THE CORRELATION OF MENTAL AND PHYSICAL TESTS

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BY

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INTRODUCTION.

This research is occasioned by the fact that psychologists and students of education have proposed certain tests, put them to trial and recorded their results, hoping thereby to find a means by which the fundamental elements of general and specific ability could be isolated and valued. In this they have not been without precedent, since upon the same assumption fitness for the civil and military service, for academic degrees and honors, for professional and technical licenses, etc., is usually determined by arbitrary tests and estimated by numerical averages in grade books. Our work is primarily with the grade book of the psychologist. It is of both theoretical and practical importance to know what relations exist between the results of his tests and those of others. The contention that all tests are arbitrary and futile has no weight in this connection so long as people go on using them. Educational, professional, physical and psychological tests are with us and bid fair to remain, at least until something better is found. Thus the times demand that the results obtained by the various tests be made an object of study. The most obvious line of approach in this problem is through correlation. If a test is general, then its results should correlate with many other special tests, and, in turn, if there is an integral relation between general and special ability, the results of the latter should correlate with the former. Should two tests show no correlation whatever, we can do no more than regard them as defining two entirely independent forms of activity. To determine the relative value of tests with respect to their general or specific significance, we must find some way of estimating the degree of correlation in terms of variability.

To the reader is due some explanation as to the methods of treating data. It is not proper to demonstrate these methods here, because they are not the objects of investigation, but, while they are treated at length in the appropriate literature, the mode of presentation is beyond the comprehension of all save the ex-

pert or those few who can afford to spend their time working up to them. So it seems necessary to give a few words to the methods employed.

The first thing to learn is that when mathematical formulas are resorted to it is only for purposes of convenient and exact statement. Long ago astronomers and engineers discovered that errors of observation are distributed in a certain orderly manner and are consequently susceptible to mathematical statement. By proper treatment they are able to estimate the precision of measurements, determine the number of observations necessary to a given standard of precision, etc. It was soon discovered that biological variation followed similar laws and that such variation could be measured accurately, thus enabling us to determine differences of race, type, species, etc. When psychologists took up their side of the question as to the precision of observations they soon discovered that all human performances, when objectified in units of space, time, etc., seem to follow certain laws of variability, and that these laws are in turn similar to those already worked out. In other words, variability is no longer a barrier to the study of human activity, because we can measure that variability. In more recent times it has been found possible to deal with variability in such a way that the functional and structural relations between phenomena can be accurately estimated, or, in technical terms, a method of correlation has been developed. As may be inferred, these methods are based upon empirical study, they have been attested by use and are the work of some of the best mathematicians and scientists of the past and present centuries. The reader who doubts their validity must look to the authors themselves.

In the following pages only such statements of the method have been offered as will enable the reader to understand the force of the results. In correlation it need only be borne in mind that we are using an accepted method to estimate the relative necessary relations between the phenomena under consideration. To make any such comparison at all we must assign our results a place in a scale of values. This is what the method of correlation does.

It remains for the writer to define his relation to this research. The tests were devised and conducted by Professor J. McKeen Cattell and his associates, but for the methods of compilation, together with all conclusions and opinions respecting the results and the validity of the various tests, the writer is responsible. The conception of the problem and the accumulation of material must be credited to the former, while the latter has only undertaken the compilation of results.

It is scarcely possible to mention the names of all who assisted in making the tests, but special note should be made of the fact that most of the tests on Barnard students were made by Miss S. L. Cody.