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## A Standardized Measure of Motility

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of the best observers tends to become a straight line and that of the others tends to remain broken.

As a check on the value of the measure, ten men from the Engineering shops were measured. Each man was given twenty-five trials and the results compared with the rating on mechanical ability given by their instructors. In six cases the two ratings were near enough to be significant, but the other four showed considerable discrepancy. The one case where the difference was most marked was rated by the instructors as being mentally unable to make good in a machine shop. As this measure is not a measure of mental ability the discrepancy is not as alarming as it at first appears.

On the whole, while the results of this investigation are somewhat negative, they are still sufficiently encouraging to continue the work, which is as yet scarcely well started, until a measure of a person's ability to acquire skill in the coördination of eye and hand is eventually evolved.

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## A STANDARDIZED MEASURE OF MOTILITY

MERRILL J. REAM

In any survey of the fundamental capacities of motor control the factor of speed of simple movement is obvious as one of the basic essentials which underlie all the developed complexities of movement. This fundamental capacity for speed in a simple repeated movement we call motility, and the motion selected is an easy movement of the forearm in which the finger taps a telegraph key. This type of movement is selected because it is one of the most rapid of the voluntary movements; it is clearly developed, is very simple, and requires no learning. It is assumed that the ability shown in this movement is, in general, indicative of corresponding ability in other parts of the body.

The investigation of motility has resulted thus far in a standardized apparatus and method for conducting the test. It was discovered that for most people voluntary movement can not be maintained at its maximum rate for more than five seconds. To measure accurately and easily this short interval of time, an apparatus was devised which eliminates the reaction time of the experimenter and the observer. The apparatus, in addition to the telegraph key, consists of a metronome, a specially reliable electric counter, and a double action shunt key. The metronome is ac-

curately timed to beat seconds and is equipped with a mercury contact during alternate seconds of its oscillation. The recording of the tapping is started and ended by the beating metronome. During the intervening seconds of the five seconds' interval, a short circuit through the shunt key makes the recording continuous. By this method we have an accurate recording and timing instrument which is also compact, portable, and usable outside of the laboratory. Any graphic method of recording the twenty trials, which are the standardized number of a single test, would be exceedingly laborious.

The efforts at standardization have shown that the fastest tapping is done under the following conditions: a natural forearm movement, the arm unsupported, a finger position in which the key is lightly held and a charge to the subject which stimulates him to his best effort.

Most interesting have been the results of a twenty day practice experiment of six normal adults. There is essentially no improvement with practice unless the observer was hampered in his initial performances by difficulties of technique. For this reason two preliminary practice trials are given. Non-improvability is very significant since it indicates that a fundamental motor capacity is being measured.

There are individual differences in regularity of performance as well as in speed. The four combinations of speed and regularity are found, though more often the fast tapper is likely to be regular. A very high irregularity often means that there are difficulties of technique which a little practice or cautioning from the experimenter may overcome.

The testing of children from each grade of an elementary school showed that motility develops consistently with age and physical growth until the adult physique is attained. At each age the boys averaged slightly better than the girls.

Motility has a low positive correlation with other motor tests, but thus far no relation has been found with mental ability. Its future application will be in those lines of activity where speed of movement is an essential specification.