Retention of Nonsense Syllables over Short Intervals of Time

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To those studies which have indicated the methodological inadequacy of the deductive type of theory proposed by Hull (3) for rote learning,* the present study should be added. The problem here is the investigation of the phenomenon of reminiscence and its measurement by latency as well as recall values, a problem occupying a central role in the Hull system.

Twenty-four college student subjects learned serial lists of 12 nonsense syllables by the anticipation method with a two-second rate of exposure per syllable, six seconds between trials. Each subject learned comparable lists under four counterbalanced experimental conditions and after two periods of practice learning. Each of the six sessions were one hour in length and on successive days. The control condition was continuous learning to two perfect recitations in succession. In the experimental conditions, rest pauses of two, five, or 20 minutes were inserted after partial learning: the first trial on which seven or more syllables were anticipated correctly. The subject named colors on specially prepared cards during the interval of no learning.

The latencies of the subject's responses were recorded kymographically through a microphone and amplifier system to signal markers which were reset by the mechanism of the drum turning. Complete verbal anticipation data were taken.

Results

The total number of correct responses on that trial in the control condition which followed the first trial having seven or more correct is used as the basis for comparing the recall scores in the experimental conditions after the insertion of rest periods. If reminiscence is present, the first recall trial of the experimental condition(s) must have a reliably greater value than the comparable trial in continuous learning. The data are presented in Table I.

The small increase in the mean recall score of the two-minute rest condition (2 in Table I) over the control condition (0 in Table I) is extremely unreliable and is not present at all in the five-minute rest condition (5 in Table I). Reminiscence, therefore, has not been demonstrated by mean recall scores under conditions supposedly optimal for its appearance (2, 6). This may well be merely a function of the high variability of scores and does not rule out the validity of the phenomenon.

* The present experiment is part of a larger work the remainder of which has been published elsewhere (5).

G. O. McGeoch (4) has suggested that mean recall scores may obscure the reminiscence effect because the subjects who gain in recall do not gain as much as an occasional subject may lose. She suggested a comparison of the number of subjects showing improvement with the number showing forgetting. An analysis of this type is presented in Table II. Although the evidence for reminiscence is supported by these data, the percentage differences lack statistical reliability.

Of all the suggested measures of reminiscence, the latency of response appears to be the most inadequate. Not only is the commensurable range of this variable extremely short (two seconds in this experiment),

Table I

Recall Scores on the First Trial After the Criterion of Partial Learning

	Experimental Condition			
	0	2	5	20
Mean recall	6.75	6.83	5.58	4.00
SEmean	.30	.30	.35	.25

	Mean Difference	S.E. mean diff.
Between 0 and 2	.08	.44
Between 0 and 5	1.17	.43
Between 0 and 20	2.75	.34

Table II

Number of Subjects Showing Improvement on the First Recall Trial After Partial Learning

	Experimental Condition			
	0	2	5	20
Recall Improvement	4	8*	3	0
Decreased Recall	12	8	18	24
Remained Same	8	8	3	0

but it is also subject to a number of determining conditions other than positive excitatory strength which Hull assumes as its major correlate. In any time controlled serial task involving subject reaction to material exposed for limited intervals, there is certain to be an influence of refractoriness to repetition as well as one attributed to the rhythm of presentation-response and its disruption. Both of these influences would tend to distort the latencies of the last portions of a serial task in the direction of greater latencies even though it is a well established fact in serial learning that excitatory strength increases from just past the middle to the end of the series.

* When improvement for the control and 2 condition are expressed as percentages, the percentage difference is .166; its S.E. is .123. N = 24.

If rest pauses are introduced, it is to be expected that latency values will recover to some extent but less in the latter portions of the series. This is contrary to the predictions of Hull who would have latency scores parallel those of excitatory strength as measured by recall successes in the series. The relevant data for recall scores on the first trial after rest are presented in Figure I, where the total number of recall failures are plotted as a function of serial position.

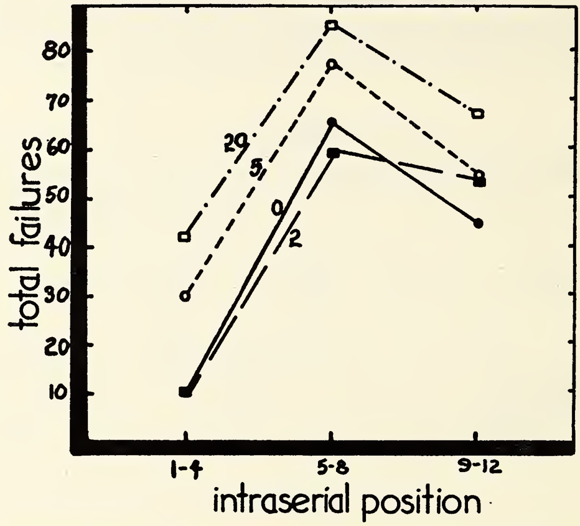

Fig. 1. Recall Failures as a Function of Serial Position. Grouped Data.

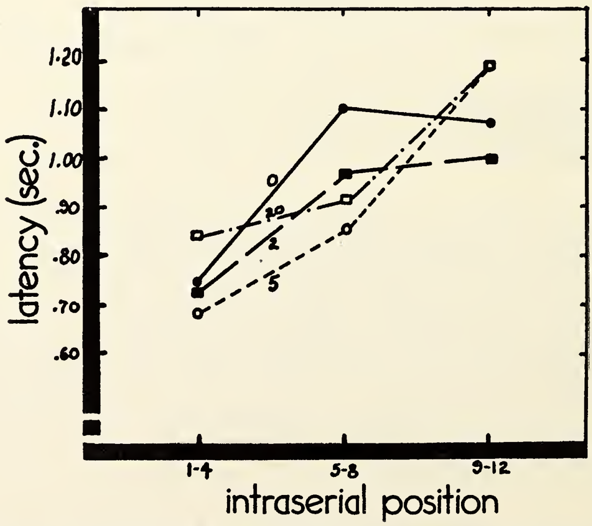

Fig. 2. Latency as a Function of Serial Position. Grouped Data.

The expected increase in excitatory strength in the latter portions of the series (as measured by decrease in recall failures) is evident. The control and 2-minute conditions are not reliably different.

In the case of latency values, however (Figure 2), it is to be noticed that latencies increased in the later serial portions in all experimental conditions even though they were shortened in the middle portions. The fact that the 20-minute rest condition is superior to the control reaffirms the view that latency values are determined primarily by factors other than excitatory strength; no one, to the writer's knowledge, has ever claimed reminiscence (under conditions similar to those used here) as late as 20 minutes after the cessation of formal practice (1).

Before latency values are used in the intricate machinations of deductive theory as a measure of the dependent variable (learning), it seems that a more exhaustive examination of that supposed dependent relation is in order. The present results indicate that latency may be an entirely different function of time interval duration than it is a function of excitatory strength as measured by recall.

Summary

Under experimental conditions supposedly optimal for the production of reminiscence—i.e., nonsense material exposed serially at a two-second rate, learned by the anticipation method, and with rest pauses of two and five minutes inserted after partial learning—the phenomenon was not reliably demonstrated by any of three techniques of measurement. The force of this conclusion is somewhat mitigated by the high variability of the data. It is suggested that latency of response is a poor variable to use as a measure of the dependent variation of learning behavior.

References

1. Buxton, C. E. The status of research in reminiscence. Psychol. Bull., 1943, **40**:313-340.
2. Hovland, C. I. Experimental studies in rote-learning theory. VII. Distribution of practice with varying length of lists. J. exp. Psychol., 1940, **27**:271-284. Consult bibliography for earlier studies in this series.
3. Hull, C. L., et al. *Mathematico-deductive theory of rote learning.* New Haven: Yale University Press, 1940.
4. McGeoch, Grace O. The conditions of reminiscence. Amer. J. Psychol., 1935, **47**:65-89.
5. Melton, A. W. and Stone, G. R. The retention of serial lists of adjectives over short time intervals with varying rates of presentation. J. exp. Psychol., 1942, **30**:295-310.
6. Ward, L. B. Reminiscence and rote learning. Psychol. Monogr., 1937, 49, No. 4.