

Letters to the Editor

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Phenomenal Regression to the Real Object

DR. THOULESS'S interesting article in NATURE of February 25 on this subject is of special interest at the present time when physicists, physiologists, and psychologists are co-operating in the solution of problems regarding vision. The terminology and modes of expression are not unusually quite different in the respective branches of investigation, and this makes it very imperative that there should be full mutual discussion regarding the statements involved so as to avoid the possibility of misunderstanding.

The following remarks may err through misunderstanding on my part of Dr. Thouless's exact meaning. But it seems to me that his statement that Fechner's law (expressed in the form $E = k \log(R/R_0)$) implies that there is a single sensation intensity for every stimulus strength may be misinterpreted as to its implications. Clearly, for example, if R_0 is constant while R is a stimulus of variable magnitude but constant quality, the statement holds. But it has to be remembered that the three variables in terms of which, as a minimum, R is usually expressed, may also appear in R_0 ; and that R_0 is usually dependent also on many other variables. Examples of these are the time which has elapsed since the stimulus began, or the times which have elapsed since preceding stimuli began or ended, or the qualities of these stimuli, or the physiological condition of the observer as dependent on precedent exercise, bodily or mental, and so on. It is evident that, unless these extraneous variables are kept constant, one and the same sensation will not in general result from a definite external stimulus.

Recognition of these conditions has direct application to the interesting cases discussed by Dr. Thouless in which the presence or absence of an additional datum, such as the distance of an object, has influence on the result of the given stimuli. But it is then a matter for experiment to determine the form of the function of that additional datum which, being introduced into the threshold value R_0 , will include the more general results within the scope of Fechner's law for single-valued sensation.

This raises the question of whether or not subjective, as well as objective, data should be treated similarly in so far as that may be found possible. The influences of memory, expectation, bias of any type, and so on, have to be eliminated or allowed for as new qualitative or quantitative data. Further, since external action produces mental activity, may not independent mental activity give rise to alteration of these mental activities? Physical analogies suggest this as a possibility. The scope for investigation on these lines is immense, but its results may not of necessity lie outside the field expressed by Fechner's law.

The interesting results which are indicated in Dr. Thouless's diagram seem to be perhaps in part due to the actual conditions of projection. If the inclined circle be viewed from a sufficiently near point, a marked excess of the apparent short diameter over

its normal projection actually exists; and the curve is not an ellipse. But no rough method of measurement gives an accurate test, while an indirect *guessed* measurement is very liable to error.

W. PEDDIE.

Department of Physics,
University College,
Dundee.
March 2.

I AGREE with Prof. Peddie that the Fechner relationship need not necessarily involve a single sensation strength for every stimulus strength, but that implication is strongly suggested by the habitual statement, as the fundamental law of sensation strength, of a law which expresses this strength as a function of one variable (stimulus strength) and not of three or more. The attitude of mind induced by Fechner's law has certainly been the relative neglect of the effects of spatial and temporal contrast (treating these as mere disturbing factors) and the complete neglect of the effect of the total situation under complex conditions of perception. This seems to be sufficient justification for making Fechner's law the starting point of a description of a quantitative investigation of the effects of the total situation.

I certainly agree that any such variable may affect the absolute threshold in such a way that E remains the same function of R/R_0 . I know of no investigation to prove that this is the case. I do not think that the question is important, since the formula $E = k \log(R/R_0)$ is indefensible even for uniform contrast conditions, since it assumes the validity of Weber's law for stimulus values down to the threshold value, which is found experimentally not to be even approximately correct.

Prof. Peddie's last paragraph is based on a misapprehension. If an inclined circle is observed from a near point the short axis of the projected figure will certainly be relatively longer than it would be if the observation were made from an infinite distance when the projected axis-ratio would be equal to $\sin \theta$ (if θ is the angle of inclination of the disc to the line of vision). The error resulting from this miscalculation of the projected axis-ratio would have been small but I did not make this mistake. Nor did I use a rough method of measurement. The only rough measurement I mentioned in my article was for the demonstration of the presence of the effect (not the exact measurement of it) by means of an elongated ellipse. Since the effect is large, it is easily perceptible to rough demonstration. Where, however, quantitative results were required, the measurements and calculations were as accurate as I could make them.

ROBERT H. THOULESS.

Department of Psychology,
University, Glasgow.

Photosensitised Decomposition of Ozone by Chlorine

THE decomposition of ozone, photosensitised by chlorine, has been the subject of numerous investigations, and it would appear from recent work that the kinetics of this reaction are by no means so simple as at first supposed. In particular, the recent paper of Heidt, Kistiakowsky and Forbes¹ describes a complex dark reaction which occurs simultaneously with the photosensitised decomposition. We have read this paper with great interest, since we have