January 17, 1940

Dear Professor Fréchet,

I am very glad to have your letter of January 8th with the quotation from Birge and Deming. I find these writers often very obscure, but as they are obviously influenced by the form of argument for which I am responsible, I should like to make my own position, at least, clear to you.

I enclose the paper on "Inverse Probability" in which I first introduced the fiducial argument, though, in fact, as my reference to M. Ezekiel shows, many people had been arguing in this way from the moment when theoretical distributions, such as ~~that~~ those of X^2, t and z, were first tabulated so as to show the values taken at different levels of significance (values of P) instead of showing the values of P's for different values of X^2, etc.

I should like you to keep the offprint so long as it is useful to you; but, as I have very few copies, perhaps you will send it back if, at any time, you find you no longer want it. A second paper (The concepts of inverse probability and fiducial probability referring to unknown parameters. Proc. Roy. Soc. Lond., A., 139: 343-348) also expresses well

what is still my point of view. I have no copies of this, but the Proceedings of the Royal Society may be accessible to you.

With respect to your other mathematical question:-
If $x_1, \ldots\ldots\ldots, x_n$ are values independently and normally distributed with standard deviation equal to σ , and if

$$S(Y) = 0$$

then $\dfrac{S(Yx)}{\sigma}$ is normally distributed about zero with standard deviation equal to $\sigma\, S(Y)^{1}$ and this distribution will be absolutely independent of that of

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

or of s/σ . So that the ratio of these two quantities

$$\frac{S(Yx)}{s}$$

will be distributed exactly as is $t\, S(Y)$, where $\underline{t}$ is the value I tabulate for "Student's" distribution.

I emphasise this type of extension of "Student's" original argument in a paper in <u>Metron</u> (Applications of "Student's" distribution) 1926, Vol V, Part 3: 90-104. It is really the basis of the tests used in the Analysis of Variance.

On your mission to England, I think you ought to see Professor Leonard Jones, at the Mathematical Laboratory, Cambridge, who will be able to put you in touch with war work involving mathematical statistics better than any one else. My Laboratory has not yet been used for this purpose.

Yours sincerely,

* In response to letter from Teichert, April 14, 1944, Fisher corrects the error in his reply, April 26. R.A.F.