29th September, 1956.

My dear Payne,

Thanks for your letter. I think the additional material covering partitions of the partiple numbers 5 and 6 ought to be enough to suggest how the polynomials and their external coefficients are really related, that was what I had in mind in the remarks of my last letter to the effect that those terms involving b could certainly be easily generalized, though those not involving b corresponding with the partitions of the natural numbers must have some special rules presumably involving differential operators, as in the case of my partitional function e. You must let me know if the change in your circumstances that you mentioned makes you more inclined for the various possible changes in occupation which at present lie open to you.

The article in the Journal of the Royal Statistical Society (Methodological), last number, may, I hope, disturb the complacency of Neyman's fans in this country.

Sincerely yours,

[illegible] corrected.

and a divisor. The degree of the polynomial in x is one more than the order of the term, but for every b included it is abated by two. The sign of each term is positive even for an odd number of factors (b, c, d, etc.) and ~~minus~~ negative if the number of factors is even.

The terms given in our paper are reproduced in a more orderly form on sheet A, and on sheet B I have given the further terms needed for the 5th and 6th orders.

It may be noted that all terms including b can be derived from terms of lower order in which one or more b's have been omitted, but that the terms free from b corresponding to the partitions of the natural numbers up to six must, so far as I know, be derived the long way as done by Cornish and Fisher in their paper. However, I believe I have sufficient checks to guarantee the correctness of the terms sent you.

As the formulae are quite general, one of the available types of check consists of making particular applications, and on sheet C I give the results of inserting the cumula~~te~~nts of the binomial distribution using the correct mean and variance and therefore having b equal to zero, and on the fourth page, D, I give the expansion given in the new book on scientific inference on page 63, with two additional terms derived from the previous page. You will have noticed that in the third line of the formula as printed a sign for division has been substituted erroneously for a sign for subtraction before the number 276.

I did this last part chiefly to satisfy my curiosity about the asymptotic fiducial distribution of p derived from a Bayesian type of observation, and you will be amused to see that the expression for the mean agrees yet again with the expansion in (28.4) appropriate to Bayes' method applied to an angularly transformed probability. I have not studied any further features of the distribution beyond the remark that I make about the inequality of the variance obtained by these two different approaches.

I should be sorry if all this was found in a year or two to be lost and inaccessible as it was quite a chore to get out and check adequately, and it might not be done again by anyone very soon.

What you say about your marriage quite astonishes me, as if character and intelligence were sufficient to stabilize a marriage I should have thought you two were very safe. I am not in the least belittling your trouble if I say that I have every hope that with patience, and patience, it will come completely right. One thing that I feel sure of is that love entails, and largely consists of, respect for the will of another.

Sincerely yours,

Encs.

P.S. If you have no copy of 'Moments & Cumulants' I will send you one.