On Terms

The Discriminative Stimulus or S^D

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The term "discriminative stimulus" or "S^D" plays a major role in much of our verbal behavior about behavior. It is generally understood as a component of the three-term operant contingency consisting of stimulus, response, and consequence. There would seem to be several essential conditions controlling the occurrence of this term in technical use. These will be described with attention to some details often taken for granted, and then some current uses will be criticized for their omission of one of these essential conditions.

When a stimulus condition is identified as an S^D there is always the implication that it controls some behavior, which means that some particular type of response is stronger in the presence than in the absence of that stimulus condition. Response strength is, itself, a controversial concept, but for the present purpose let us identify it with direct measures such as response latency, frequency, or resistance to response weakening operations such as extinction (Nevin, 1974). (Probability of response is here deliberately omitted.[1]).

The S^D, then, is a stimulus condition in the presence of which some type of response has shorter latency, greater frequency of occurrence, or greater resistance to response weakening operations than it does in the absence of that stimulus condition. In addition there is the implication that this stimulus control is due to a particular type of history. For a stimulus condition to be considered an S^D it must have acquired its control of some particular type of response because that type of response was more successful in the presence than in the absence of that stimulus condition, with success referring to some particular type of consequence. "Success" may not seem like a technical concept, but it is especially convenient here because of the several different ways in which stimulus control can be generated. A type of response may be more successful in that some type of reinforcement follows the response in the presence of the S^D more frequently than in its absence. Alternatively, reinforcement frequency may be the same in the presence as in the absence of the stimulus, but in its presence that reinforcement may be of greater quantity, better quality, shorter delay, or may require less effort to obtain than in its absence. There are also a number of relations between stimulus, response, and punishment which may develop stimulus control.

The S^D relation, then involves (1) the greater strength of some particular type of response in the presence than in the absence of the S^D; furthermore this differential strength is (2) due to a history involving (a) greater success of that particular type of response in the presence

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[1]In operant psychology "probability of response" often functions as an inferred basis for the direct measures of behavior. Its use as a name for a direct measure is never clear without further specification, for example "proportion of trials on which a response occurred." And even when thus specified it is difficult for writer and reader to avoid blending this direct measure with the inferential concept, suggesting a clear advantage to avoiding "probability" in general. I think there are many other advantages to eliminating this term from our technical repertoire, but this issue will have to be the subject of another paper.

than in the absence of the S^{D2} (b) with respect to some particular type of reinforcement. This last factor must also be specified since the differential strength cannot be expected unless the type of reinforcement involved is currently effective as reinforcement. For example an S^D for lever pressing developed with food as reinforcement would not produce an increase in lever pressing frequency while the organisms is food satiated.

Naturally, it is not expected that our ordinary use of "S^D" should be accompanied by identification of each of these defining features; they can often be taken for granted. However, there are several current uses which seem to imply the irrelevance of the differential strength of some particular type of response. A stimulus is sometimes said to be "an S^D for reinforcement," "a cue for reinforcement," or "a stimulus for reinforcement." It is possible that these phrases simply represent sloppy use brought on by an attempt to be brief. It would be more correct to say a stimulus is "an S^D *for a response* because of its relation to reinforcement." Omission of reference to the response may, however, be the result of contact with cognitive orientations. Two other current uses are clearly cognitive in origin. An S^D is said to be a stimulus that "signals reinforcement" or that "predicts reinforcement." Cognitive psychologists are mainly concerned with understanding how the organism "processes information." What action occurs as a result of this information and how this action is controlled by the information is generally left for future study, or, in flirtation with a nondeterministic position, "left to the organism." "Signals" and "predicts" have entered our field from their use in current respondent conditioning theory as a result of the possible relevance of this theory to an understanding of such phenomena as autoshaping, feature-value discrimination, selective attention, etc. Results from current respondent conditioning research may be of considerable value, but it should be recognized that much of the language in this area is quite frankly cognitive in its assumptions and implications. In respondent conditioning it is sometimes necessary to describe a systematic relation between CS and US without mention of behavior. But to say that the CS "signals" the US, or "predicts" the US is to say more than that these two stimuli are associated or correlated in the environment. These uses bring in the organism, but as a processor of information, not as an eye blinker or a secreter of saliva; in other words, not as a behaver.

The fact that such uses are so readily adopted by many behaviorists suggests that the ubiquitous mentalism of commonsense language is not being identified and effectively resisted. Perhaps it is time for a little "consciousness raising" with regard to such issues, for which purpose a re-reading of "Why I am not a cognitive psychologist" (Skinner, 1978) would be a good beginning.

[2]There are possible exceptions to the requirement of this particular type of history. Stimulus control *can* develop as a function of nondifferential reinforcement. See MacIntosh, 1977, p. 489 ff. for a review of this issue. It is also possible that the S^D relation can be developed simply by pairing a neutral stimulus with one that already functions as an S^D. Morse and Skinner, 1958, provide a possible example of this. And one must certainly consider the various kinds of rule-governed development of S^Ds in humans; see Skinner, 1957, p. 357-362. These exceptions, however, should not be taken as encouragement to rely on only the first feature of the definition, i.e., differential strength in the presence of the stimulus. The general importance of the other defining features is well established and their suspected irrelevance in any particular case should be closely examined.

REFERENCES

MacIntosh, N.J. Stimulus Control. In W.K. Honig and J.E.R. Staddon (Eds.). *Handbook of Operant Behavior.* Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1977.

Morse, W.H. and Skinner, B.F. Some factors involved in the stimulus control of operant behavior. *Journal of the Experimental Analysis of Behavior,* 1958, *1,* 103-107.

Nevin, J.A. Response strength in multiple schedules. *Journal of the Experimental Analysis of Behavior,* 1974, *21,* 389-408.

Skinner, B.F. *Verbal Behavior,* New York: Appleton-Century-Crofts, 1957.
Skinner, B.F. Why I am not a cognitive psychologist. In B.F. Skinner, *Reflections on Behaviorism and Society,* Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1978.