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ABSTRACT

The author initially cites the associationistic position of Spiker and the perceptual learning position of E. Gibson and concludes that the existing data does not clearly support either hypothesis. He describes a new approach designed to test these explanations of the role of verbal pretraining on subsequent discrimination learning. It consists of verbal repetition (satiation) of the names previously learned to the objects. Fifty-one white middle-class preschoolers were subjects. The procedure was extensively outlined and included three phases: (1) Discrimination Training; (2) Satiation; and (3) Criterion Task. The data collected was clearly in accord with the predictions from perceptual learning theory and contrary to those of associationism. The author concludes, however, although Gibson's position was supported, it lacks a specificity of mechanism which seems, at present, to preclude a very direct test of it. [Not available in hard copy due to marginal legibility of original document.] (TL)

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A Test of Two Explanations of the Role of Verbal Pretraining on Subsequent Discrimination Learning[1,2]

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There is an extensive literature demonstrating that learning distinctive names to relatively indistinguisable stimuli produces rapid learning on a subsequent two-choice discrimination of those stimulus (Cantor, 1965; Reese, 1968). The mechanism underlying this effect has been investigated from several theoretical points of view. While they are not exhaustive, the associationistic position delineated by Spiker (1963) and the perceptual learning position of E. Gibson (1969) have been the main and most clearly different protagonists.

Spiker has very clearly outlined an associationistic mechanism to account for the effect. This model maintains that learning distinctive names to similar stimuli yields a distinctive response produced cue attached to each of the stimuli. The stimulus objects can then be relatively quickly discriminated in a two-choice task because the correct response is associated with a distinctive stimulus complex: one of the similar stimulus objects plus its attached distinctive response-produced cue. The model, schematically presented in Figure 1, and the process it depicts is termed acquired distinctiveness of cues (ADC).

Figure 1 about here

Gibson's perceptual learning hypothesis is less clear about the functioning of mechanism; rather, it stresses the product of the name - object learning. The hypothesis states that learning distinctive names to similar objects forces S to attend to subtle, but distinctive features which differentiate the objects. These distinctive features, when once perceived,

provide the basis for relatively fast learning to choose one of the objects in a subsequent two-choice discrimination. Gibson (1969) refers to the overall effect as predifferentiation.

Efforts to provide experimental tests of these two hypotheses are summarized in Gibson (1969), Spiker (1963) and Reese (1968). It seems fair to conclude, that the existing data do not clearly support either hypothesis to the exclusion of the other. Rather, the research seems to have had the effect of forcing each position to consider more carefully what it would consider an adequate test of its hypothesis (cf. Gibson, 1969 and Reese, 1968).

The purpose of the present research was to investigate a new approach to the problem. This approach consists of verbal repetition (satiation) of the names previously learned to the objects. The significance of this technique is that it can also be used in other paradigms thought to reflect associationistic processes. Specifically, the three-stage chaining paradigm is considered to involve a sequence of associations. As noted above, Spiker's model of the effects of name - object learning postulates an associationistic process. Consequently, verbal repetition of the linking term in three - stage chaining and the response producing cue in verbal pre-training paradigm should produce similar effects.

Cook and Smothergill (1970) investigated chaining in preschoolers by having them learn three lists of paired-associates conforming to the A-B, B-C, A-C paradigm and the A-B, D-C, A-C control paradigm. It was found that preschoolers learned the third term significantly faster if a mediating link (B) had been previously established than if it had not been (D). The result acquired pertinent to the present research was that verbal repetition of the mediating term (B) interfered with third-list learning.

The aim of the present research was to determine if the same results would occur when the same operation - verbal repetition - was used in the verbal pretraining paradigm. With reference to Figure 1, the question was whether repetion of ra and rb, after each had been learned to its respective object, would interfere with a subsequent two-choice discrimination in which S1 and S2 were the stimulus objects.

The associationistic position should predict that repetition of the terms responsible for the existence of the distinctive cues would interfere with subsequent learning. This prediction derives from the theoretically similar associating of stimuli and responses postulated to be operating in both paradigms. On the other hand, the hypothesis derived from Gibson's theory makes a different prediction. If learning to name objects functions to isolate features which distinguish them, the names are theoretically irrelevant thereafter for maintaining the discriminability of the objects. Hence, according to Gibson's theory, repetition of the names should not interfere with the facilitation of learning usually found as a result of verbal pretraining.

METHOD

Subjects Fifty-one white, middle class preschoolers, mean age of 4.6 years, served as Ss. All were enrolled in a laboratory nursery school associated with the Syracuse University Psychology Department. One more girl than boy served in the experiment.

Apparatus Two very similar line drawings of a boy's face were mounted on a cardboard backing. The drawings were similar to those used by Cantor (1955). A simple display stand, resembling a lectern was used to present the drawings in the third phase of the experiment. Two small hollows were created on the diagonal backing of the stand to conceal a reward.

Procedure The Ss were randomly assigned to one of three groups: Satiation (S), No Satiation (NS), and Control (C). The experiment was conducted as follows.

Phase I: Discrimination Training. After an S from either Group S or NS was seated in front of E he was read the following instructions: "Today I want you to meet two young boys." A picture of "Pete" (or "Tom") was then presented and S was told the boy's name. The S was told to look carefully at the picture. It was then removed and a second picture was presented. This picture was introduced as Tom (or Pete) and S was told to observe it carefully. After allowing a short interval for inspection the picture was removed. The E then said: "Now I am going to show you the pcitures again and this time I want you to tell me the name of the boy in each picture." The pictures of Pete and Tom were then individually presented in a random order. Upon each presentation S was asked: "Is this Tom or is this Pete?" If the correct name was given E smiled and said "good" or "that's right." Incorrect responses were corrected. This procedure continued until S reached a criterion of 9 out of 10 correct responses.

Phase II: Satiation. Group S received the following procedure immediately after Phase I. The S was told: "Now I would like you to say the name "Pete" (or "Tom") over and over again until I tell you to stop. OK? When I say 'go' you say Pete, Pete, Pete, etc. until I tell you to stop. Do you understand? OK 'go'." S was given 30 seconds in which to repeat the word. E recorded the number of times the word was spoken in this interval.

S was then told: "This time I want you to say "Tom" (or "Pete") over and over again until I tell you to stop. Remember, when I say 'go' you say Tom, Tom, Tom, etc. until I tell you to stop. Do you understand?

OK 'go'." Again E recorded the number of times S repeated the word during the 30 second interval. Order in which the words were repeated was randomly determined for the first of each consecutive pair of Ss in group S.

The Ss in group NS were engaged in conversation with E for a time interval equivalent to that of the repetition procedure of the experimental Ss.

Phase III: Criterion Task. All groups were run identically in Phase III. The Ss were shown the pictures of Pete and Tom on a small lectern. The pictures were removed revealing a small well behind each. The Ss were shown a red peg and told their job would be to find it on each trial.

The peg was always placed behind the same picture, the position of the picture (left or right) being randomly determined on each trial. If S made a correct response E smiled and verbally indicated approval (that's good! You found it!). A non-corrective procedure was used if S made an incorrect response. This procedure continued for 30 trials at which point S was told that he had found the peg a number of times and that he had done very well in the task.

To summarize the procedure: Groups S and NS received the Phase I treatment; Group S received the Phase II treatment; and, all groups were run through Phase III.

RESULTS

The number of correct responses in each of 6 blocks of 5 trials was calculated for each S. It was apparent that variability within each group was large; therefore, the number correct attained by each S in each block of trials was transformed by the statistic $\sqrt{x + .5}$. A 3 (Groups) x 6 (Trial Blocks) analysis of variance was performed on the transformed scores. Results for this analysis are presented in Table 1.

Table 1 about here

Since the Trial Blocks and interaction terms were not significant they were excluded from further analysis. The significant Groups effect ($p < .025$) was broken down into three pair-wise comparisons in order to evaluate the predictions of each theory.

Both theories predicted that Group NS should make more correct responses than Group C and this did occur ($t = 2.79$, $p < .005$; 33 df.) The associationistic and perceptual learning hypotheses made different predictions about the outcome of the remaining two comparisons. First, and more crucial, the associationistic hypothesis predicted that Group NS would produce more correct responses than Group S, while the perceptual learning hypothesis predicted no difference between these groups. The perceptual learning hypothesis was supported ($t = 1.04$, $p > .10$, 33 df.)

Finally, the perceptual learning hypothesis predicted that Group S should make more correct responses than Group C. Associationism predicted no difference between these groups. Again, the perceptual learning hypothesis was confirmed ($t = 1.73$, $p < .05$; 33 df.

The mean transformed scores for the three groups are presented in Figure 2.

Figure 2 about here

Discussion

The data are clearly in accord with the predictions from perceptual learning theory and contrary to those of associationism. Several comments regarding the experimental strategy and derivations from the alternate hypotheses should be made.

First, no theoretical stance regarding the operation of verbal repetition was taken here. Various investigators have suggested that repetition functions by depriving the repeated word of its meaning, Jakobovits

& Lambert (1962), or by habituating the orienting reflex (Das, 1964). The experimental strategy adopted here was to use verbal repetition as a tool. Repetition should have similar effects to the degree that phenomena have a common explanation. Both chaining and verbal pretraining have been conceptualized within a framework that heavily involves the connecting of stimuli and responses.

Yet differences between chaining and verbal pretraining have been noted. Spiker (1963) stresses that in verbal pretraining, the effect of naming similar objects is to make "...the stimulus complexes of the second task...distinctive..." (p. 55). Yet the only schematic difference between verbal pretraining and chaining is that in the former a direct connection is hypothesized between the original stimulus and the criterion response in addition to the connection between the response-produced cue and the criterion response (cf. Figure 1). In the chaining model, the first stimulus is connected to the final response only through connections with intermediate stimuli and responses. The theoretical importance of this difference is unclear. Perhaps the direct connection between the original stimulus and the criterion response in the ADC model is only to acknowledge that the same physical stimulus is presented during discrimination learning. If so, the theoretical difference between ADC and chaining is even less clear.

Reese (1968) has proposed that the ADC model depicted in Figure 1 is too similar to chaining and thereby misses Miller & Dollard's idea that naming similar objects brings about a change in the stimulus complex. Reese's proposed modification is presented in Figure 3.

Figure 3 about here

Reese's model emphasizes that a change in the stimulus complex is brought about by naming similar objects. The stress is demonstrated by

having just one connection between the stimulus complex and the criterion response.

The argument might be put forth that Reese's model is no different from Gibson's proposal since both positions acknowledge that a new effective stimulus is created. The difference between the positions remains in how the new stimulus comes about. As noted above, Gibson maintains that subtle features, unnoticed originally, are subsequently perceived. Reese states, "... the labels ... are assumed to become part of the initial stimulus." (p. 261)

Reese's position implicitly postulates some kind of synthesization process or compounding which yields a new stimulus complex. This is a drastic departure from the traditional associationistic notion of independent S's and R's which are connected by conditioning. It is not clear how the associative process gives rise to synthesization; nor under what conditions it occurs.

Finally, it is obvious that Gibson's theory is lacking in specification of the mechanism by which distinctive features are perceived. The theory proposes that naming objects is a powerful route to isolation of distinctive features because it forces Ss to carefully attend to the objects and to search then for identifying characteristics. The mechanisms regulating the attention and search processes have not yet been described, however. In conclusion, the specificity of the traditional associationistic account of verbal pretraining permitted it to be tested and the results did not support it. While this result thereby supports Gibson's position, the lack of specificity of mechanism in that position seems, at present, to preclude a very direct test of it.

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Footnotes

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