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UNIVERSITY COLLEGE,
LONDON.

A NOTE ON NEYMAN'S THEORY OF STATISTICAL ESTIMATION[1]

BY SOLOMON KULLBACK

In this note we shall examine a section of a recent paper by Neyman[1] dealing with statistical estimation. Consider the following quotation from that section[2] which deals with the statement of the problem:

"Consider the variables $[x_1, x_2, \cdots, x_n]$ and assume that the form of the probability law $[p(x_1, \cdots, x_n \mid \theta_1, \theta_2, \cdots, \theta_l)]$ is known, that it involves the parameters $\theta_1, \theta_2, \cdots, \theta_l$ which are constant (not random variables), and that the numerical values of these parameters are unknown. It is desired to estimate one of these parameters, say θ_1. By this I shall mean that it is desired to define two functions $\bar{\theta}(E)$ and $\underline{\theta}(E) \leq \bar{\theta}(E)$, determined and single valued at any point E of the sample space, such that if E' is the sample point determined by observation, we can (1) calculate the corresponding values of $\underline{\theta}(E')$ and $\bar{\theta}(E')$ and (2) state that the true value of θ_1, say θ_1^0, is contained within the limits

$$\underline{\theta}(E') \leq \theta_1^0 \leq \bar{\theta}(E') \tag{18}$$

this statement having some intelligible justification on the ground of the theory of probability.

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[1] Specifically we refer to J. Neyman "Outline of a Theory of Statistical Estimation Based on the Classical Theory of Probability," *Phil. Trans. Roy. Soc.*, vol. A236 (1937), pp. 333–380.

[2] J. Neyman, loc. cit., p. 347. The material in brackets are slight alterations of the original text in order that the quotation do not refer to previous matter in the original paper.