mendation made at the Berkeley meeting that the council adopt the following amendment to the constitution, which was also considered favorably by the council at Berkeley: In Article 2, line 4, omit the words, "The admission fee for members is five dollars; the annual dues are five dollars," and add in their place, "The Council shall fix the admission fees and dues."

(16) A report from the committee on source books in science was read and accepted.

(17) The permanent secretary reported progress for the committee on grants, but no action was taken.

(18) It was recommended to the council that $3,000 for grants be appropriated from treasurer's funds available for appropriation.

(19) A brief report of progress from the committee on adult education was read and accepted.

(20) The permanent secretary presented a report on recent publications of the association, namely, the book on "Nationalism" and the two Occasional Publications issued this year.

(21) A statement from Dr. Duren J. H. Ward summarizing the organization of the Far Reaching Foundation was accepted for record. The permanent secretary was requested to correspond with the secretary of the special committee appointed in 1931, requesting it to continue its work.

(22) Dr. W. A. Noyes was appointed the association's representative in the division of foreign relations of the National Research Council.

(23) A special committee was appointed to study the problems of organization recently raised and to report to the executive committee and council at the Pittsburgh meeting. The chairman appointed as members of the committee Drs. Caldwell (*chairman*), Cattell, Compton, Livingston and Ward.

(24) The committee adjourned to meet in Pittsburgh at 8 P. M., on Wednesday, December 26, 1934, following the committee dinner at 7 o'clock at the Hotel Schenley.

HENRY B. WARD,
Permanent Secretary

SCIENTIFIC APPARATUS AND LABORATORY METHODS

SIMULTANEOUS RECORDS OF EYE-MOVEMENTS AND THE VOICE IN ORAL READING

ALTHOUGH silent reading and oral reading are recognized as being essentially different processes, many clinicians in this field make frequent use of oral reading as a diagnostic tool in the treatment of poor silent reading. Also, recent studies have shown that poor silent readers are also inferior in oral reading and make essentially the same kinds of errors in both silent and oral reading.[1] Phonograph recordings of oral reading show definitely the frequency and nature of these errors, but they fail to indicate how the errors are related to the sensory processes of vision employed in reading. One important phase of these sensory processes is eye-movements. Accordingly, it seems that an apparatus which will record eye-movements and speech simultaneously will make it possible to examine the validity of the former as a diagnostic tool in reading difficulties from an entirely new angle, *i.e.*, in the light of the errors actually made by the reader.

The technique proposed consists of three parts: (a) a standard eye-movement camera,[2] (b) a commercial cutter for recording aluminum disk phonograph records and (c) an oscillograph which photographs the sound wave from the voice on the film which receives the eye-movement record. The oscillograph used for this purpose is a Dorsey Phonelescope[3] with the diaphragm activated by a standard headphone. Although the phonelescope does not record wave-form accurately, it is inexpensive and durable and is thus ideal for the present purpose, where it is desired only to locate the various words and syllables. The reader's voice is picked up by means of a ribbon microphone, amplified and sent into the electrical phonelescope. The ribbon microphone is very suitable in this set-up because it is directional in its sensitivity and this makes it possible to eliminate most of the noise of the eye-movement camera.

A record taken on the apparatus assembled as described is shown in Fig. 1. The letters A, B and C indicate the points on the film at which the eyes begin new lines of print. The numbers 1, 2, 3, etc., show the saccadic movements of the eyes in moving across the page. The small letters a, b and c indicate the beginning of vocalization of the lines which correspond respectively to points A, B and C on the eye-movement record. It will be noticed in this sample passage that the eyes are preceding the voice by approximately one second as well as by two or three saccadic movements. The amount of this "eye-lead," as it might be called, seem to be a definite and constant reading habit and is probably functionally

[1] By "oral reading" is meant vocalizing to oneself rather than reading interpretatively, as if to some one else. The vocalization is simply an exaggeration of the ordinary subvocal speech which is frequently, if not always, present in silent reading.

[2] H. H. Jasper and R. Y. Walker, "The Iowa Eye-movement Camera," SCIENCE, 74: 291–294, 1931.

[3] Sold by C. H. Stoelting, Chicago, Ill.

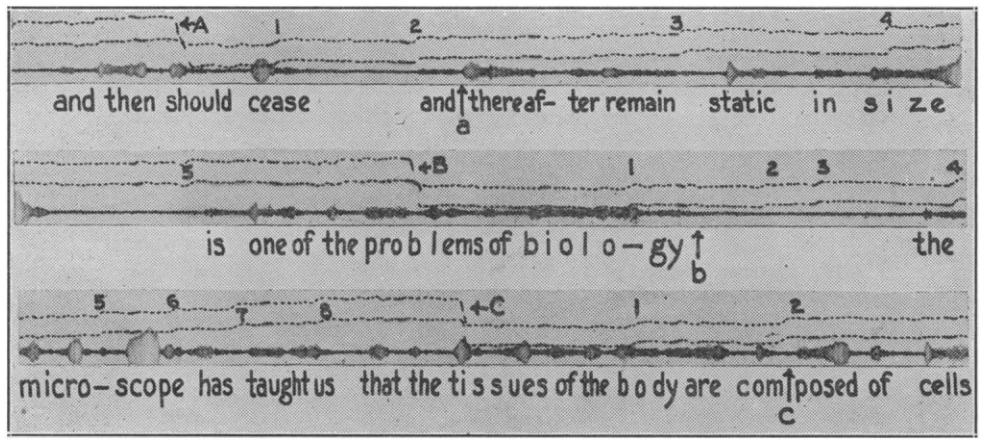

FIG. 1.

related to reading ability. It remains for a series of studies now under way to determine the relationship between this variable and other measurable aspects of reading ability.

This note is published at this time because others interested in eye-movement photography may wish to expand the possibilities of the supplementary voice record.

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SPECIAL ARTICLES

THE WEIGHT OF THE NEGRO BRAIN[1]

BURIED in the older literature of medicine and anthropology, and in the main forgotten, is to be found a great wealth of quantitative material on variation in man, in respect of various anatomical and physiological characteristics. In many cases these data are quite as accurate, critically taken and recorded as those being gathered at the present time. All that they need to be made useful for present-day purposes is to be analyzed biometrically. Furthermore, such forgotten observations often have a special interest for comparative purposes, in that they date from a substantial period of time back of the present, and therefore present the opportunity of judging what degree of secular change, if any, has occurred in the character observed. As new methodologies are discovered and perfected in any branch of science it is often profitable to reexamine and reanalyze old data by the new methods, provided, of course, that the old data are intrinsically sound and critically collected. Nowhere is this more true than in physical anthropology, where the collection of data is at best an extremely expensive and laborious process.[2]

It is an accepted view that the skull capacity and the brain weight of the Negro, whether pure or mixed with white races, tends on the average to be smaller than the same dimensions in whites. The amount of precise data upon which this opinion rests is, however, meager. In 1849 Morton[3] published a series of observations on the cranial capacity of various races, using the method described in his "Crania Americana," which substituted "leaden shot" one eighth inch in diameter for the conventional mustard or millet seed. He gives no distributions, but tables (in cubic inches) the minimum and maximum observations and the means for some 20 racial groups, of which four are negroid. Seventy-four skulls of "Native African family" and "American-born Negroes" (62 of the former and 12 of the latter) gave a combined mean cranial capacity of 1,360.1 cc,[4] as compared with a mean capacity for 18 German, 5 English and 7 Anglo-American skulls averaged together of 1,489.6 cc. The mean capacity of the Negro skulls was thus 91.3 per cent. of that of the Caucasian group with the largest average capacity. Morton's conclusions and his table were republished elsewhere a year after their original appearance,[5] but without additional data.

[1] From the Department of Biology of the School of Hygiene and Public Health, Johns Hopkins University.

[2] Pearson's laboratory has furnished numerous examples of the value of studying old data by modern methods, notably in a series of papers analyzing Galton's anthropometric data (*cf. Ann. of Eugenics, passim*). Greenwood's (*Biometrika*, III, 63–83, 1904; IX, 473–485, 1913) analysis of autopsy records is another case in point.

[3] S. G. Morton, *Proc. Acad. Nat. Sci. Philadelphia*, Vol. 4, pp. 221–224, 1849.

[4] The original figures are in cubic inches. I have here and elsewhere in the paper when necessary translated dimensions in English units to metric units for the sake of uniformity.

[5] S. G. Morton, *Trans. Amer. Med. Assoc.*, Vol. 3, pp. 56–58, 1850.