St John's College
Cambridge.

Nov. 14.

Dear Fisher,

I don't know if you have thought at all about that question of combining standard errors that I asked you. On some reflection I think that I have got a method that is both fairly efficient and can be done with less than a month's arithmetic. If s is the estimated standard error, n the number of observations, two parameters eliminated for each phase, we can write approximately

$$\sigma = s\left(1 \pm \frac{1}{\sqrt{\{2(n-2)\}}}\right).$$

or

$$\log \sigma = \log s \pm \frac{1}{\sqrt{\{2(n-2)\}}}$$

But log σ will be the sum of a term from the observer and one from the phase, and we can proceed by least squares. This of course goes back to pre-Student days but it is near enough.

I was glad to see that Yates got his Sc.D. If you think of putting him up for the Royal Society some time I should be glad to add a signature. I don't suppose he is anywhere near the standard yet on quantity, but his quality has struck me as masterly - which I wouldn't... no I mustn't say that.

By the way who introduded the hypothetical infinite population? Your Phil.Trans. paper was the first place where I saw it mentioned, but it seems to be implicit in K.P.'s habit of calling chances frequencies in his tables, and it may have a longer history. There is a curious point about Laplace's (p + 1)/(p + q + 2) rule of succession. It is given in the Grammar, and I proved it myself about 1915 for a population of any size - it is exact even for a finite population. ~~But~~ I took it for granted that this was as old as the hills, but apparently it was new, at least I can't find it anywhere. Laplace's constant chance at each trial would mean either drawing with replacement or a population so large that the extraction of the sample produces a negligible change in the proportions in it. So perhaps Laplace may be responsible after all !

Yours sincerely,

Harold Jeffreys.

It also follows, if the sample is all of one type & of number p, the probability that the next q will all be of the type is $\frac{p+1}{p+q+1}$ whatever the number in the population. There are further extensions.