

CORRELATION AND GROUP THEORY*

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1. *Introduction.* The following considerations, that were first presented at the meeting of the American Mathematical Society at Amherst in September 1928, might seem rather trivial. Indeed, their essential elements are well known to all statisticians. I have, however, never seen an explicit statement of these principles and it might therefore be useful to give a short presentation.†

2. *The Groups of Correlation.* Problems on correlation may be divided into three different groups.

A. Problems in which comparison is made between quantities that can not be expressed in the same units. For instance the marriage rate and the foreign trade of a country. Here the marriage rate may be expressed in number of marriages per thousand of population and the foreign trade in dollars. Change in unit in both cases may be entirely independent. The marriage rate may be expressed in percentage, or per million of population, the foreign trade in thousands of dollars, or in pounds sterling. If the two variables be denoted by x and y , I may just as well introduce variables x' , y' defined by the equations

$$(1) \quad x' = \lambda x, \quad y' = \mu y,$$

where λ and μ are arbitrary independent constants.

B. Problems in which comparison is made between quantities that can be expressed in the same units. For instance heights of fathers and heights of sons, age of husband and age of wife. Here the only reasonable change in the variables x and y is the same change of scale

$$x' = \lambda x, \quad y' = \lambda y, \quad (\lambda \text{ constant}).$$

C. To this type B, belong also problems in which the x and y

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† A reference has been made by N. Wiener, *Harmonic analysis and quantum theory*, Journal of the Franklin Institute, vol. 207 (1929), pp. 525-534; particularly p. 531.