

Comment on finding "frustration effects" instead of secondary reinforcement by Louis J. J. Bruno

Longstreth's study (1966) attempted to answer the question: Do "frustration effects" really occur in a study designed to demonstrate secondary reinforcement? It used two groups of children whose crank-turning responses were initially maintained by a variable-ratio schedule (Ferster & Skinner, 1957) in which the median number of responses per reinforcement (a poker chip) was eight. Each group made the same number of responses and produced the same number of reinforcements before extinction was programmed. The groups differed only in the sequential placement of an added stimulus (a blue light), whose duration was timed from the end of one response to the end of the next. For the experimental group, the added stimulus occurred after the last unreinforced response of a ratio and ended with poker chip delivery; for the control group, it occurred when one-third of the ratio had been completed. In extinction, which ended after more than 1 sec., or after three shorter periods, without a response, the added stimulus occurred for both groups after every ninth response.

Although the extinction criteria would probably not distinguish extinction from variable-ratio behavior—pauses longer than 1 sec. often occur in maintained responding—they did distinguish the extinction behavior of one group from that of the other. Since the experimental group reached the criteria first, Longstreth concluded that secondary reinforcement was not demonstrated for the added stimulus, although it was predicted, so that a "frustration effect" might reasonably be invoked. Unfortunately, this conclusion cannot be drawn, since Longstreth's study could not have demonstrated secondary reinforcement, even had the control group reached the criteria first. It is simply not possible to demonstrate the reinforcing function of a stimulus apart from its discriminative function, unless it is shown that the stimulus which reinforces a response cannot also set the occasion for its occurrence (Kelleher & Gollub, 1962). In other words, to show that a stimulus increases the probability of the response it follows, a design must ensure that the stimulus cannot also determine the probability of that response when it precedes it. It is clear that Longstreth's added stimulus came both before and after, and also coincided with some occurrences of the operant he measured, and thus was not operationally restricted to any one function, reinforcing or discriminative.

It is unreasonable, however, to assume that the added stimulus served no function. Sidman (1960, pp. 101-104), for example, argues that the probability of a response will not return to its operant (unconditioned) level until each of the stimuli previously associated with a schedule

of primary reinforcement no longer controls responding. The point, for Longstreth's study, is that where operant level data are not reported, it is conservative to assume that response probability in extinction reflects the continued control of reinforcing or discriminative stimuli. Still, without operationally restricting its function, it is impossible to predict what control, if any, the added stimulus acquired in each group, and similarly impossible to predict the control exerted by the stimulus during extinction. If, however, it is necessary to distinguish analytically stimulus functions which were not distinguished operationally, it is equally appealing to invest the added stimulus with discriminative control. For the experimental group, the stimulus might have set the occasion for exactly one more crank-turning response; for the control group, it might have cued at least two, maybe ten more responses. More responses in extinction would be predicted, then, for the control group, and it would take longer to reach the extinction criteria.

The vagaries of after-the-fact predictions might be avoided by attempting to answer, instead of Longstreth's, a question more suitable to his independent variable. That is, "how does variable-ratio behavior change when the sequential placement of an added stimulus is varied?" A parametric study comparing the behavior obtained under the different stimulus placements with that maintained by the same schedule without the added stimulus should be able to answer this question. Inferences from extinction responding would be unnecessary since the behavior actually controlled by the stimulus would be available for and constitute the primary data of analysis. An experiment of this nature (cf., Farmer & Schoenfeld, in press) examines the behavioral sequence maintained between primary reinforcements (variable-ratio schedule without added stimulus) by systematically adding the same stimulus at different points in the sequence. It does not attempt to demonstrate effects, but rather to observe the relationship of ongoing behavior to the intrusion of an experimentally-specified stimulus.

References

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