

THE
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MEMORY OF SKILLFUL MOVEMENTS.

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The purpose of this investigation was to determine the length of time that would be needed to attain a degree of skill in typewriting equal to that which the writer had acquired in 1903 at the close of his investigation¹ of this type of learning.

The experimental work of which this is the memory test closed on December 25, 1903. This test was begun January 29, 1906. Two years and thirty-five days had therefore passed, and during that time the subject (the writer) had not touched any style of typewriter until one week before the present test was undertaken, when he wrote a short letter of about fifty words. The apparent ease with which these few words were written after the lapse of so much time was so striking that a memory test was at once decided upon. The test lasted ten days with the omission of the intervening Saturday and Sunday. In order that the significance of the curve may be more evident the original curve showing the progress made by the subject in the regular learning practice of two years and thirty-five days ago is repeated here. Curve 1 is the regular learning curve and 2 is the memory curve giving the results of the test just completed.

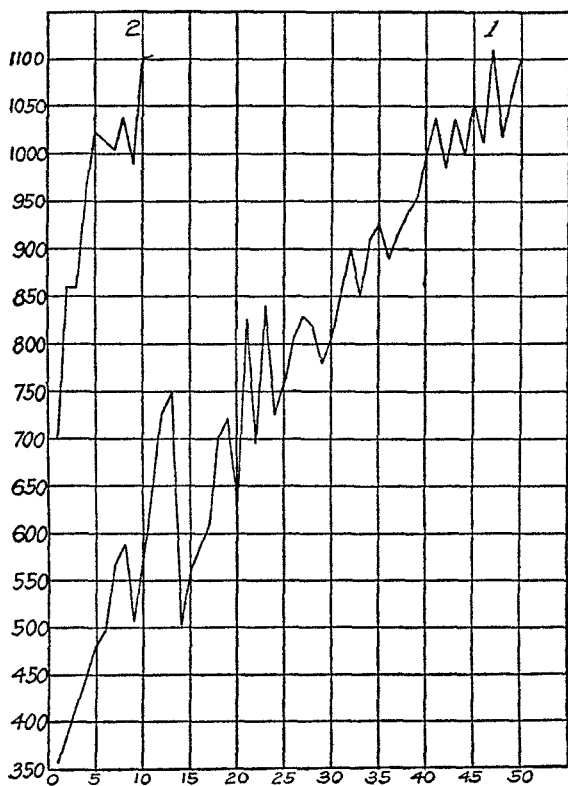
As will be seen from the curves the original investigation covers a period of fifty days, while in the memory test only eleven days were required to reach the degree of proficiency with which the original investigation closed. As a matter of fact practice was omitted on five of the fifty original practice days and once during the memory test. The actual number of days of work was therefore forty-five in the former and ten in the latter. In both cases Sundays were omitted.

The length of each day's test was one hour, as in the original in-

¹The Acquisition of Skill in Type Writing; a Contribution to the Psychology of Learning, *PSYCHOLOGICAL BULLETIN*, vol. I., p. 295.

vestigation, and the same typewriter was used in both instances. The number of words written during the hour is shown to the left of the vertical line and the days are given below the horizontal line.

In beginning the original investigation¹ the subject was able to finger out three hundred and fifty-five words during the first hour. In the present memory test, as will be seen from the curve, after an interval of two years and thirty-five days, the subject began the work



with the ability to write seven hundred words during the first hour, and in nine days of practice, work being omitted on one day when the subject was not in his normal condition, he regained the skill which he had acquired at the close of his regular practice of forty-five working days two years and thirty-five days before. The rapidity of ascent in comparison with the original curve, as well as the difference in the

¹ *Loc. cit.*

lines of direction of the two curves, are striking. Beginning with a score nearly twice that made on the first day of the original investigation the subject made a gain of one hundred and sixty words the second day. The failure to advance on the third day was partly due, at least, to the fact that the subject had attended a banquet the night before and was 'out of condition.' On the fourth day another advance of practically a hundred points was scored and fifty-eight on the fifth day. Here, at a score of ten hundred and twenty-three, the first real delay was met, but it was so near the subject's maximal record that it was not surprising. Five days were now needed to reach the permanent score of the original practice work.

From the start the subject wrote with a feeling of ease that was very different from the strain of the earlier work as shown by the notes for those days. During the first few days it seemed to be a matter of reëxcitation of nervous centers and of stirring to renewed activity habitual associations that had lain for the time dormant. There was a tendency to strike the keys quicker than at the corresponding time of the original investigation, and this brought increasing liability to error. One reason why this quicker movement did not bring greater rapidity was that the subject would repeatedly catch himself in the act of striking the letter adjoining the correct one, and recovery from this, with effort to find the right key, lost time. The fact that the fingers went without delay to approximately the right place shows that the old associations of muscular location were still ready to function at call, but slightly inaccurate. Indeed the whole process seemed to the subject to be the reinstatement of accuracy rather than the making of new associations. The nervous alterations that represent the physiological basis of memory evidently remained fixed during the intervening period and all that was needed to bring the old accuracy of discharge was a few days of practice. Besides the introspective evidence, which clearly showed this, the same thing is indicated by the rapidity with which the curve ascends. The same persistence of memory through long periods has been demonstrated by the writer¹ in keeping two balls in the air with one hand and by Bourdon² in various mental processes.

¹ *American Jour. of Psychology*, vol. 16, p. 131.

² *L'Année psychologique*, vol. 8, p. 327.