account might not be on the same slippery slope with respect to the term *symbolic behavior*. That is, might giving symbolic behavior a common name similarly bring together different behavioral relations under a single rubric, giving rise to the notion that there is a unitary psychological phenomenon called "symbolic behavior" that is in need of explanation? The common name carves out a domain with precisely the characteristics that succumb to an analysis in terms of naming. But do we know enough about the diverse array of behavioral relations wherein we speak of symbolic functioning to justify calling them all by one name? It seems to us that systematic behavioral investigations of the

many relationships that occasion use of the term *symbolic* are in such early stages that it may be premature to identify common features that justify giving them a single name. One of the hallmarks of behavior analysis has been a refusal to take mainstream psychological terms as defining a subject matter, not so much because they are wrong but because they can create a misleading picture of the facts to be accounted for (Skinner, 1945). If, as the present account suggests, naming is capable of creating new patterns of discrimination and generalization, including those of scientific inquiry, then perhaps we should be conservative in our adoption of such names until more of the empirical facts are in order.

THE ORIGINS OF NAMING: A CRITIQUE OF SELF-LISTENING

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Horne and Lowe's article is impressive because it makes the language development literature more accessible to behavior analysts. By relating the findings of developmental psychology to verbal behavior, stimulus equivalence, and rule governance, Horne and Lowe enhance the experimental analysis of verbal behavior by showing the kinds of complex behavior developmentalists have observed children emit. A unique and controversial aspect of their theory, however, is the role that self-listening plays in the development of naming and the bidirectional stimulus relations involved in verbal behavior. Many behavior analysts will reject self-listening as an important variable because it cannot be experimentally manipulated. Some may interpret self-listen-

ing as having the same function as other events that have been experimentally manipulated (Skinner, 1953). To be convincing, however, an interpretation of self-listening as a potential causal variable should conform to known experimental facts. If interpretation is to be different from speculation, it needs to specifically describe the relation between the interpreted event and manipulable variables (Donahoe, 1993; Palmer, 1991). The question addressed in this commentary is whether Horne and Lowe's analysis of self-listening functions as sound interpretation.

Verbal Relations as Operants

Figure 1 outlines some verbal relations as sets of three-term contingencies. These response classes seem to be the critical links between listening, echoing, and naming that Horne and Lowe use to build the case that self-listening can be used to explain bidirec-

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	Caregiver/Environmental Antecedents	Child Responses	Caregiver Consequences
Listening			
1	object⇒	looks⇒	names
2	object, "bring object"⇒	conforms⇒	social S ^{r+}
Joint regard			
3	pointing, object⇒	looks at point and object⇒	social S ^{r+}
Echoing			
4	says "say name"⇒	hears "say name", echoes, hears self⇒	social S ^{r+}
Naming			
5	object, points, names⇒	hears, sees, names, and hears self⇒	social S ^{r+}
6	object⇒	sees, names, hears self⇒	social S ^{r+}

Fig. 1. Illustrative verbal relations presented as potential operants.

tional control of stimuli such as objects and names. Each operant is specified as one example of the many objects, events, and responses that might occur in an environment supporting the acquisition of verbal behavior. For example, saying might be replaced by signing as a topography of behavior throughout the figure. The operants also are listed in order of reference in this commentary and not in a proposed ordinal sequence of acquisition.

This analysis groups together different topographies of the child's behavior (hearing,

seeing, echoing, naming, etc.) as parts of the same operant. Thus, a class of behavior, such as saying or hearing, is identified as a set of topographies that may be selected by a consequence. In this descriptive account, then, the specific responses the child emits within an operant do not cause each other, but rather are all caused by the same consequence. Analyzing the behavior classes in this way presents some potentially important contrasts with the way in which these relations are described by Horne and Lowe. The current analysis also isolates some critical claims

made by Horne and Lowe and suggests some potential problems with those claims.

Questions and Criticisms

Horne and Lowe claim that the relation shown in Operant 1 enhances the child's listening skills (listening is exemplified in Operant 2). That caregivers observe where children are looking before naming is a well-established developmental observation, but how such an operant leads to listening is unclear. One interpretation might be that naming functions as a conditioned reinforcer in Operant 1 and then becomes a discriminative stimulus (S^D) for looking when an object is named. According to behavior-analytic research, however, the relation between conditioned reinforcement and discriminative functions is more likely to be reversed. Consequences typically become conditioned when they have been an S^D for some response (Keller & Schoenfeld, 1950). This suggests that naming has already been established as an S^D . If this is true, then the relations specified in Operant 1 cannot be marshaled to help account for the development of listening because listening has already been established or partially established.

The problem illustrated with Operant 1 is an example of a more general difficulty of not specifying the contingencies that select behavior in the presence of relations among stimuli. For example, Horne and Lowe claim that relations like those shown in Operant 3 occur because the child has learned to respond to objects and pointing (joint regard). Operant 4 is said to occur because the child has acquired listener behavior similar to Operant 2 and hears herself as well as the caregiver. The question is how do these stimuli get connected? What joint or new contingencies of reinforcement select and support seeing a caregiver point and seeing an object? What contingencies select hearing the caregiver and hearing oneself at the same time?

Similar questions can be asked of the operants in the naming section (Operants 5 and 6). Horne and Lowe's critical point about these relations is that through echoic and listening skills, the child's naming comes under antecedent control of the object. These operants produce a bidirectional relation between seeing the object and the caregiver's naming the object, and the child's hearing herself

naming the object and seeing the object. This analysis also does not specify the contingency that would produce such a relation. Throughout, Horne and Lowe's analysis relies on the contiguous occurrence of these events.

The experimental evidence, however, suggests that such contiguous relations do not result in control by members of the purported relation without an explicit contingency. The unified principle of reinforcement (Donahoe, 1977; Donahoe, Burgos, & Palmer, 1993; Rescorla & Wagner, 1972) demonstrates that whereas contiguity is an important determinant of conditioning, it is not sufficient. The blocking paradigm illustrates this well (e.g., Kamin, 1969). When behavior is conditioned in the presence of a tone, and then a light is presented with the tone, the light will not control responding by itself. Control by the light occurs when there is a discrepancy between the initial condition and the subsequent condition. This effect has been demonstrated with conditioned stimuli (Kamin, 1969), discriminative stimuli (vom Saal & Jenkins, 1970), and conditioned reinforcement (Williams, 1975). When appropriate temporal relations occur between environmental events and a contingency-produced behavioral change or discrepancy occurs, then the behavior becomes conditioned to the environmental events (Donahoe et al., 1993). Without the discrepancy produced by events that change the behavior, the behavior will not come under the control of new environmental events.

In order to be more complete, then, Horne and Lowe's analysis needs to describe the separate contingencies of reinforcement that would select responding to all of the stimuli or combinations of stimuli in each of the instances described above. This is not an easy task, but without performing this detailed analysis, interpretation, particularly an interpretation of the role of responding to stimuli produced by one's own behavior, is limited. From this view, the link between these repertoires is not an explanation; it is simply an observation of a behavioral complexity that an experimental analysis of behavior might try to explain (Donahoe, 1986; Donahoe et al., 1993; Palmer & Donahoe, 1992).

Besides, there is a plausible alternative interpretation consistent with the experimental literature that does not require hearing one's

own verbal behavior in order to learn verbal relations. There is not space to describe this alternative here, but this perspective also starts with the interpretation provided by Skinner (1957). It is extended with modern interpretations of how conditional discrimination and rule governance explain some critical aspects of verbal behavior (e.g., Cerutti, 1989; Chase, 1986; Hall & Chase, 1991; Hayes, 1991; Sidman, 1986). These interpretations are supported with experimental literature that shows the functional independence of many verbal repertoires as well as how some of these repertoires become connected (e.g., Chase & Imam, 1987; Chase, Johnson, & Sulzer-Azaroff, 1985; Ellenwood & Chase, 1992; Hall & Sundberg, 1987; Imam & Chase, 1988; Lamarre & Holland, 1985; Lazar, 1977; Lee, 1981; Lipkens, Hayes, & Hayes, 1993). This alternative suggests that responding to names and responding to objects can be developed separately and then induced by environments that require a new contingency. If Horne and Lowe leave out the self-listening components of echoing and naming and focus on the contingencies that select responding to object-name relations, name-object relations, and bidirectional relations among names and objects, then an account of verbal behavior is possible without

an interpretation of self-listening as a causal variable.

Conclusion

Ayer (1984) predicted that the current period of intellectual history would be marked by discussions of the kinds of evidence scientists adopt for accepting new knowledge. Horne and Lowe's theory of naming contributes to discussions among behavior analysts about levels of evidence. What kinds of evidence will behavior analysts use to incorporate new variables into behavioral theory? Can behavior, which cannot be manipulated independently, be described as a causal variable? If behaviorists do not accept behavior as a causal variable, will they accept interpretations of behavior functioning like environmental events that have been experimentally manipulated? What criteria are used to evaluate the usefulness of such interpretation? Horne and Lowe's interpretation of naming relies on the role of self-listening. I have tried to show that the usefulness of this interpretation is limited by not specifying the contingencies. I predict that when the contingencies are spelled out through careful experimentation, behavior analysts will see that self-listening is part of the topography of verbal behavior, but is not required in a functional account of verbal behavior.

SEPARATE REPERTOIRES OR NAMING?

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By adding listener behavior to some of Skinner's elementary verbal relations, Horne and Lowe are able to propose the concept of

naming as a higher order behavioral unit (p. 185). Naming is then used to interpret symbolic behavior and findings in the area of stimulus equivalence. Their analysis of equivalence research in terms of listener behavior, the tact relation, echoic and self-echoic behavior, and conditioned perceptual effects is, for me, a plausible and attractive alternative

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