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RETROACTIVE INHIBITION OF CONNECTED DISCOURSE AS A FUNCTION OF PRACTICE LEVEL [1]

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Retroactive inhibition (RI) varies inversely as a function of the degree of practice on original learning (OL) (McGeoch, 1929; Briggs, 1957), and, up to intermediate levels of interpolated learning (IL), directly as a function of the degree of practice on IL (McGeoch, 1932; Melton & Irwin, 1940; Underwood, 1945). All of these studies used nonsense syllables or other unconnected materials. However, there is doubt about the susceptibility of connected discourse to RI, particularly when rote retention measures are used (McGeoch & McKinney: 1934a, 1934b). We have been unable to find any evidence in the published literature that verbatim recall of prose is subject to significant RI. However, some preliminary work from this laboratory, using a group testing procedure, gave encouraging results (Slamecka, 1958), and the general importance of this problem warranted further investigation.

The present study was designed as a more precise test to determine whether varying degrees of practice would have the same effect upon the recall of connected discourse as they have upon unconnected materials. Specifically, it was hypothesized that the rote retention of a passage of prose is subject to RI, and that its recall is a direct function of amount of practice in OL and an inverse function of amount of practice in IL.

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METHOD

Subjects and materials.—Thirty-six students in general psychology at the University of Vermont served as *S*s as part of the requirements of the course. Each *S* served in four 40-min. sessions, the first being a practice period. Each session followed the RI paradigm, with OL, IL, and relearning of the OL passage by the method of serial anticipation. The materials were eight 20-word sentences, all taken from the same book source, modified slightly for length. Each word was exposed on the memory drum for 3 sec. Thus each trial took 60 sec., followed by a 6-sec. intertrial interval. The passages were grouped into four pairs, one of which was used for practice, and the others for the experiment proper. The first passage of each pair was for OL and the second for IL. The following three pairs of passages were used in the experiment proper:

(*a*) We must postulate that from strictly semantic points of vantage, most confusions in communication revolve about inadequate stipulation of meaning.

Communicators can exercise latitude in specifying meaning however they choose, provided that such definitions correspond somewhat closely to customary usage.

(*b*) So habitual become our expectations about symbols invariably possessing referents, that we tend unconsciously toward such assumptions concerning every word.

When words are utilized ostensibly as symbols although lacking appropriate referents, then perilous depths of semantic ignorance have been reached.

(*c*) However in most instances, linguists are predominantly concerned about determining the concrete denotations of discrete words functioning as proper names.

Much evidence regarding the inference of authentic meanings which are not stipulated, is derived from context analysis within the passage.

TABLE 1

MEANS AND *SD*s OF TOTAL CORRECT ANTICIPATIONS PER *S* DURING OL AND IL ACQUISITION

IL Trials	OL-2		OL-4		OL-8	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
	OL Acquisition					
0	18.00	5.00	40.33	12.88	105.17	21.16
4	17.42	6.38	40.17	8.69	107.17	22.12
8	16.33	5.57	44.50	11.30	97.33	22.24
	IL Acquisition					
4	32.58	8.6	37.08	15.66	43.83	11.24
8	89.00	21.27	109.25	20.22	114.75	26.10

Design and procedure.—A mixed factorial design (Lindquist, 1953, Type II) was used. One variable was the degree of OL practice (2, 4, and 8 trials), and the other was the degree of IL practice (0, 4, and 8 trials). Of the nine possible combinations of these levels of both variables, each *S* was given three, in such a manner that he had all levels of each variable but no repetitions of any level. The 36 *S*s provided 12 replications of the nine-cell matrix. Conditions were arranged so that the list pairs, sequence of sessions, and *S*s, were each counterbalanced with respect to the two main variables.

Each session began with two warm-up trials of color guessing. The colors appeared on the memory drum. Next, instructions for serial anticipation were given, followed by the appropriate number of OL and IL trials. In every case, 30 sec. elapsed between the end of OL and the start of IL, and 9.5 min. elapsed between the completion of OL and the OL relearning. To fill the temporal gap for the control (IL-0) and IL-4 conditions, a "rest activity" of color guessing was used in order to prevent rehearsal, while still preserving the set to respond to stimuli on the drum. Then, four relearning trials on the original passage were given, followed by three trials on the interpolated passage. Relearning of IL was done to motivate *S*s equally in the acquisition of OL and IL, thereby preventing laxness with respect to IL in later sessions.

TABLE 2

ANALYSES OF VARIANCE OF OL ACQUISITION AND RECALL

Source	*df*	Acquisition		Recall	
		MS	*F*	*MS*	*F*
Bet. *S*s	35	.031	.97	.069	1.07
OL × IL (b)	2	.016	.50	.142	2.20
Error (b)	33	.032		.065	
Within Ss	72	.165	17.85*	.114	2.93*
IL	2	.002	.20	1.088	28.06*
OL	2	5.629	608.67*	1.623	41.85*
OL × IL (w)	2	.006	1.25	.099	2.55
Error (w)	66	.009		.039	

* $P < .01$.

RESULTS AND DISCUSSION

Acquisition data for OL and IL appear in Table 1, in terms of the mean total correct anticipations per *S*. The OL data were subject to analysis of variance after a logarithmic transformation, and the results appear in the left half of Table 2. It is clear that increasing the OL trials, at every level of IL, produced a significant increase in the mean correct anticipations. Means within any IL level differed significantly from the adjacent means and there were no significant *F*s within any OL level. Analysis of the IL acquisition data indicated that increasing the

IL practice significantly increased the degree of acquisition. A tendency toward positive transfer was evident in that the IL means increased with increasing OL trials. Since this worked in a direction counter to the hypothesized effects of the main variables, the significance of the recall analysis, to follow, can only tend toward conservatism.

Table 3 shows the relearning of OL in terms of the mean total correct anticipations on each relearning trial. The recall data (first relearning trial) were analyzed after a log $(1 + X)$ transformation, and the relevant findings appear in the right half of Table 2. Both of the main variables were seen to be effective in determining recall. Within the levels used, recall as a function of OL practice approximates a linear function. An extrapolation through the OL-0 point gave a value of about two correct anticipations. It would be expected that even with no practice on such passages, *S* could guess a few words correctly by virtue of previous familiarity with the general language structure. Analyses within each OL level and within each IL level gave significant *F*s. Regardless of the degree of OL practice, the control group (IL-0) always recalled significantly more than the experimental groups (IL-4, IL-8). Thus, significant RI was obtained. It should be noted that the direction of effects of amounts of OL and IL was always as predicted even though all specific comparisons were not significant.

From the data of Table 3, relative RI $\left[\left(\frac{\text{Rest-Work}}{\text{Rest}}\right) \times 100\right]$, was calculated. The over-all RI was 43.0%. At IL-4 the relative RI for OL-2, 4, and 8, respectively, was 58.7%, 38.6%, and 24.3%. At IL-8 the values were 76.0%, 44.1%, and 34.7%, respectively. Thus, relative RI decreased as a function of increasing OL and decreasing IL practice.

The forgetting was rapidly dissipated within a few relearning trials. Table 3 shows that by the fourth relearning the differential effects of the interfering IL practice upon recall were largely dissipated, which

TABLE 3

MEANS AND *SD*s OF OL RELEARNING TRIALS

RL Trials	IL Trials	2 OL Trials		4 OL Trials		8 OL Trials	
		Mean	*SD*	Mean	*SD*	Mean	*SD*
1	0	8.67	3.00	9.08	4.06	14.42	3.80
	4	3.58	3.16	5.58	2.53	10.92	3.10
	8	2.08	1.98	5.08	3.62	9.42	4.90
2	0	11.75	1.79	13.16	4.33	16.83	3.41
	4	10.16	3.53	12.50	2.66	16.25	2.83
	8	9.08	3.82	12.16	4.54	14.33	4.06
3	0	14.75	2.58	14.75	3.74	17.91	3.22
	4	11.25	3.48	14.50	2.30	18.50	1.65
	8	11.83	3.93	14.50	3.75	15.66	3.10
4	0	15.25	3.19	14.75	4.44	18.91	2.10
	4	13.16	5.48	15.66	1.79	19.33	1.18
	8	13.33	4.56	15.58	3.22	17.00	2.47

TABLE 4

CLASSIFICATION OF ABSOLUTE NUMBER OF ERRORS AT RECALL

Error Class	IL-0			IL-4			IL-8		
	OL 2	OL 4	OL 8	OL 2	OL 4	OL 8	OL 2	OL 4	OL 8
Omissions	100	68	37	141	129	73	174	145	92
Intralist	10	32	18	8	10	16	13	12	7
Interlist	0	0	0	7	12	10	5	5	12
Extraneous	24	25	11	32	21	6	23	15	15

is in accord with the usual findings based on unconnected materials.

The types of errors that occur during recall are often scrutinized for hypotheses concerning the processes underlying RI. A tabulation of all responses classed as errors is presented in Table 4. There are four categories of errors: (*a*) omissions, i.e., no response was made; (*b*) intralist intrusions, i.e., incorrectly placed words from the original passage; (*c*) interlist intrusions, i.e., words from the interpolated passage; and (*d*) extraneous intrusions, i.e., words found in neither passage. The use of connected discourse makes it impossible to categorize all intrusions unequivocally. For instance, a response which is classed as an intralist error is still a word in *S*'s language, and may have really originated as an extraneous intrusion. In addition, since connected discourse is serial in nature, errors cannot be subject to the S-R intrusion analysis traditionally done with the A-B, A-C paired-associate paradigm. In spite of these inherent limitations the data appear to provide tentative hints regarding the distribution of response tendencies.

The error data support two generalizations. First, that the better the recall, the less likely is an error to be an omission. This is the tendency even when omissions are stated as percentages of all errors made. Thus, under conditions of maximum recall (OL-8 and IL-0), only 56% of the errors are omissions, whereas under conditions of minimum recall (OL-2 and IL-8), 81% of all errors are so classed. Considering the two variables singly, there is still a trend toward decrease in the percentage of omissions as OL increases, and also as IL decreases. If omissions are considered as covert errors, and all other errors are considered as overt errors, then the data suggest a shift in the covert–overt error ratio paralleling changes in recall, reminiscent of the formulation of Thune and Underwood (1943).

The second generalization concerns the appearance of interlist intrusions. The frequency of these errors has been used as the index to the degree of competition attributed to the interfering material. The data suggest that such intrusions (whether listed in absolute or percentage terms) are more frequent when OL and IL acquisition is about equal. In terms of the percentage of all overt errors accounted for by this category, higher values are found at the OL-8-IL-8 (35%), and the OL-4-IL-4 (28%) levels, where the two lists are at about equal strength. Such a tendency has been reported for unconnected materials by Briggs (1957) and others. It appears to be consistent with a differentiation hypothesis (Gibson, 1941) whereby competing

responses of near equal strength are most likely to produce such intrusions, as compared to response systems more differentiated from each other by unequal amounts of practice.

With respect to the two hypotheses tested in this study, the following conclusions are drawn. First, that the rote retention of connected discourse has been shown to be subject to significant RI, and secondly, that such recall varies directly with degree of OL practice and inversely with degree of IL practice. These results serve to confirm the previous preliminary findings (Slamecka, 1958) and support the extension of generalizations hitherto based on the serial learning of unconnected materials to the serial learning of connected discourse.

Summary

In the RI paradigm, *S*s learned passages of connected discourse by the anticipation method. Three levels of OL practice (2, 4, and 8 trials) and three levels of IL practice (0, 4, and 8 trials) were given, with appropriate counterbalancing in a mixed design. Results indicated that (*a*) OL and IL acquisition was a function of number of practice trials, (*b*) recall of prose was subject to significant RI, (*c*) recall varied directly with OL practice and inversely with IL practice, and (*d*) recall errors suggested a shift in the covert–overt error ratio paralleling recall, and an increase in interlist intrusions at points of near equal acquisition of the two passages. It is concluded that findings regarding degree of learning and RI, based on unconnected materials, can now be generalized to connected discourse.

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