September 26, 1938

Dear Jeffreys,

So far as I can judge, "Student" and I ~~will~~ would have differed quite inappreciably on randomisation if we had seen enough of each other to know exactly what the other meant, and if he had not felt in duty bound, not only to extol the merits, but also to deny the defects of Bevan's half drill strip system.

For example, randomisation was never intended from the first moment it was advocated to exclude the elimination from the error of components of error which could be completely eliminated, as in the case of differences between blocks in a randomised block system. It only requires that these components shall equally be eliminated from the estimation of error, as is now usual, though it was not appreciated at the time I first wrote on the subject. I often put this by saying that it is only the components which contribute to the actual error of the experiment which need to be randomised to provide an estimate of that error. In the Latin Square, for example, these are the components of ~~randomisation~~ variation that would remain after elimination of the best formal additive

in rows and columns.

The second point on which there has been some misapprehension is that ~~it is taken~~ I should take for granted that the experimenter can choose anything he likes to be regarded as a single plot. For example, in sampling agricultural crops, a sampling unit, as it is there called, may consist of 50 roots scattered over the whole sampling area, with a rigid structural relationship intereße, so that the whole unit is determined by a single act of randomisation. For example, one might choose roots 7, 27, 47, etc, walking up and down a line, until the whole sampling area has been covered. The number 7 has been chosen at random from the numbers from 1 to 20, and to provide an estimate of error, a second sampling unit of the same kind is always taken from the same sampling area, e.g., the series based on number 12. Comparison of the results from numerous such pairs of sampling units from the different sampling areas will then provide a valid estimate of the sampling error of the samples used.

This is actually parallel to putting down a systematic comparison of two barley varieties at a number of centres and using the discrepancies among the comparisons made at different centres to estimate the precision of the aggregate comparison. In doing this, of course, we should make no pretence of knowing how

precisely the comparison has been made at each particular point, i.e. in relation to local circumstances, which might favour one variety rather than another. The assertions made are valid only for the aggregate of all such tests, and, if the difference betweeb the two varieties is different on different farms, we shall have no valid estimate of error on which to judge the significance of such differences. One of the practical points on which, so far as I can judge, I differed from "Student", is that he was willing to ignore such local differences, possibly because, in any case, Guinness wanted Ireland to grow only one barley variety, whereas I felt that we owed it to the farmers to encourage him to grow whatever variety seems most profitable to him.

I fancy also that Gosset never realised that a fertility gradient when, as in my experience is not very frequent, it is important enough to bother about, can easily be eliminated from a randomised experiment. It is, I think, my fault that I have not made this clear earlier, but until the last two years I had really thought that "Student" accepted all that I had put forward on behalf of randomisation. In the next edition of Statistical Methods I am exhibiting the procedure of eliminating a fertility gradient, as one lot of uniformity trial data used in that book happens to show a gradient

which it is profitable to eliminate in this way.

Thanks for sending me your paper on Sampling a mixed population. I am glad to see how close to my position you come in the parts referred to. I suppose you will send it to Cambridge Phil. Soc., or somewhere of the kind.

Yours sincerely,