NOTE ON A REMARK OF D. J. STRUIK ON CORRELATION COEFFICIENTS

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In his paper on *Correlation and group theory*,* D. J. Struik points to the dualism between the total and partial correlation coefficients.

Let there be given any scatter diagram in n-dimensional space, consisting of N points determined by the coordinates

$$\overset{(i)}{x_1}, \overset{(i)}{x_2}, \cdots, \overset{(i)}{x_n}, \qquad (i = 1, 2, \cdots, N).$$

For ease of computation suppose that

$$\bar{x}_j = \frac{1}{N}\sum_{i=1}^{N} \overset{(i)}{x_j} = 0, \qquad (j = 1, 2, \cdots, n).$$

Then, if

$$\sigma_{jk} = \frac{1}{N}\sum_{i=1}^{N} \overset{(i)}{x_j} \cdot \overset{(i)}{x_k},$$

the Gram determinant of the system is

$$G \equiv \begin{vmatrix} \sigma_{11} & \sigma_{12} \cdots & \sigma_{1n} \\ \vdots & & \vdots \\ \sigma_{n1} & \cdots & \sigma_{nn} \end{vmatrix}.$$

Now let the minor of the element σ_{jk} be denoted by Σ_{jk}; then the equation of the so-called correlation hyperellipsoid may be written either in the form

(1) $$\Sigma_{11}x_1^2 + 2\Sigma_{12}x_1x_2 + \cdots + \Sigma_{nn}x_n^2 = \text{const.},$$

or, with tangential coordinates,

(2) $$\sigma_{11}u_1^2 + 2\sigma_{12}u_1u_2 + \cdots + \sigma_{nn}u_n^2 = \text{const.}$$

The total correlation coefficients follow from

(3) $$r_{jk} = \frac{\sigma_{jk}}{(\sigma_{jj}\cdot\sigma_{kk})^{1/2}},$$

and the partial correlation coefficients are given by

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