On the Distinction Between Positive and Negative Reinforcement

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I have always found Michael's (1975) arguments for eliminating the distinction between positive and negative reinforcement compelling, even more so after having conducted a number of studies on applied aspects of negative reinforcement (Iwata, 1987) than when I first read the article in 1975. However, the distinction not only has remained but has become more pronounced, at least in the applied literature. A keyword search for *negative reinforcement* in the *Journal of Applied Behavior Analysis* yielded 80 citations. Of these, 16 appeared in Volumes 1 through 20, whereas 64 appeared in Volumes 21 through 37. Thus, in reiterating Michael's concerns and adding new ones, Baron and Galizio (2005) do a service to the field by prompting us to reconsider an unresolved issue in terminology.

The authors of both articles took a similar approach: They enumerated several ways in which positive and negative reinforcement might differ and then argued effectively against them. The question remains: Given the ambiguities arising from attempts to classify certain stimulus changes as "presentation" versus "removal" and the similarities between processes described as positive and negative reinforcement, why does the distinction persist? Little was mentioned about why we continue to use the terms, except to suggest that they are too well established in our vocabulary (Baron & Galizio, 2005) and that terminological change at this point

seems too effortful (Michael, 1975). Neither explanation implies any particular reason why retaining the terms *positive* and *negative* might facilitate research or practice, so I will offer several, although I am not a proponent of retaining the distinction but simply one who sees some uses for it.

1. Many stimulus changes involve pre- and postchange conditions in which it is possible to determine that the relevant stimulus is present or absent.

Michael (1975) and Baron and Galizio (2005) pointed to the fact that reinforcement involves operations that might not easily be described as the presentation or removal of a stimulus (Michael cited changes in shock intensity as an example; Baron and Galizio cited changes in temperature). Michael limited this concern to stimulus changes along a continuum and emphasized the importance of specifying carefully both the pre- and postchange conditions, as well as the difference between the two, rather than simply referring to "presenting" or "removing" stimuli. There is no question that examples such as these blur the distinction between stimulus presentation and removal, but are there many such examples?

Baron and Galizio extended the issue beyond what Michael proposed by noting that (a) food presentation (positive reinforcement) also reduces a state of deprivation (negative reinforcement), (b) escape from shock (negative reinforcement) might be attributed to the onset of stimuli correlated with safety (positive re-

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inforcement), and (c) delivery of money (positive reinforcement) ends a moneyless period (negative reinforcement). I view it somewhat differently. To say that food is delivered refers to actions of the experimenter; however, to say that deprivation is reduced refers to the reversal of a condition that also must be attributed to actions of the experimenter (withholding food). Similarly, terminating shock does not seem to involve delivery of safety per se but, rather, reversal of a condition in which a *specific* stimulus (shock) was presented. Finally, delivery of money may or may not end a moneyless period, but it does result in the increased availability of money. So, in the case of food, the relevant contrast is one in which a prechange condition (no food delivery) is followed by a postchange condition (food delivery). Although one could dispense with the word *delivery* to describe the difference between the pre- and postchange conditions, the fact that food is delivered only in the postchange condition seems clear to me.

To the extent that most reinforcement contingencies involve pre- and postchange conditions in which specific stimuli (food, shock, money, praise, tokens, etc.) are present in one condition but absent in the other, the transition between conditions can easily be described as one involving presentation or removal by the experimenter and classified as positive and negative reinforcement, respectively. Stimulus changes along a continuum are more difficult to classify because both involve delivery, but the changes still involve either increasing or decreasing some characteristic of the stimulus. Whether such parametric changes function as positive or negative reinforcement requires more extensive analysis, and herein lies the value of the concerns expressed by Michael (1975) and Baron and Galizio (2005).

2. *Identifying the critical difference between the pre- and postchange con-*

ditions of reinforcement facilitates the development of effective contingencies.

In referring to research on the functional analysis of problem behavior, Baron and Galizio (2005) ask, "Is it better to speak of the consequence [for problem behavior] as increased attention or as relief from loneliness? Of escape from an aversive task or of access to an alternative activity? Either description appears appropriate" (p. 91). If the authors are willing to accept my substitution of "ending a period in which attention is unavailable" for "relief from loneliness," I agree that wording may not matter much from a purely descriptive standpoint. However, something may be gained by identifying the nature of the stimulus change that serves as reinforcement. Knowing that the delivery of attention serves as a positive reinforcer for problem behavior may help to identify situations (prechange conditions) in which attention would and would not be effective as a reinforcer, to examine effects of the opposite type of stimulus change (removing or withholding attention), and to identify other stimulus changes that have the same effect as either the delivery or removal of attention.

The example of work termination is even more important. Osborne (1969) noted that free-time contingencies involve both termination of ongoing work and access to alternative activities, and determining which of these stimulus changes serves as reinforcement may be important to the development of effective free-time contingencies. If termination of the work requirement per se functions as reinforcement, little additional information is needed because one could program an effective free-time contingency without consideration of what is available during free time. By contrast, if the nature of the alternative activities available during free time is an important determinant of the reinforcement effect, then simply terminating work would be

expected to have little therapeutic value; that is, more careful consideration must be given to the postchange condition that is delivered than to the prechange condition that is terminated (see Zarcone, Fisher, & Piazza, 1996, as an example).

Finally, identifying the stimulus change that serves as reinforcement may be helpful in determining how to best implement extinction. If work termination serves as reinforcement, extinction must involve the continuation of work. However, if access to activities during free time serves as reinforcement, continuation of work is unnecessary to produce extinction (i.e., preventing escape is unimportant), but limited access to alternative activities during the escape period probably is.

3. *Recent developments in the field suggest that subtle and perhaps arbitrary terminological differences may be functional.*

Laraway, Snyderski, Michael, and Poling (2003) recently introduced an expansion of the concept of establishing operations (EOs). To better accommodate the bidirectionality of EOs, Laraway et al. suggested the term *motivating operation* (MO) to include both EOs and abolishing operations (AOs). I have no argument against this expansion except to say that, based on the logic presented by Michael (1975) and Baron and Galizio (2005), one could argue that EOs and AOs can be forgotten entirely, leaving us with the MO as a more general substitute for all influences previously attributed to EOs. That is, the MO alters (increases or decreases) the reinforcing effectiveness of a given stimulus change and alters (increases or decreases) the probability of behavior that historically has produced that change.

It is unclear whether the EO–AO distinction will become commonplace; although unnecessary, it does

seem to describe different operations and may be useful in a number of ways that are yet to be identified. And that sums up my view on the distinction between positive and negative reinforcement—probably unnecessary but useful. Put another way, as long as the conditions labeled as positive or negative reinforcement (or as EOs or AOs) are described carefully, I do not see much harm in maintaining the distinction. Aside from the possible benefits noted above, it already has generated a great deal of research into similarities and differences between performance produced by the two types of operations and, with the aid of prompts provided by Michael (1975) and Baron and Galizio (2005), it highlights the importance of further research on the effects of parametric stimulus changes, which are relevant not only to a consideration of reinforcement effects but also to a consideration of extinction and punishment effects.

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