EDITORIAL

FUNDAMENTALS OF THE THEORY OF SAMPLING

III. DISTRIBUTION OF SAMPLE m TH MOMENTS ABOUT THE ORIGIN OF THE PARENT POPULATION

As in section I, we shall be concerned with the $\binom{s}{r}$ possible samples, each consisting of r variates, that can be selected from the parent population of s variates $x_1, x_2, \ldots x_r, \ldots x_s$. The m th moment of each sample, computed in each case about the origin of the parent population, may be written

$$\begin{cases} z_1 = \frac{1}{r}\left\{x_1^m + x_2^m + x_3^m + \cdots + x_r^m\right\} \\ z_2 = \frac{1}{r}\left\{x_2^m + x_3^m + x_4^m + \cdots + x_{r+1}^m\right\} \\ \cdots\cdots\cdots\cdots\cdots\cdots \\ z_{\binom{s}{r}} = \frac{1}{r}\left\{x_{s-r+1}^m + x_{s-r+2}^m + x_{s-r+3}^m + \cdots + x_s^m\right\} \end{cases}$$

If we write $\frac{x_i^m}{r} = y_i$, it will be observed that the above distribution may be written

$$\begin{cases} z_1 = y_1 + y_2 + y_3 + \cdots + y_r \\ z_2 = y_2 + y_3 + y_4 + \cdots + y_{r+1} \\ \cdots\cdots\cdots\cdots\cdots\cdots \\ z_{\binom{s}{r}} = y_{s-r+1} + y_{s-r+2} + y_{s-r+3} + \cdots + y_s \end{cases}$$

and therefore may be regarded as a distribution of the algebraic sums of the respective samples withdrawn from the parent population $y_1, y_2, \ldots y_s$, i. e. $\frac{x_1^m}{r}, \frac{x_2^m}{r}, \ldots \frac{x_s^m}{r}$. Consequently, since

$$\mu'_{n:y} = \frac{\Sigma y_i^n}{N} = \frac{1}{N}\Sigma \frac{x_i^{mn}}{r^n} = \frac{1}{r^n}\mu'_{mn:x}$$