

time ago dealt with the same problem of k samples. Mr. Krishna Iyer took the unweighted mean of all the values of t^2 and finding it different from the ratio of variances felt that the former would be the proper criterion for discriminating between the sample means. The form he obtained for the distribution of the unweighted mean of all the values of t^2 was found to be erroneous. In fact the true distribution does not come out in a suitable form for exact tests of significance. The relationship between the ratio of variances and the weighted mean of the different values of t^2 , established above would indicate that there is no point in trying to develop a test based on the unweighted mean.

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1. P. V. Krishna Iyer, *Proc. Ind. Acad. Sci.*, 1937, 5, 528. 2. —, *Curr. Sci.*, 1938, 6, 392. 3. K. R. Nair, *Ibid.*, 1937, 6, 290. 4. —, *Ibid.*, 1938, 7, 21.

AN EXTENSION OF THE NEWTONIAN RELATION

$$\sum_{r=0}^{w-1} (-)^r a_r s_{w-r} + (-)^w w a_w = 0^*$$

THE relations given below may be considered as extensions of the Newtonian relation mentioned above:—

$$G(pq) = \sum_{m=1}^{p-1} \sum_{s=1}^{q-1} (-)^{s+m+2} a_{s+m} G(p-m, q-s) +$$

$$q \sum_{m=1}^{p-1} (-)^{q+m+2} a_{q+m} G(p-m) +$$

$$p \sum_{s=1}^{q-1} (-)^{p+s+2} a_{p+s} G(q-s) +$$

$$\overline{p+q} (-)^{p+q+2} a_{p+q}.$$

$$G(pqr) = \sum_{t=1}^{p-1} \sum_{m=1}^{q-1} \sum_{s=1}^{r-1} (-)^{t+m+s+3} a_{t+m+s} G(p-t, q-m, r-s) +$$

$$r \sum_{t=1}^{p-1} \sum_{m=1}^{q-1} (-)^{r+m+t+3} a_{t+m+r} G(p-t, q-m) +$$

$$q \sum_{t=1}^{p-1} \sum_{s=1}^{r-1} (-)^{t+q+s+3} a_{t+q+s} G(p-t, r-s) +$$

$$p \sum_{m=1}^{q-1} \sum_{s=1}^{r-1} (-)^{p+m+s+3} a_{p+m+s} G(q-m, r-s) +$$

$$\overline{p+q} \sum_{s=1}^{r-1} (-)^{p+q+s+3} a_{p+q+s} G(r-s) +$$

$$\overline{q+r} \sum_{t=1}^{p-1} (-)^{t+q+r+3} a_{t+q+r} G(p-t) +$$

$$\overline{p+r} \sum_{m=1}^{q-1} (-)^{p+m+r+3} a_{p+m+r} G(q-m) +$$

$$(-)^{p+q+r+3} 2! \overline{p+q+r} a_{p+q+r}.$$

It may be mentioned that when $p-t = q-m = r-s$, the coefficient of a_{t+m+s} will be $(-)^{t+m+s+3} 3!$, in place of $(-)^{t+m+s+3}$. Similarly when any two of the terms $p-t$, $q-m$ and $r-s$ are equal, the usual coefficient given above will have to be multiplied by 2!

Similar relation can be given for $G(p, p_2, \dots, p_s)$. For economy in space, the coefficient of a typical term alone is given.

$$(\alpha-1)! \overline{p_k+p_l+p_m \dots \alpha} \sum \sum \dots s-\alpha$$

$$\text{times } (-)^{p_k+p_l+p_m \dots + \sum r_i+s} a_{p_k+p_l+p_m \dots} \sum r_i.$$

$G(p_1-r_1, p_2-r_2, \dots, p_k-r_{k-1}, p_{k+1}-r_{k+1}, \dots, p_{l-1}-r_{l-1}, p_{l+1}-r_{l+1}, \dots)$. As mentioned before, the coefficient will have to be multiplied by π_1', π_2', \dots , if π_1', π_2', \dots , terms of $p_1-r_1, p_2-r_2, \dots, p_s-r_s$ happen to be equal.

The importance of these relations lies in the fact that they show the structure of the methods of evaluations of the Bipartitional Functions $G a(P, Q)$ and $G h(P, Q)$ by distributions in *plano* dealt with by Dr. Sukhatme. It is not possible in the short compass of this note to bring out these relations. It is hoped to do this in detail later on.

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* The notations used in this note are the same as those of Macmahon in his book *Combinatory Analysis* and Sukhatme in his paper entitled "On Bipartitional Functions," *Phil. Trans. Roy. Soc.*, London, 1938, 237, 375-409.

NEW FORMULÆ FOR THE DETERMINATION OF MAGNETIC QUANTITIES H, I, M AND m

FROM the equations $T = 2\pi \sqrt{I/MH}$ and $H \tan \theta = 2Md/(d^2 - l^2)^2$, we may obtain from two positions of the deflection magnetometer,

$$H = \frac{\pi \sqrt{8I}}{T} \frac{\sqrt{d_1/\tan \theta_1} - \sqrt{d_2/\tan \theta_2}}{d_1^2 - d_2^2}.$$

This equation gives better results for H than the equations given by Worsnop and Flint¹ and by Hutchinson.² The value of l (half the magnetic length) is eliminated in the above equation and hence no error arises due to its uncertainty. Attention may be drawn to this correct method of calculating H, since it is not usually given in College text-books.

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1. *Advanced Practical Physics*, 1927, p. 441. 2. *Advanced Text-Book of Electricity and Magnetism*, 1935, p. 122.