

THE GENERALIZED PROBLEM OF CORRECT MATCHINGS

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A method common to many experimental and testing procedures in psychology and education is to require an individual to match, as best he can, members of one series of items with members of a second series of quite different items certain of which are in some sense true opposites of items in the first series. Thus the experimental psychology of personality has often investigated the ability of graphologists or laymen to pair samples of handwriting produced by a group of persons with, say, character-sketches of these same persons; and the excess of correct matchings thus produced over the number to be expected by chance has been used as evidence that the expressive movement of handwriting affords characteristics diagnostic of personal traits. Fortunately, the excesses experimentally obtained have often been so large as obviously to exclude the operation of chance alone. But many empirical results show small excesses only; and the interpretation of such findings has not hitherto been subjected to rigid statistical analysis.

The particular statistical problem resident in this experimental procedure is twofold, involving the estimation of the significance of (a) a given number of correct matchings produced by one individual, and (b) a given mean number of correct matchings produced by a group of individuals working with the same material independently.

Furthermore, two cases arise in practice: (1) the two series of items are of equal length, and each item in either series has a true apposite in the other series; or (2) the two series may be of unequal length, in which case the longer series contains not only a true apposite for each item of the shorter series, but, in addition, a certain number of extra, irrelevant items which cannot be correctly matched with any items in the shorter series. I have already given the solution to problems (a) and (b) for case (1).¹ But case (1) forms only a corollary of the more general case (2), to the solution of which this present paper is devoted.

(a) The Significance of a Given Number of Correct Matchings Resulting from a Single Trial

Let there be given a series of u x -items,

$$x_1, x_2, \dots, x_t, \dots, x_u$$

and a series of t y -items,

$$y_1, y_2, \dots, y_t.$$

¹ The Statistics of the Method of Correct Matchings, *Amer. Jour. Psychol.*, 46, 1934, 287-298.