3rd January, 1949

Dear Mr Lyle,

Thank you for your letter and for the typescript which I am returning herewith. It is not supprising that the two tests made in Section 4, should not yield the same answers, for they are really tests of different questions. In the first case, the test "for $b_1$" is a test of whether the observed covariation can be expressed adequately, (i.e. without ignoring significant discrepancies) in terms of $X_2$ only; the significant value 6.493 answers this question firmly in the negative. The second test "for $b_2$" asks whether a regression in terms of $X_1$ only would be satifactory, and the unsignificant value, 0.918 gives an affirmative answer. Since $v_1$ is identically equal to $x_1$ in the next subsection, the same question is put in the new form - 'can the regression be expressed in terms of $v_1$ only?' and yields an identical test "for $v_2$". Whereas in the second subsection one is asking whether $u_2 = x_2$ alone is good enough, and this is again negatived with a new question - 'would $u_1$ alone be sufficient to use?' which is answered in the negative also.

With respect to l hour-saving, it would be unwise for me to express any opinion without having had a good many hours experience on the appropriate material using both methods. In my own work, I have not found it inconvenient to invert symmetrical matrices up to 8 x 8, or occasionally up to 10 or 12; beyond these numbers some more expeditious method is necessary. A most important consideration is always the form in which the data are presented, which I think should always be taken into account in deciding what particular procedures to apply to them. Very often the algebraist's first inclinations lead him ~~to~~ onto a wildly unnecessary detour. I have given some examples in Statistical Methods, for instance in Section 29.2, progressive summation of the original data is shown when the algebra is reorganised to suit this arithmetical process, to yield values ordinarily expressible as very complicated algebraic functions. Perhaps an even better example is that in Section 49.2, where a quantity is required which makes the determinant of an algebraic 4 x 4 matrix vanish, the reduction of this matrix to give a quartic equation in the unknown would be very tedious, and, of course, thereafter the quartic would have to be solved numerically. By evaluating the determinant for a series of trial values, all the algebraic manipulation is cut out, and the solution of the equation found by direct arithmetic.

In your particular case, obviously a good deal hangs on the preliminary labour of replacing the original variates by orthogonal set. This is certainly worth doing in the case for which I originally introduced orthogonal transformed variates, i.e. "time series", in which there is a series of single observations equally spaced and in which one ~~wants~~ needs also to find out how many variates should be used. In Section 29.1 where the frequencies are unequal I have preferred not to use orthogonally tranformed functions, but to guess that 3 would be enough and verify that fact after the event. I, therefore, leave open the question whether 2 would have been enough, though this does not seem probable on inspecting a graph.

My impression is that Kendall is sometimes a little didactic in putting forward methods which are, of course, possible in general, but particularly suitable only to fairly circumscribed classes of problems.

Yours sincerely,