28 April 1943

Dear Kendall,

I was naturally interested in your letter of the 17th. I have looked again at the paper* with a view to misprints, but it is all right as it stands. *[CP 125]

The general principle for a single parameter, θ, is that if you have an estimate, T, which is exhaustive, as Darmois' people say, i.e. is either sufficient or is used in conjunction with exhaustive ancillary information, then there is a function $f(T,\theta)$ giving the probability of the estimate exceeding any value T for a population having any value θ, and this function will also be a function of n, the sample number, and of any ancillary statistics that may be used.

Then the frequency-distribution of T, if the function is differentiable, is given by the frequency-element

$$\frac{\partial f}{\partial T}\,dT$$

but the fiducial frequency-element for θ is

$$-\frac{\partial f}{\partial \theta}\,d\theta.$$

The formulae may be checked otherwise by substituting $(n-1)\frac{s^2}{\sigma^2}$ for χ^2, and in one case taking

$$d(\tfrac{1}{2}\chi^2) = \tfrac{1}{2}\chi^2\,\frac{2ds}{s}$$

and in the other case

$$d(\tfrac{1}{2}\chi^2) = -\tfrac{1}{2}\chi^2\,\frac{2d\sigma}{\sigma}$$

The concordance of these procedures is what I mean by saying "the fiducial distribution .... may be found by substitution", in the last paragraph of the section.

Yours sincerely,