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NEW MEASUREMENTS IN THE PROCESS OF READING

E. O. FINKENBINDER

The lectometer is a special form of tachistoscope which provides a connection with a chronoscope. Through an open, adjustable sector of a rotating disc is presented material for reading. Just as the view is shut off a small arm attached to the spindle of the disc dips into mercury, thus completing an electric circuit which sets the chronoscope into action. The observer reads into a voice key which stops the chronoscope and gives the time to the thousandth of a second it takes him to know and say what he had observed during the short view.

The lectometer makes possible (1) the measurement of eye range or size of visual field, (2) the length of time in thousandths of a second it takes a person to see a given content in a certain size of field, (3) the length of time required for the person to know *that* he has seen, (4) the length of time, after seeing, required for him to report what he has seen, (5) the length of time, after seeing, required for him to report what he has seen, and (6) the effect of various factors, such as meaningful combinations of letters, on the above measures.

When employed in the analysis of the act of reading, the lectometer measures the various factors of the process: (1) the width the eye sees at a single glance (also factors determining this width), (2) the length of time required for that glance (also factors determining this), and (3) the time it takes to comprehend what is seen. This third measure is new. Two steps must be taken to measure this third factor: (1) the length of time it takes a person to see and report what he has been told will be presented to him, and (2) the time it takes him to read the same material when he is not told what will be shown him. The first measure subtracted from the second gives the comprehension time.

Apparently at no previous time have these factors been measured separately. Our common and standardized measures for reading give us a speed score and a comprehension score, both composites. Laboratory studies have measured the eye-movements but have not isolated the two main factors, — time required for the eye-

movements, the seeing, and time required for knowing what is viewed. The lectometer provides a means of measuring the length of exposure necessary (the length of time the material must be physically present in order that it may be seen) and the time it takes to do the mental part of the work of reading, — the comprehending. In other words, the question as to where we spend our time in reading can readily be answered.

Our present data from about 100 persons show that the "eye work" is not so important a factor (at least as to time required) as the "head work." Most observers require only from ten to thirty-five thousandths of a second exposure of reading matter to see it but 150 to 250 thousandths of a second to know what they have seen. The act of reading thus turns out to be a matter mostly of thinking, not of looking, hence, one should *ease up on looking so hard* and *stress thinking more* in learning to read most efficiently.

THE DIFFERENTIAL DEATH-RATE OF THE SEXES AMONG ANIMALS, WITH A SUGGESTED EXPLANATION

S. W. GEISER

(ABSTRACT¹)

It has been conclusively demonstrated in certain mammals, fishes, arthropods, nematodes and mollusks that the female sex has a greater longevity than the male. (Geiser, '21, '23; *et al.*)

Longevity within the species appears to be inherited in the manner of "blending inheritance," *i.e.*, its mode of inheritance is probably through a series of multiple gametic factors. (Beeton & Pearson, '00, '01; Pearl, Parker & Gonzalez, '23; Gonzalez, '23.)

In many of these groups the genetic constitution has been proved, on the basis of cytological or genetic study, to be of the XX, XY genetic type. The female possesses two X-chromosomes, the male only one.

When certain long-lived strains are crossed with another, shorter-lived strain, longevity has been shown to be inherited in a Mendelian manner. The segregation takes place in the F₂ generation. (Hyde, '13; Gonzalez, '23.)

Strains possessing somatic mutations usually have a shorter life-duration than normal strains. (Morgan, '14; Morgan & Bridges, '16; Pearl, Parker & Gonzalez, '23.)

¹ The entire paper, with references and tables appears in the *Washington University Studies*, Scientific Series, July 1924.