Separate LTM and STM systems?

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This study investigated the effects of a previously learned item (LTM) and a newly learned item (STM) on the growth of within list proactive inhibition. It is shown that an item in LTM has a different effect on the within list PI than does an item in STM, thus supporting a dual theory of memory.

In a study of Short-Term Memory (STM) with retarded children (Scott, 1966) it was found that Proactive Inhibition (PI) did not increase in a session as a function of performance on five previously learned items but did rapidly rise to a maximum when a single new item was introduced. This observation is of importance in the disputed distinction between LTM and STM (Melton, 1963) for it suggests separate, or at least partially independent, storage systems.

A further disputed issue in STM has been the use of repeated measures with the same S. Keppel (1965) has argued that since PI accumulates across sessions Ss should only be used on a single list in STM studies. Peterson (1965) has presented some data to show that a 1 min. rest is sufficient for a marked recovery from PI in STM.

The present study was aimed at further examining these questions.

Method

The Ss were 48 paid female volunteers from the subject pool at the University of Illinois. None of the Ss had previously served in a verbal learning experiment. On appearance, the Ss were randomly assigned to an order of conditions.

The stimuli were 15 trigrams chosen from the 25% association value list of Witmer (Underwood & Schulz, 1960). They were chosen so that first, no consonant was used more than three times over the 15 trigrams and second, no consonant appeared three times in the same intra-trigram serial position. From these 15 trigrams 24 random order lists were made with the restriction that a particular trigram was used no more than twice, in the 24 tests, as the pretrained or "old" item. Each list was used with two Ss.

Other materials were three digit numbers, greater than 175, taken from a table of random numbers. These were presented to control rehearsal after the presentation of a syllable. The S was instructed to count backwards from this number by threes pacing himself with a small light that flickered once per sec.

The procedure of Peterson & Peterson (1959) was followed. The trigrams were presented in a pretraining block followed by experimental blocks. All blocks were separated by a 1 min. rest. The pretraining block consisted of six presentations and recalls of the trigram so that it might become well learned. The

same sequence was used for each presentation and recall throughout the experiment.

After the instructions the S attended to the window of a Stowe memory drum and the word *ready* appeared for 2 sec. This was followed in order by: a syllable for 2 sec., a number for 2 sec., a blank window during a counting interval of 25 sec., the appearance of three dots for 8 sec. to signal that S to recall, and finally, the word *rest* for 6 sec. If an S had not given a response, he was asked to guess in the last 2 sec. of the recall interval.

The experimental blocks were of two kinds. In the one kind all the presentations were of items assigned randomly from the list of syllables. In the other kind the first syllable of the block was the one that had been pretrained at the start of the session and this was followed by three items randomly assigned from the list of syllables. These blocks are designated New and Old Series respectively to describe the characteristic of their first item. Each S had a total of four blocks being two of the New Series and two of the Old Series. They were administered so that each of the six permutations of Old, Old, New, New, was used equally often.

Results and Discussion

Inspection of Fig. 1 shows the differential effects of old and new first items. A test of independent proportions comparing the first trigram of the Old

Fig. 1. Retention of single (CCC) trigrams, for the first block presented to each S, as a function of ordinal position in the block.

Fig. 2. Retention of single (CCC) trigrams, for block 2 (B2), block 3 (B3), and block 4 (B4), as a function of ordinal position in a block.

and New Series showed a significantly larger number of old stimuli were recalled than new stimuli ($z = 2.36$, $p < .01$). The number of correct responses for trigram 2 of the Old Series (the first new stimulus following the old stimulus) did not differ significantly from the number correct on trigram 1 of the New Series ($z = .672$, $p > .25$), but was significantly greater than the number of correct responses on trigram 2 of the New Series ($z = 2.31$, $p = .01$). This indicates that a previously learned item does not generate PI. Furthermore, trigram 2 of the New Series did not differ significantly from trigram 3 of the Old Series ($z = 1.16$, $p > .1$) showing that the first new item of the Old Series did have the same PI effect as the first item in the New Series.

The difference between trigram 1 of the New Series for block 1 and trigram 1 of the New Series for block 4 was tested to determine whether the 1 min. rest interval between blocks was sufficient for PI to dissipate. The test was based on the 32 Ss who were not assigned to both conditions. There were significantly fewer correct responses made in block 4 than in block 1

($z = 1.8$, $p < .05$) indicating that the PI had not dissipated during the rest interval. Figure 2 shows that the first trial of the New Series was also affected in blocks 2 and 3. Thus Peterson's methodological contention is not supported.

The fact that the PI did not dissipate during the 1 min. rest interval allowed an additional observation to be made regarding the relationship between a previously learned item and PI. It is seen in Fig. 2 that not only does an old item fail to produce PI, but the PI generated in the previous block dissipates during the trial with the old item. Thus for block 2 there are significantly more correct responses on trigram 2 of the Old Series than on trigram 1 of the New Series ($z = 1.7$, $p < .05$). This difference is in the same direction for blocks 3 and 4, although the test is not significant ($z = 1.35$, $p < .09$ and $z = .29$, $p < .39$ for blocks 3 and 4, respectively). Other data that we have obtained, and will report, provide a clearer demonstration of this effect.

Melton's (1963) argument for the continuity of LTM and STM emphasized the similarity of the laws applying to each. The present study examined the different effect of a well learned item, that is an item in LTM, as compared to a newly learned item, that is an item in STM, on the growth of within list or short-term PI. It is shown that an item in LTM has a different effect on the within-list PI than does an item in STM, thus supporting a dual memory theory.

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