

In one respect the reviewer feels strongly inclined to criticize the author's reasoning, namely, with respect to his conclusion that Gauss's law does not apply either to the results of his experiments or to psychophysics in general. In order to prove this he points to such series as these:

3, 3, 1, 4, 3, 1; or
6, 10, 8, 8, 10, 6, 4.

One can scarcely expect a total number of fifteen judgments to be distributed according to Gauss's law. Even the second series of a total of fifty-two judgments does not allow any conclusion either in the affirmative or in the negative. The number of judgments is far too small to draw any conclusion in experiments where the disturbing factors are considerable and where the subjects had so little practice. In ordinary life we scarcely compare the intensity of noises; and the practice acquired in the experiments cannot have amounted to much. It is clear, however, that without considerable practice the subject cannot be expected to possess a firmly established subjective scale of the steps 'equal — different' and 'different — clearly different.' In astronomical observations, where the conditions are much more favorable, Gauss's law has been found to apply with considerable accuracy, even where the steps are, not two as here, but four, as in Argelander's *Stufenschätzungsmethode*¹ (called also method of sequences). If Gauss's law holds good in photometry, where the practice of ordinary life is highly developed, and in experiments made under the favorable conditions of the astronomical observatory, it seems to be somewhat rash on the author's part to conclude from technically rather imperfect work on the estimation of sound intensities that Gauss's law is not applicable to psychophysics. If the judgments had been a hundred times as numerous as they were, Gauss's law would probably have been found to apply to them.

MAX MEYER.

UNIVERSITY OF MISSOURI.

PSYCHOPHYSICS.

The Method of 'Right and Wrong Cases' ('Constant Stimuli') without Gauss's Formulæ. C. SPEARMAN. *British Journal of Psychology*, 1908, II., 227-242.

The author proposes to determine the actual distribution of the threshold from the experimental data. He derives for this purpose a

¹ See G. Müller, *Die Photometrie der Gestirne*, p. 459; and A. W. Roberts in the *Astrophysical Journal*, IV., p. 184, 1896.

table of the distribution of the threshold and shows how the average threshold and the accuracy of its determination can be found. The necessary formulæ are given as well for equidistant as for non-equidistant comparison stimuli.

Our fundamental criticism of the method proposed by Spearman is this: The method of constant stimuli can be properly understood only in connection with the method of just perceptible differences, and the result which the author derives is not the one which would be obtained by that method. It is interesting to notice that this paper was written with a full knowledge of the ideas of Müller, who maintains the correct view about the method of just perceptible differences but does not prove it. The fact that the author did propose his method shows how little confidence Müller's unsupported statement inspired.

It was shown lately that the notion of a threshold is superfluous and that the so-called law of the distribution of the threshold can be replaced by the simpler notion of the 'psychometric function.' This is borne out by Spearman's method in a peculiar way. The essential feature of his method is the attempt to characterize a 'Kollektivgegenstand' by one quantity. This can give only an approximation, and a complete characterization could be obtained only by more elaborate methods, among which we mention the one worked out by Bruns. In applying this method one would have to form certain sums which lead back exactly to those data from which the author derived his table of distribution from which one determines the 'Summenfunktion' which is the psychometric function. This shows that the notion of the psychometric functions is more primitive than that of the law of the distribution of the threshold, just in the same way as the notion of the probabilities of the different judgments is simpler than that of the threshold.

Zur Psychologie der Sinne. J. v. KRIES. Nagel's Handbuch der Physiologie des Menschen, Vol. III., 1905, pp. 16-29.

Physiology of the senses deals not only with sensations but also with more complex states of consciousness (sense perceptions) which contain certain elements besides sensation. These phenomena, which belong to the realm of psychophysics, are similar for the different senses, so that it seems advisable to describe them in a general way before entering into the special study of the different senses. We have to mention in the first place the temporal and spatial sensations. The expressions 'time-sense' and 'space-sense' do not designate separate functions, as the name seems to indicate, but complexes of different