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## Positive Transfer as a Factor in Memory

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## Positive Transfer as a Factor in Memory

RICHARD WELLINGTON HUSBAND

### I. *Problem*

It is but reiteration to observe that once a skill has been acquired or a problem solved, the second attempt at that or a similar task will be accomplished with greater efficiency, lesser expenditure of time or effort, or both. Such improvement may be due either to memory or transfer of training—memory when repetition of the same performance is requested at a later date, and transfer when a different but more or less similar task is to be done.

Memory is commonly measured by one of two principal ways: by amount retained, and by relearning. The latter method gives an index of retention in terms of saving, or economy, of time or some other measure over the score for the original acquisition. After a certain lapse of time, the subject is asked to bring again to perfection the material he once had learned. Relearning has often been claimed to be the fairest means of estimating retention, because, it is said, many elements may on the first relearning trial be subliminal, yet will come back to the subject so readily after one or two promptings that it would be unfair to assign him a zero memory score on these elements. The rapid reacquisition is evidence that he has retained them, but not clearly enough to reproduce them unaided without a little review.

It appeared to the writer that these facts, arguments, and explanations might as well be accounted for by transfer of training as by retention. For instance, suppose a subject learns a maze today in 600 seconds and a week or a month hence relearns the same pattern in 300 seconds. The traditional interpretation would be that the saving of 50 per cent represented remembering half of the material.

Why could we not with equal justification assert that the subject need not, or may have not, remembered one iota of that pattern, but that the fact that he had already learned one maze has suggested to him a better method of going about another learning task? Whether the second material is the same or new makes no difference to us right now.

This last comment gives a suggestion as to a fairly simple method by which this problem may be studied. If the method of attack—which we may term positive transfer—is what is responsible for the saving, then the learner should be able to learn a new maze, of similar general design but with a different sequence of turns, just as readily and just as rapidly as he can relearn the original maze.

### II. *Procedure*

Hence the technique of this experiment consisted in having a group of subjects learn a maze; then after a designated interval a

second appointment was kept, and the subjects were alternated between relearning the original pattern and learning a new maze. Our results can then be tabulated in terms of the comparative savings effected by the two procedures. In the terminology of transfer of training, we would say that the latter group could use only methods, while the former has the advantage of both methods and identical elements. Simple subtraction should furnish an indication of the proportion of memory supplied by each.

The mazes were of the well known U-design, elevated finger-tracing, ten turns in length. With college students, these require, including giving directions, 15-20 minutes. The subjects were all taken from beginning psychology classes, none having any experience in maze learning or any other laboratory task. Various groups were 50, 75, and 100 in number.

We shall report in substance the results of four different experiments.\* They were as follows:

(1) One week lapse. Subjects learned a maze, and returned, ostensibly "to learn another maze" one week later to the hour. Half were given the same pattern to relearn and half learned a new pattern.

The other three experiments concerned themselves with longer lapses of time. Since it is well known that meaningful material has greater retention value than rote material, it might well be that any superiority that *re*-learning has over learning a *new* pattern might vanish after a considerable lapse of time, since we could class methods of learning as meaningful, but memory for the exact sequence of turns as rote. Therefore,

(2) Experiment 2 had two weeks lapse;

(3) Experiment 3 had four weeks lapse; and

(4) Experiment 4 had six months interval. Subjects were followed up after a six months interval, and even though many were no longer enrolled in courses within the department, we secured excellent cooperation, and there was almost no mortality beyond those no longer in the university. This six months group should be crucial: memory of mode of attack might persist well, but memory for sequence of turns might have arrived virtually at the vanishing point.

### III. Results

Let us start with a broad summary, as presented in Tables 1 and 2. There are two main trends to our results. (1) Relearning the same pattern is somewhat more efficient than is learning of a new maze. (2) The gross differences between relearning and new learning are greater than between the new and original learning, with the one week group, but less after six months.

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The data were collected at the University of Wisconsin, and part of the results were previously reported at the American Psychological Association meeting at Pennsylvania State College in 1940—Psychol. Bull., 1940, 37, 491-2.

**Table 1. One week's lapse of time.**

|                                    | Trials | Errors | Time |
|------------------------------------|--------|--------|------|
| Learning First Maze.....           | 15     | 30     | 479  |
| Learning Second Maze.....          | 12     | 21     | 350  |
| % Saving .....                     | 20%    | 30%    | 27%  |
| Learning First Maze.....           | 19     | 38     | 575  |
| Relearning First Maze.....         | 10     | 11     | 212  |
| % Saving .....                     | 49%    | 67%    | 63%  |
| Difference between Re-L & L-2..... | 29%    | 37%    | 36%  |

**Table 2. Six month's interval.**

|                             |     |     |     |
|-----------------------------|-----|-----|-----|
| Learning First Maze.....    | 17  | 37  | 575 |
| Learning Second Maze.....   | 13  | 24  | 378 |
| Relearning First Maze.....  | 11  | 17  | 289 |
| % Saving: L-2.....          | 23% | 35% | 34% |
| % Saving: Re-L.....         | 36% | 54% | 50% |
| Difference: Re-L & L-2..... | 13% | 19% | 16% |

Precisely—with the one week group, learning a new maze was achieved with 27% savings over the time required to learn the original, while 63% was saved in relearning the original pattern. After six months the savings were 34% and 50% respectively. The two and four weeks groups followed similar trends.

Subtracting the percentages, the same pattern produced a difference of 36% in savings after a week, but only 16% when a gap of six months was inserted between original learning and the memory test. We see, then, that much of the memory for turns had vanished, but that remembering how to go about learning a maze supplied most of the savings over having to go about the new task as if one had never learned a maze before.

In addition to positive transfer, there is still another possibility, namely that the saving in learning a second pattern may be due entirely, or almost entirely, to eliminating the initial "floundering about" trials. The subject—if this theory were correct—would simply start his second learning with a minimum of trial and error. This might possibly be verified if we tried an interval far beyond the longest one we used, six months, and tested subjects after a lapse of two or three years following their original learning.

This was actually demonstrated in another way through an experiment the writer performed several years ago. The best methods of learning a maze were explained in a class lecture, and later the same week in a laboratory session each student learned a maze. They were not ordered to learn in a certain way, but were merely given the opportunity to profit from the class lecture. Their scores turned out to be one-third better than those of a control, or uninstructed group.

#### IV. Summary

Let us present a very brief summary. We attempted in this study to isolate the factor of positive transfer from strict memory as such

in a relearning task. The general technique was to have human subjects learn a maze pattern, then after lapses of time of one week to six months, one-half relearned the original pattern and the rest a new pattern on a maze of similar construction. It was found that both groups learned the second maze faster, but those with the longer gap had forgotten much more of the exact sequence of turns, while at the same time remembering as much about how to go about their learning task. Therefore, methods, as meaningful memory, produced a considerable amount of positive transfer which could be applied to a second pattern, and produce a pseudo impression of memory for the maze itself. The memory is for method of approach, and not sequence of pattern.

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