Encls.

Rentonhall House,
Morham,
East Lothian.
April 25, 1941.

Professor R. A. Fisher.

Dear Fisher,

I have looked over your sixteen questions, which I am returning herewith, and I think they are quite suitable for the purpose in hand.

I send you a bunch of thirty of my own, a mixed grill, some of them perhaps rather heavily theoretical. I have looked out some bits for translation from French and German. Questions of a general nature, on characteristic functions and on establishing the Poisson limit to the binomial and so on can go in the earlier papers.

As to the practical papers, I have not included many examples, not having much suitable material by me. I suppose the candidate will have a machine at his disposal, and access to the Tables of yourself and Yates.

In a time of paper shortage, it seems a great waste of printing and stationery for the sake of one candidate. It is to be hoped that the printing press is not bombed.

Yours sincerely,

A. C. Aitken.

In three trials one event has been observed in a times out of A trials, a second event b times out of B trials, and a third c times out of C trials. There are theoretical reasons for thinking that the probability of the 3rd event may be the product of the probabilities of the first two.

Apply the method of maximum likelihood to estimate the true probabilities of the two first events accepting the theory is correct.

By this means we likewise obtain a test for the verification of the theory.

Apply the test to the case

$$A = 30 \qquad a = 25$$

$$B = 40 \qquad b = 32$$

$$C = 50 \qquad c = 25$$

$$\frac{a}{p} - \frac{A-a}{1-p} + \frac{c}{p} - \frac{(C-c)q}{1-pq} = 0$$

$$a - Ap = (1-p)\lambda \qquad c - Cpq = -(1-pq)\lambda$$

$$b - Bp = (1-q)\lambda$$

$$(25-\lambda)(32-\lambda)(50+\lambda) = (30-\lambda)(40-\lambda)(25+\lambda)$$

10000	−1600 −1200	+50 −25
	−1250 +750	−25 +30
	+800 +1000	−32 +40

$$10000 - 1500\lambda + 38\lambda^2$$

$$\lambda = 8.495$$

$$p \quad .7675$$

$$q = .7462$$

2250000
152
730000

1500
884.4
76) 645.6 (8.495
37.6
7.20
.36

21.505) 16.505 (.7675
1.4515
1612
107

31.505) 23.505 (.7462
1.4515
1913
13

$$m \quad \left(\frac{a-\lambda}{A-\lambda},\ \frac{A-a}{A-\lambda}\right) A$$

$$\frac{(a-\lambda)^2}{m} \quad \frac{(A-a)^2\lambda^2}{(A-\lambda)A}\left\{\frac{1}{a-\lambda} + \frac{1}{A-a}\right\} \qquad \lambda^2\ \frac{A-a}{A(a-\lambda)}$$

$$\lambda^2\left\{\frac{1}{6(a-\lambda)} + \frac{1}{5(b-\lambda)} + \frac{1}{2(c+\lambda)}\right\} = \chi^2$$

$$\frac{1}{99.030} + \frac{1}{117.525} + \frac{1}{66.990}$$

May 2, 1941

My dear Aitken,

I enclose herewith copies of the theoretical papers, together with forms which have to be signed before they are returned to Mr ~~Clow-Ford~~. R.B.P.Wallace. If you approve, will you post the papers in the enclosed envelope, and say that the student - or candidate- should have access to "Statistical Tables".

I am making out two practical papers, which I will send you soon.

Yours sincerely,

Papers A. I - VI
Envelope
Forms