Comment

JOSEPH W. BERNHEIM, UNIVERSITY OF PENNSYLVANIA,
Philadelphia, Pa. 19104

Biederman (1967) presents data which he considers to demonstrate that a non-reinforced discriminative stimulus (S-) when trained without errors does have inhibitory properties. Two groups of Ss, which differed in the number of responses made to S- in acquisition, were compared on probe trials in which one of the discriminative stimuli and an unfamiliar "neutral" stimulus (S°) were simultaneously presented on two response keys. One such choice occurred at the end of each discrimination session, and, averaged across Ss and across all eight training days, yielded 74% choice of S° when paired with S- for the group which learned with relatively few errors, and 70% choice of S° over S- for the group with many errors. On the basis of these results Biederman concludes: "It would seem that S- is inhibitory for both errorless and nonerrorless learners."

There are two possible justifications for the claim that an errorless S- is inhibitory: (1) absolute choice data; that is, S° is chosen more frequently than the errorless S-; (2) relative choice data; that is, the errorless group chooses S° over S- at least as often as the nonerrorless group. However, the experimental design vitiates both of these justifications.

The absolute choice results are meaningless because no attempt was made to assess the true neutrality of S°, nor were S° and S- counterbalanced. It is not implausible to assume that the preponderance of choices for S° were due to a response bias for S°. This assumption is supported by the fact that choices for the reinforced discriminative stimulus when paired with S° did not exceed 80%, although the procedure explicitly reinforced responses to the positive stimulus. Thus, absolute choice of S° over S- does not confirm the hypothesis that an errorless S- is inhibitory.

Conclusions based on a comparison between the errorless and nonerrorless Ss are tarnished by the fact that the two groups were derived not by a specific experimental manipulation (such as fading-in S-; see Terrace, 1966a), but by ex post facto selection. All Ss experienced the same training procedure; those that happened to learn with few errors were assigned to one group, those with many errors to another group, while Ss with intermediate error scores were discarded from data analysis. Given this method, which does not assign Ss randomly to each group, one must inquire as to the possible differences among Ss that would lead a particular S to make few or many errors, and hence to be assigned to the errorless or nonerrorless group. In all likelihood the crucial difference between the two groups was an initial response bias with regard to S-. In other words, those Ss that were destined to make fewer errors were those Ss that had a weaker tendency to respond to S- before any discrimination training had taken place.

If this assumption is correct, then early in training the errorless Ss should show a greater frequency of S° choice than the Ss that learn with errors. Furthermore, if, as Terrace (1966a) claims, errors made in the process of discrimination learning cause S- to become inhibitory, then the choice data should shift toward S° as a function of training for the Ss that learn with errors, but not for errorless Ss. Reexamination of Biederman's results confirms both of these predictions. Table 1 has been computed from Biederman's Fig. 2 and shows the per cent choice of S° vs S- for both groups both early and late in training. The slight increase in choice of S° for errorless Ss is consistent with the fact that these Ss make a modest number of errors in discrimination learning. Thus, Biederman's own results support a conclusion quite contrary to the one he puts forth; indeed, they suggest that the inhibitory strength of an S- is directly related to errors made in discrimination learning.

Biederman's experiment was interpreted as refuting Terrace's

Table 1
Per Cent Choice of S° When Paired With S-

	After Trials 25-150	After Trials 175-400
Errorless Learning	71%	77%
Learning With Errors	61%	81%

(1966b) claim that an S- trained without errors is not inhibitory. The above reevaluation of Biederman's data supports Terrace's conclusion. Unfortunately, Terrace's claim is based on an experiment that is contaminated by procedural flaws similar to those criticized above, and a reevaluation of Terrace's data can support neither conclusion. Terrace's Ss all confronted the same discrimination between a vertical line on a white background (positive stimulus) and a monochromatic nonpatterned stimulus (S-). Some Ss made many errors and some made few errors learning this discrimination; and, once again, an ex post facto assignment to errorless and nonerrorless groups was made. Generalization gradients were then obtained around S- along the wavelength dimension, which was assumed to be orthogonal to the dimension of the discrimination learned. Virtually no responses were made to any of the stimuli in the generalization test for the errorless Ss, while nonerrorless learners showed U-shaped gradients centered on S-. Terrace interpreted the flat zero gradients of errorless Ss to indicate a lack of inhibitory control of S- learned without errors. It is likely, however, that the procedure selected as "errorless" those birds with an initial predisposition not to respond to nonpatterned monochromatic stimuli. In this light the failure to obtain inhibitory gradients from these Ss should be understood simply as the result of a zero baseline.

Deutsch (1967) has taken issue with Terrace's conclusion, and argues that the flat gradients obtained for errorless Ss actually indicate greater inhibitory strength for the errorless S- when compared to the S- learned with errors. This conclusion is likewise unnecessary if one assumes that a different baseline of responding to monochromatic nonpatterned stimuli was the biasing factor in the selection of the two groups.

Terrence's (1966b) data can neither support nor deny the assertion that an errorless S- is not inhibitory, although other evidence put forth by Terrace (1963a, 1963b, 1964, 1966a) argues convincingly to that point. Furthermore, Biederman's (1967) results, if anything, support Terrace's theoretical assertion. It is suggested that, in future work, either pretreatment response biases be carefully assessed, or, preferably, Ss be randomly assigned to groups and that the course of discrimination learning be modulated by suitable experimental manipulation.

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