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Generalized Imitation and Generalized Matching To Sample

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Almost 40 years ago, Baer and Sherman (1964) pointed out that experimental work in the imitation area often has failed to invoke imitation in its most powerful meaning. In describing the problem, they commented that ''the similarity [of the behavior of the model and the behavior of an observer] may lie in the eye of the experimenter rather than in the eye of the observer'' (p. 38). Even though they pointed out that imitation itself must involve ''generalization'' in the sense that it includes novel instances, the title of their article contained the phrase ''*generalized* imitation,'' which may have contributed to the spread of that term in the behavior-analytic literature.

Many behavioral terms are functionally defined and designate a procedure as well as a resulting process or behavioral change. For example, there can be no reinforcement procedure without a corresponding reinforcement process. Similarly, extinction serves both as a name for a procedure and for a resulting behavioral change. However, such dual usage of behavioral terms has not been entirely consistent. Sometimes, the name of a procedure has been kept even when the implied behavioral change failed to occur. For instance, the ''identity matching'' procedure is often designated as such even in the absence of support for identity as a controlling variable for the subjects' behavior in the task (e.g., Cumming & Berryman, 1965). Similarly, it seems that imitation training does not require true imitation as a result, just as a fishing tour does not require any fish as a result.

Catania (1973) distinguished between descriptive and functional classes of behavior. He defined a descriptive operant class as a class of responses for which consequences are arranged and a functional class as a class generated by that procedure. An apparent trend in the behavior-analytic literature is to use the terms *imitation* and *identity matching to sample* to designate training procedures as well as the descriptive behavioral classes strictly specified by those training procedures. The qualifier *generalized* is added to these terms to designate resulting functional classes that extend beyond directly trained exemplars to the general principle of identity or similarity as a controlling variable. Although any instance of a descriptive class can be identified when it occurs, we can only *infer* that particular instances are also members of the functional class.

INFERRED STIMULUS CONTROL

How, then, does one decide exactly which stimulus properties enter into a controlling relation? As Sidman (1979) argued, controlling relations are never directly observable. In a simple laboratory example, we have a pigeon pecking for food in the presence of a red stimulus and not pecking in the presence of a green stimulus. One might easily come to think that ''red'' controls pecking, and ''green'' functions as an S^{Δ} for the pigeon's pecking. We can ensure that both colors have

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the same brightness but, even then, there are additional possibilities of control that do not involve red *and* green. For example, it is possible that the pigeon responds to red by pecking and to not-red (i.e., anything other than red) by not pecking (i.e., doing anything else without pecking). Alternatively, the pigeon could respond to green (no peck) and to not-green (peck). The more exact identification of the controlling relation can be obtained only through experimental isolation of the variables over successive instances.

THE CASE OF "GENERALIZED" IDENTITY MATCHING TO SAMPLE

In identity matching to sample, the subject is said to select the one among two or more comparison stimuli that is identical to the sample stimulus. Thus, in the presence of a red sample stimulus, the subject selects a red (and not a green) comparison stimulus, and in the presence of a green sample, the subject selects the green (and not the red) comparison. On that basis, to suggest that the subject chooses the comparison stimulus on the basis of identity (or similarity) is an unsupported inference. First, as in the previous example and as pointed out by Sidman and Tailby (1982), it is possible that not-red and not-green enter into the controlling relations and, in this case, with respect to both the sample and the comparison stimuli. In addition, it is also possible that selecting the respective comparisons is differentially controlled by the two samples just as any other two responses may be differentially controlled by two different stimuli, that is, without identity as a feature of the sample–comparison relation that affects performance (e.g., Carter & Werner, 1978). Hence, as Sidman and Tailby (1982) pointed out, ''only if the subject matches each new stimulus to itself without differential reinforcement or other current instructions can one be certain that identity is the basis for the performance'' (p. 6). Using the term *generalized identity matching,* then, is unwarranted, because identity matching itself presupposes that generality.

THE CASE OF "GENERALIZED" IMITATION

Current behavior-analytic literature often contains the term *generalized imitation* in addition to just *imitation* (e.g., Catania, 1998; Hayes, Barnes-Holmes, & Roche, 2001; Pierce & Epling, 1995; Schlinger, 1995; Spradlin & Brady, 1999). According to Poulson and Kymissis (1996), ''generalized imitation is a more robust concept than imitation, because generalized imitation refers to a learning phenomenon in which more behavior is generated than was directly taught'' (p. 77). But what, then, is imitation in the first place?

Although researchers generally agree on the importance of imitation in children's learning, an appropriate definition is hard to find. A purely formalistic definition, according to which imitation is simply ''doing what another organism does,'' is insufficient: ''The patrons of a restaurant are behaving in roughly the same manner with respect to their dinners, but they are not imitating each other; they are behaving in similar ways because they are exposed to similar contingencies'' (Skinner, 1974, p. 65). Therefore, in addition to a formal similarity between the behavior of a model and the behavior of an imitator, the term *imitation* implies a controlling relation from the behavior of the first to the behavior of the second. However, even that does not suffice. For instance, when someone chases a thief, they may both be running and the running of the chaser is controlled by the running of the thief, but the chaser does not therefore imitate the thief. In imitation, the formal similarity of the behavior of the imitated and the behavior of the imitator must itself enter into the controlling relation. Reinforcement of the be-

havior of a street mime, for instance, may be contingent on the formal similarity of his behavior to that of a passerby, and he may imitate the behavior of a running thief just like he imitates the behavior of any casual passerby.

In establishing an imitative repertoire in an autistic child, for instance, let us say that we begin with the prompting, fading, and differential reinforcement (possibly even shaping) of the child's hand clapping whenever the teacher is clapping her hands. We may decide that a mastery criterion is reached when the child claps his hands nine out of ten times within 5 s after the teacher claps her hands, and does not clap his hands during 10-s intertrial intervals. Now, does the child imitate? Probably not. When we proceed to our next trial type in which, for instance, the teacher puts her palm on the top of her head, the child may clap his hands. After the criterion is reached for the second task, we may randomly intermix the two trial types until the training criterion is reached again. Now, does the child imitate those two responses? We do not know. For all we know, we could just as easily have taught the child to put his palm on the top of his head whenever the teacher claps her hands, and vice versa. Thus, the conditional discrimination may still be a nonexample of imitation. The term *imitation* is restricted to cases in which ''similarity'' is a relevant property of the controlling relation. The important point here is that the relevance of such similarity or any other point-to-point correspondence can be inferred only to the extent that novel cases yield the same pattern. Only to the extent that the child responds appropriately to novel responses by the model are we justified in applying the term *imitation*.

To illustrate the point further, let us imagine that a dog is trained to sit whenever the owner sits down in a chair, and to turn around in a circle whenever the owner turns around. Does the dog imitate the owner's behavior? Almost certainly not. The dog could have as easily been taught to sit whenever the owner turns around in a circle and to turn around in a circle when the owner sits down. Thus, what may look like imitation may be nothing more than a series of directly taught *discriminated operants*. The source of control can be determined only by introducing novel exemplars. In the absence of a demonstration that the dog responds to novel performances by ''doing the same,'' there is no evidence that a similarity to the owner's behavior is important in determining the form of the dog's response. Hence, there is no true demonstration that the dog imitates the behavior of the owner unless it also responds to new instances of the owner's behavior by ''doing the same.''

CONCLUSION

The term *generalized* in *generalized imitation* and in *generalized identity matching to sample* is misleading because it suggests that there can be cases of imitation and identity matching to sample even without such generality. However, true imitation as well as true identity matching to sample imply properties of controlling relations that can be inferred only through instances that do not have a direct reinforcement history. Both identity matching and imitation must, by definition, be generalized, so the term is redundant at best and deceptive at worst.

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