20 June 1944

Dear Whately Carington,

On your first point, I think I agree entirely. Just to check up, is Section 29.1 of Statistical Methods (page 158 of the 5th edition) the amount deducted from the sum of squares by using a new parameter b_i is evaluated as $\frac{b_i^2}{c_{ii}}$. O.K. also to point 2.

Your third point introduces a large topic that is not at all hopeless. For direct analysis of variance, in which one has the convenience of finding interactions by subtraction, the numbers in the component cells should be all equal or at least proportional, i.e. with frequencies determined by any arbitrary but general sex-ratio applicable to all age-groups and experiments, any arbitrary age-group distribution applicable to all experiments and both sexes, and finally arbitrary numbers of subjects in the different experiments applicable to all age-groups and both sexes.

In fact-of course, things are not strictly proportional, but if nearly so a very convenient way is to take the observee means in each cell as if they were based on proportionate numbers of subjects. Variance within cells, as ordinarily calculated, still stands as basic Error, and the process merely ascribes slightly erroneous weights to the individual cell-means. The method is not misleading but slightly ~~misleading~~, often very slightly so, and leads to standard form of analysis. With gross disproportion, things become more tedious, and a rather elaborate set of linear ~~equations~~ is needed to fit the constants. If this is done, the different ingredients oneewants to examine will usually not be orthogonal, so that the sums of squares will not add up to the total, though each may be extracted for a separate test.

Yours sincerely,