THE RELATION BETWEEN MEMORY FOR WORDS AND MEMORY FOR NUMBERS, AND THE RELATION BETWEEN MEMORY OVER SHORT AND MEMORY OVER LONG INTERVALS.

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Measurements of mental relationships are so important and so scanty that I venture to report certain ones in the case of memory, although they are by no means satisfactory with respect to method. They will not, however, be misleading to any one who bears in mind their limitations.

The measurements are of the relations in educated adults: — (1) between (a) the ability to remember a list of twelve words from a single hearing, at a rate of approximately one per second, long enough to write them immediately at the close of the reading; and (b) the same ability in the case of a list of five three-place numbers. There were five lists of (a) and five lists of (b). (2) Between: (a) and (c) the ability to remember the sixty words given in the five tests of (a) twenty-four hours later.

No requirements were made as to the order except, of course, that the order of the digits within each three-place number must be correct. The basis of the memory of (c) was not only the single hearing, and the experience of writing down such words as the individual remembered, but also the experience of scoring one's results from a complete list given to the individual for that purpose.

(1) and (2) do not, that is, measure the relationships in general, but the relationships as influenced by the restriction of the tests to one half-hour in the case of (1) and (2) and the relationship as influenced by the variations in the degree of attention given to the words in scoring results in the case of (2). Moreover, I have not corrected the results for spurious correlation due to sex, nor for attenuation due to the small number of tests.

The lists used and the method of scoring were as follows: The number of individuals was 38 for relation 1 and 40 for relation 2.

The lists of words used were:

near	bell	break	maze	yet
out	cloud	call	cress	shall
false	box	sleep	hob	and
lot	slate	drop	zest	lest
gift	cap	smile	eke	how
end	wing	run	slink	could
cheat	flag	eat	fob	though
thought	bed	cry	lush	when
lose	stone	drink	elk	let
add	pig	hit	bland	your
queer	house	sing	tweak	since
full	nose	skip	lilt	more

The lists of numbers used were:

791	254	639	948	579
469	624	716	851	356

918	683	532	746	823
493	321	228	264	974
671	572	787	435	358

The score for one correct word was 1.

A word apparently misheard but remembered as heard (*e.g.*, slake for slate or amaze for maze) was scored correct. Each individual's testimony was accepted in such cases. For each word written that was not in the list a discount of one word was made. Such errors are rare, making only 3 per cent. of the words written; 50 seconds were allowed to write out the words remembered for each list.

Each three-place number recalled exactly counted 1. Each number of which two digits were correct and correctly placed counted .5. 30 seconds were allowed to write out the numbers for each remembered list.

The obtained 'raw' correlation for (1) is .4½ ± .1. The mixture of the two sexes and the testing of the two traits in the same hour tend to make this higher than the relation between the general ability to remember word lists and the general ability to remember three-place number lists. On the other hand, there is the attenuation due to the variation, in both (a) and (b), of the result from five tests from the person's true ability. I estimate that correction for all three would result in a correlation of about .5½. The relation between (a) and memory of lists of 12 single digits was found to be .6, eight independent records of each being used. Correction for attenuation raises this to .7—. So, until more adequate measures are made, we may accept as the most likely fact that, in such a test of brief retention, a variation in the content from words to numbers reduces the correlation from 1 to about ⅝. Even if the reduction should prove to be to only ¾, the fact would still be very strong evidence of the dependence of efficiency of memory upon content and of the specialization of mental functions in general.

The obtained 'raw' correlation for (2) is .5½ ± .1 Allowing for the mixture of the sexes, the inaccuracies of the original measures, and the individual variations in the experiences upon which the memories for twenty-four hours were based, I estimate the relation as .8 ± .1. I know of no other measure of the relation between brief and long retention in the case of unconnected material. Henderson, in the case of connected trains of thought, gives data for memory over a few minutes from three minutes' study and memory of the same material after forty-eight hours, based upon the three minutes' study and the experience of writing out what was remembered at its close. The resulting correlations would seem, if corrected for attenuation on the one hand, and for mixture of the sexes and of differently selected groups on the other, to be about .9.

The relation between retention of the effects of an experience for one or two minutes and their retention for one or two days thus seems to be one of the closest yet measured in human nature.