Informative feedback conditions and verbal-discrimination learning in elderly subjects¹

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Verbal-discrimination learning was investigated in elderly Ss under three different informative feedback conditions: Right-Wrong (RW), Right-Nothing (RN), and Wrong-Nothing (WN). In contrast to studies with younger Ss, Group WN displayed a slower rate of acquisition than Groups RW and RN, with the latter two groups being comparable. A successive probability analysis indicated that the slower rate under WN resulted from a perseveration of incorrect selections.

Recent studies (Spence, 1966; Spence & Lair, 1965; Spence, Lair, & Goodstein, 1963) have related verbal-discrimination (VD) learning to the informative feedback condition extant during practice. Informative feedback involves varying verbal reinforcement contingencies following S's verbalization of his item selection for each pair. In the standard condition (Condition RW), E says "right" whenever S selects the right item and "wrong" whenever S selects the wrong item. Two variants of this standard condition involve the omission by E of either the "right" or the "wrong" verbal reinforcement. In the one (Condition RN), E says "right" whenever it is appropriate, but E fails to respond (i.e., says nothing) when S's selection is wrong. In the other (Condition WN), the contingencies are reversed. Spence and Lair discovered that these three conditions are equal in terms of their effects on VD learning, provided that S is informed as to the nature of the contingencies, for a broad spectrum of S populations—college students and noncollege adults (Spence et al, 1963), and normal children (Spence, 1966). However, in other populations, such as schizophrenics (Spence & Lair, 1965) and retarded children (Spence, 1966), the equality of conditions is less apparent. For example, in schizophrenics RW was found to be superior to other conditions. The present study tested for the differential effects of RW, RN, and WN in another "special" population, elderly Ss.

Method

Subjects. The 48 Ss were patients who had been hospitalized in Cochran VA Hospital (St. Louis) for general-surgical reasons. None of the Ss had a history, past or present, of psychiatric or neurological disturbance. They ranged in age from 55-79 years and in extent of formal education from sixth grade to some college. They were assigned alternately to three groups (N=16), Groups RW, RN, and WN, representing the reinforcement-informative feedback conditions of the present study. The mean ages were

66.9, 69.6, and 68.3 for Groups RW, RN, and WN, respectively. The median educational level for each group was eighth grade.

Learning task. The VD list was constructed from a pool of 24 high-frequency (A and AA categories; Thorndike & Lorge, 1944) four letter words (nouns and adjectives), selected so that interword associations and interword synonymity were minimized. The words were randomly assigned to 12 pairs, with one member of each pair, in turn, being randomly designated the R item and the other the W item. Each pair was typed on a 3 x 5 in. index card, with the items being placed centrally in a left-right spatial sequence. Three different serial orders of the 12 pairs were prepared for control over the use of spatial position as a discriminable cue.

Procedure. Each S was told that he was to examine each pair of words and call out the "right" item, beginning with the first trial. The Ss in Group RW were further told that E would say "right" when the correct item had been selected and "wrong" when the incorrect item had been selected. The Ss in Groups RN and WN were given further instructions explaining that E would say "right" when appropriate (Group RN) or "wrong" when appropriate (Group WN). The meaning of "nothing" as a response by E was carefully explained to both groups (as an indicator of an incorrect selection in Group RN and as an indicator of a correct selection in Group WN).

The pairs were exposed at a 4 sec rate, with a 4 sec interval between pairs and with an 8 sec intertrial interval. Practice continued to a criterion of one perfect trial or to a maximum of 15 trials, whichever came first. The Ss who reached criterion prior to 15 trials were given zero error scores for post-criterion trials.

Results and Discussion

A plot of mean errors across 15 trials revealed a near identity for the three conditions on Trials 1-6. However, for Trials 7-15 Group WN's proficiency fell consistently below that of Groups RW and RN, an event highly unlikely as a chance occurrence, whereas Groups RW and RN remained roughly comparable in error rate. In order to test statistically the differential trends in acquisition rates between Group WN and the other two groups, errors for each group were grouped into three blocks of five trials per block. Summary statistics for error by blocks

Table 1. Means and Standard Deviations for Total Errors and Errors on Blocks of Trials

Group	Trials							
	1-5		6-10		11-15		Total	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
RW(n=16)	20.38	7.80	12.19	10.50	8.50	10.44	41.07	27.55
RN(n=16)	22.31	7.04	11.81	9.67	8.19	7.56	42.31	24.07
WN(n=16)	20.31	5.89	13.44	8.21	10.75	10.60	44.50	22.72

are given in Table 1. A 3 by 3 mixed analysis of variance, with reinforcement conditions as the between-group variable and trial blocks as the within-group variable, revealed a nonsignificant main effect for reinforcement conditions ($F < 1$) and a highly significant main effect for trial blocks ($F = 99.89$, $p < .001$). The reinforcement conditions by blocks interaction effect fell short of statistical significance ($F = 1.79$, $p > .10$). However, an orthogonal analysis of the linear trends across blocks for the three reinforcement conditions revealed that the WN vs RW, RN comparison was statistically significant ($F = 5.26$, $p < .05$). That is, the trend in mean error scores over trials did vary between reinforcement conditions, with the variation being attributable to the WN condition relative to the other two conditions. The difference in trends for Groups RW and RN (i.e., the RW vs RN comparison) did not approach significance ($F < 1$). Further evidence for the surprising inferiority of Group WN, relative to Groups RW and RN, during the later stages of practice is evident from a trials analysis. The mean and standard deviation for the number of trials received by each S were 11.12 and 4.30, 11.12 and 2.11, and 13.69 and 2.21 for Groups RW, RN, and WN, respectively. An analysis of variance revealed a significant effect for reinforcement conditions ($F = 3.76$, $p < .05$). Moreover, an orthogonal analysis indicated that the effect was due solely to the WN vs RW, RN comparison ($F = 7.52$, $p < .01$).

A successive probability analysis (Spence & Lair, 1965) attempted to isolate the process underlying the differential rates of acquisition for WN vs RW

and RN conditions. In this analysis, percentages are computed for pairs answered correctly on Trial n and again on Trial $n+1$ and also for pairs answered incorrectly on Trial n and correctly on Trial $n+1$. Successive probabilities were determined for each S on Trials 1-2, 2-3, and 3-4. All three groups showed similar trends for correct-to-correct pairs, with percentages increasing steadily across trials. Groups RW and RN also displayed regular increments across trials for incorrect-to-correct pairs. However, Group WN displayed a decrement across trials (55.6%, 49.5%, and 30.5% for Trials 1-2, 2-3, and 3-4, respectively). That is, "wrong" informative cues that were perceptually isolated by virtue of being the only overt reinforcements given by E seemed to increase the repetition of incorrect selections, rather than to promote their active avoidance on succeeding trials. This finding is not characteristic of younger Ss (Spence et al, 1963) and may represent an aging phenomenon. A frequency theory of VD learning (Ekstrand, Wallace, & Underwood, 1966) hypothesizes that discriminative cues for selecting right items within pairs consist of differential frequencies of responding to right and wrong items. Perseveration of incorrect responses by elderly Ss under the WN condition may add sufficient frequency units to wrong items to make discriminations based on differential frequency difficult.

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Note

1. The writers are indebted to Karen Gatto for the collection of the data.