

Dr. E. S. Pearson,
University College,
Gower Street,
London, W.C.1.

3rd November, 1933.

Dear Dr. Pearson,

Many thanks for your letter. I am glad you have not hesitated to put your criticisms on paper. I feel that perhaps they should be submitted to Eden before I reply to them, especially as he wrote the Introduction to which you take exception. However, as he is in ^{Ceylon} India I will compromise by giving my own views, afterwards sending him a copy of them and of your letter, so that he can dissociate himself if he wants to.

Admittedly if a theoretical investigation of a sampling distribution is to be made it will have to be made on an infinite population of some comparatively simple form, if only for the reason that the handling of a distribution containing a finite number of observations is mathematically excessively troublesome - in fact such handling would appear to be equivalent

to enumerating all possible samples and calculating the statistic in question for each. When, however, mathematical handling is impossible, and experimental sampling is resorted to, the case for using actual distributions appears to be much stronger; for even if we knew the theoretical distribution from which the actual finite distribution is a sample there would seem to be little to be gained by putting ourselves to the trouble of resampling this distribution. In actual fact we never do know this theoretical distribution. Nor do most of the non-normal finite distributions met with in practice appear to be representable as samples from the ordinarily recognised mathematical forms. The distribution utilised in this paper, for example, indicates the existence of (at least) bimodal parent population. Any conformity with a member of the Pearson system which may have existed in the original data has been successfully destroyed by the preliminary process of eliminating "blocks". I would emphasise that we have taken no "particular form of skew distribution" but merely a set of actual results chosen because they could only be assumed to be an exceedingly improbable random sample from a normal population. The definition of population of which they could be assumed to be a random sample did not concern us .

I agree that our wording on clause (3) p. 17, might be read to indicate that tests of goodness of fit were not performed by previous workers. Clearly this was not intended, and the words cannot really bear this interpretation. The words 'to be of use to the experimenter' are perhaps also a little sweeping, but not unduly so if one considers the amount of work put into the investigation of such distributions as the rectangular and triangular.

No, I think you have missed the main criticism which should be made in this paper. That is, that the distribution of 256 heights is immediately combined once and for all, and in one way only, into 32 values, so that the sampling test is made on these 32 values (given in the figure on p.13). The test has really shown that the $(4!)^7$ values of z obtained from all possible experimental layouts of the 4 treatments closely approximate to the z distribution (at least as judged by a sample of 1000). But there is only one sample from the 256 values. On the other hand since an agricultural experiment can be regarded equally as a sample of one out of all the possible arrangements which may be set out on a ^{set of blocks} given/on a given piece of land, the value for each plot being fixed, there is no need to trouble ourselves about the exact form of hypothetical parent population, seeing that even a single set of these fixed values appears to give a very adequate reproduction of the z distribution.

The above point is referred to in a paper on Latin squares for the Empire Journal of Experimental Agriculture now in the press. I will send you a copy when published.

I enclose a reprint of the paper under discussion, and also of one or two other papers that may interest you. I should be very grateful if you would place me on your off-print list. I shall of course be pleased to reciprocate, though perhaps a good percentage of our publications here are rather severely agricultural. By the way may I thank you for seconding my nomination to the Statistical Society.

I hope we shall see something of one another sometimes. We were introduced ^{on} ~~in~~ the tow path at Cambridge, weren't we?

Yours sincerely,

(F.Y.)

==