelling case for the role of operant processes in language.

We take issue, however, with several of their contentions about stimulus equivalence and naming. Our commentary focuses on only a few points to which our own work seems directly relevant. We believe that they are fundamental to a fully informed evaluation of Horne and Lowe's central argument that naming enables emergent performances from which equivalence relations might be inferred. Implicit in Horne and Lowe's position are four critical assumptions, which we counter as follows:

Assumption 1: Match-to-sample (MTS) procedures are necessary to assay stimulus equivalence. It is surprising that Horne and Lowe select mostly experiments that used MTS procedures, rather than other methods, to support their arguments about naming and equivalence. We are gratified that they cited our recent paper (Saunders & Green, 1992) to support the need to reconceptualize equivalence, but it appears that one of our main points did not come through.

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Several experiments have shown that stimulus classes can develop from training other than match to sample: sequence training, simple discrimination training, and training that relates antecedent stimuli to specific consequences. These demonstrations suggest that class formation and perhaps equivalence class formation may be a product of any procedure that serves to *partition a set of stimuli into subsets of stimuli that are substitutable for one another in certain contexts*. If we are correct, Vaughan's (1988) experiment showing set partitioning by pigeons should be reexamined, given its implications for the relation between equivalence and language. . . . We do not think that the tests that comprise the definition of stimulus equivalence proposed by Sidman and his colleagues are definitive or exhaustive. (Saunders & Green 1992, p. 239; italics added, most citations deleted)

Although MTS can be a very elegant experimental preparation, and conditional discriminations are inherent in many important repertoires, we suggested that there must be other processes by which organisms learn to treat dissimilar events as equivalent. From that perspective, it seems plausible that there are more valid means than MTS to evaluate equivalence with certain subjects. Horne and Lowe largely ignore this possibility (reiterated by Sidman, 1994), state that little learning in "real life" resembles arbitrary MTS (p. 238), and then paradoxically emphasize findings from MTS experiments in making their case.

Assumption 2: Evidence against the naming account of stimulus equivalence is weak. Horne and Lowe assert that the conclusion that naming is not necessary for stimulus equivalence is weak because it is "based almost exclusively on the finding that in postexperimental naming tests . . . some individuals do not reliably

produce common names for the stimuli in the same class" (p. 216). In fact the conclusion is based on strong convergent evidence from subjects with very limited verbal repertoires, mostly overlooked by Horne and Lowe: (a) Such subjects have demonstrated equivalence classes consisting entirely of abstract visual stimuli for which extant names were unlikely (e.g., Barnes, McCullagh, & Keenan, 1990; Dube, McIlvane, Mackay, & Stoddard, 1987; Green, 1990; Green, Clark, & Iennaco, 1995; Saunders, Wachter, & Spradlin, 1988; Sidman, Willson-Morris, & Kirk, 1986). (b) Some subjects with mental retardation demonstrated auditory-visual equivalence classes more readily than all-visual classes, but they also demonstrated entirely visual equivalence classes (Green, 1990; Green et al., 1995; Sidman et al., 1986). (c) Production of stimulus names by subjects with severe language and learning deficits can foster the development of conditional and equivalence relations (e.g., Eikeseth & Smith, 1992), but such subjects rarely engage in naming unless contingencies require it explicitly (Constantine & Sidman, 1975).

In short, many subjects with very limited verbal repertoires have demonstrated stimulus equivalence without the benefit of naming. Most were unlikely to engage in verbal behavior of the types that Horne and Lowe and others have observed with normally capable subjects. In addition, verbally sophisticated subjects have demonstrated relatively rapid emergence of large numbers of untrained stimulus relations, which would be unlikely if they had to talk their way through all the complex paths by which the stimuli were related (e.g., Bush, Sidman, & deRose, 1989; Lynch & Green, 1991; Wulfert & Hayes, 1988).

Assumption 3: Evidence for the naming account of stimulus equivalence is strong. Much of Horne and Lowe's argument rests on reports that some language-disabled children failed to pass MTS equivalence tests, whereas most language-able children passed readily. Unfortunately the first such study (Devany, Hayes, & Nelson, 1986) had several methodological problems, some of which apparently were repeated in attempted replications (e.g., Augustson & Dougher, 1992; Barnes et al., 1990). Specifically, the Devany et al. study did not provide clear evidence that equivalence depends on verbal skills because (a) the va-

lidity and reliability of assessments of subjects' verbal repertoires were questionable. (b) Initial training required simple, not conditional, discriminations. Although the language-disabled mentally retarded subjects eventually performed the baseline conditional discriminations to criterion, they were given unreinforced tests for equivalence almost immediately thereafter, which they apparently failed. There is no evidence that those subjects' baseline performances (prerequisites for equivalence) were well established in training or maintained in testing. (c) Subjects were given verbal instructions, which might not have controlled any relevant responding by the subjects who had very limited verbal repertoires.

Research on stimulus control with subjects with learning difficulties suggests that these factors—initial history of simple discrimination, fragile baselines, confounding effects related to instructional control—provide more parsimonious and feasible explanations for the language-disabled subjects' apparent failure to show equivalence than an explanation based on inadequate naming repertoires.

A demonstration of stimulus equivalence by a nonhuman would refute the hypothesis that naming underlies equivalence. Horne and Lowe cite failed or flawed attempts to show equivalence with nonhumans to support their naming hypothesis (e.g., McIntire, Cleary, & Thompson, 1987; Sidman et al., 1982; see Hayes, 1989; Saunders, 1989). Their criticisms of a successful experiment with a sea lion (Schusterman & Kastak, 1993) are unfounded, in our opinion. Horne and Lowe assert that "the only response requirement [was] orientation to the left or right of release location such that the sea lion's nose broke the plane formed by the front of the correct comparison stimulus" (p. 223). They infer that the experimental contingencies established each sample and correct comparison as a compound discriminative stimulus that evoked "swaying or moving back and forth (which is food-related behavior in sea lions) across the two stimulus elements of the compound," and that discriminative control by the "outer" element of each compound could account for the animal's accurate performances on equivalence tests (p. 224).

Having observed the sea lion in question perform MTS tasks firsthand, we find Horne

and Lowe's speculations implausible. To start each trial, the animal (Rio) assumed a position with her head resting on a T-bar, and maintained it while a sample was displayed. When the comparison stimuli appeared on each side of the sample, Rio moved her head to look at them without leaving the station, and returned her head to the T-bar. When a tone sounded, Rio moved about 2 to 3 feet and inserted her nose into an opening that framed the comparison. Our observations were that Rio scanned the comparisons quickly, became stationary again until the release signal sounded, then moved directly and rapidly to one comparison. We did not see the swaying, food-related behavior Horne and Lowe described. Further, if Rio had learned to respond to each trained sample-S+ combination as a compound discriminative stimulus rather than a conditional relation, it is very unlikely that she would have performed correctly on numerous trials presenting sample-comparison combinations that had never been presented together during training (see Bush et al., 1986; Lynch & Green, 1992; Sidman, 1986).

Assumption 4: Naming contingencies do not entail equivalence relations. Horne and Lowe sug-

gest that a child's behavior as listener (e.g., looking at a ball in response to a caregiver's utterance "ball") is reinforced early on. The child's imitations of caregiver utterances (echoics) are also reinforced. Repeated interactions of this sort establish echoics as tacts. Subsequently, the child's imitative utterances become discriminative for reinforcement for the same listener behavior that was emitted in response to caregivers' verbal utterances. Observations like these are offered as evidence that verbal utterances function as both tacts and names (pp. 193-200). We maintain that the child's behavior indicates that contingencies like those described by Horne and Lowe establish equivalence relations among dissimilar environmental events (e.g., objects and words).

Conclusion. In our view, naming is neither necessary for, nor a more fundamental process than, the development of equivalence relations; rather, naming is made possible by contingencies that establish prerequisites for equivalence relations (Saunders & Green, 1992; Sidman, 1994). To paraphrase Horne and Lowe (p. 237), we fear that their undue emphasis upon characteristics of the behavior of verbal organisms misdirects efforts to identify the necessary conditions for equivalence.