12 February 1931.

Dr W.O. Kermack,
Research Laboratory,
8 Forrest Road,
Edinburgh.

Dear Dr Kermack,

Thanks for your interesting letter, which raises a number of valuable points.

In the case of the fourfold table, it is possible by calculating χ^2 from the frequencies, and ~~imagining~~ recognising that when the marginal frequencies are not given by theory, there remains only one degree of freedom, to test the significance of deviation from proportionality; this may be interpreted as giving a fiducial probability that the correlation is not less than zero, or not more if the ~~score~~ sign of one of the variates is reversed. For cases other than independence there is no ready made method, though ~~other~~ the general theory could undoubtedly still be applied. The principal difficulty lies in the choice of the form of association~~s~~ to be tested. For example one might in suitable cases take the tetrachoric correlation, and ask if the value of r obtained from the data, is too great for the true correlation in the population sampled to be less than ρ. I should expect the solution of this problem to be complex.

In the case of two parameters, as in fitting the normal curve, a most interesting possibility is opened up by finding some statistic the distribution of which depends only upon one of the parameters. For example

$$\bar{x} = \frac{1}{n} S(x)$$

$$s^2 = \frac{1}{n-1} S(x-\bar{x})^2,$$

then the distribution of s^2, or of s, depends only upon the true value of the variance in the population sampled. Again if

$$t = \frac{\bar{x} - m}{\sqrt{s^2/n}}$$

then the distribution of t, which involves only the one unknown parameter m, depends only upon the sample number, consequently one has fiducial probabilities for both the unknown parameters separately.

The general application of this principle has scarcely been expl~~ain~~ored.

Yours sincerely,

(Sgd) R.A.F.