

ROTHAMSTED EXPERIMENTAL STATION
(LAWES AGRICULTURAL TRUST)

Director: Sir WILLIAM G. OGG

DEPARTMENT OF STATISTICS
(Research Statistical Service)

Head of Department:
F. YATES, Sc.D., F.R.S.

HARPENDEN
HERTS.

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My dear Ron,

Many thanks for your further letter. Wednesday ^{evening} ~~afternoon~~
(the 16th) and Thursday morning will suit me fine. I will endeavour
to arrive about 6.30.

I thought I had better let you have some notes on "Statistical
Tables". These mainly concern the transformations.

I have now made out tables for the logit transformation and
the loglog transformation. I enclose copies of these and would be glad
of your views, both with regard to accuracy and arrangement. If each is
arranged on one page as at present intended the values for final
adjustments can go on the opposite pages. These latter I am proposing
to give in the standard form:

Expected	Minimum	Range	Maximum	Weighted ^{ing} Coefficient
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In each case there will be room for two sets of columns. In the logit
case I was proposing to give the values for expected logits $0.00 - 3.95 \times 0.005$
i.e. at half the interval given by Finney in his book "Biological Assay",
to the same accuracy. For the loglog table which is unsymmetrical about
50% there will only be room for an interval of 0.01. The values for this
table would be taken directly from Finney (I already have his permission),
~~but the arrangement would be the same as for logits,~~ but since the
complementary loglog transformation is to be used the values will be in
ascending and not descending order of magnitude. I think the range
 $-7.5 - +2.5$ in the expected values will be adequate.

Is 3-figure accuracy for the transformations themselves
adequate? This is one more place than Finney gives and was arrived at
as a result of my somewhat limited experience in the use of these

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transformations. The tables would, however, easily carry another place without making the interpolation intolerable and would then be of substantially the same accuracy as the probits tables. In your letter of 11th February you indicate that you would like at least 4-figure accuracy. There is no trouble in running the tables again with an additional figure if required. The present tables are ~~rounded~~ to 3-figure accuracy, the additional two figures being included for checking purposes. The fifth figure is unrounded.

As far as symbols are concerned, we do not at present seem very consistent. p and q and the corresponding P and Q are consistently used for the observed and provisional probabilities. We use Y and y for the provisional and working probits and Finney uses the same symbols for logits, whereas we use Z and z. {I think I prefer to use $\frac{1}{2} \log \frac{p}{q}$ as the basic log transformation rather than the analogous transformation

$$2y = \tan h (2x)$$

In your general formulae (introduction, p.15) you use X for the provisional value. This, I think, is likely to lead to confusion and would be better replaced by Y. I would have no objection to using Y and y for probits, logits and loglog, retaining ϕ for the angular transformation, but you might prefer to keep Z and z for the logit transformation in view of the historical associations.

I have been looking again at the angular transformation. It has frequently been represented to us that the present table, Table XII, is somewhat inadequate. It is certainly not in line with our other transformations. If we make the very simple change in definition of

$$p = \sin^2(\phi' + 45^\circ)$$

a table with 0.1° interval can go on one page. Table XIV would then not require extension (though I agree with you that the minimum values should be included). I think on balance I would also include the range as in probits and the other tables. If Table XIV is tabulated at intervals of 1° as at present it could just be got on the same page as Table XIII. Alternatively we could tabulate by $\frac{1}{2}^\circ$ and ~~cut~~ Table XIII. I have not yet myself come across anyone who uses Table XIII but your experience may be different.

We can find a home for the new Behrens-Fisher table in its proper place by scrapping Table VII which will be unnecessary with the

new logit table, and putting Table VI and Table VIII on the same page, cutting the text from Table VIII and revising the introduction where necessary.

I am sending the new insertion ^{to your book} to Barnard which is, I take it, what you wish.

Yours sincerely,

Frank.

Professor Sir Ronald Fisher