

**ARITHMETIC TESTS AND STUDIES  
IN THE PSYCHOLOGY OF  
ARITHMETIC. VOL. I, NO. 4,  
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**GEORGE S. COUNTS**

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ARITHMETIC TESTS AND STUDIES  
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ARITHMETIC

*By*

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## CHAPTER I

### INTRODUCTORY STATEMENT

This investigation is a study of the arithmetical abilities or attainments of school children as measured by an arithmetic test. The study naturally falls into two divisions, the first including chapters ii, iii, and iv, the second, chapters v and vi. In the former, the test used in the investigation is described, and results are discussed which throw light on its use. In the latter, two special studies are made in which the test is used as a measuring instrument. These five chapters will now be described in greater detail.

In chapter ii it is shown that there is a need for a spiral test in the "fundamentals" of arithmetic to be used in diagnosing city, school, class, and individual weaknesses in the various operations included in the term "fundamentals." It is further pointed out that Series A and B of the Courtis standard tests are inadequate to meet this need. The test then, as developed, composed of 15 sets of different types of examples, is described and analyzed. This is followed by a statement concerning the collection of the data upon which the remainder of the study is based.

The purpose of chapter iii is fivefold: (1) In order that the test may be of the greatest value educationally it is necessary that standard attainments for children in the various grades in each of the 15 sets be determined. This is done on the basis of results from Cleveland and Grand Rapids. The validity of these results is discussed from the standpoint of the Courtis standard scores. (2) A system of weights is derived by which it is made possible to convert the scores made by a particular group or individual in the 15 different types of arithmetical operations into a single score to represent general arithmetical attainments of the individual or group. (3) The use of the test is discussed in detail, the method by which it may be employed to diagnose city, school, class, and individual weaknesses being shown. (4) Distributions of the scores

made by groups of children in the typical operations are discussed for the purpose of indicating the different types of individual reaction to examples of varying degrees of complexity and for the purpose of pointing out certain differences in the responses made to the "fundamentals" and to fractions. (5) The degree of accuracy with which the various types of examples are worked is shown, accompanied by a comparison of the curve of accuracy and the curve of "rights" for one of the sets.

Chapter iv is a study of errors, in which the types of errors made by children in working the different kinds of examples are analyzed. It is of value to the teacher to know what sorts of errors she may expect from the pupil when the latter encounters the different arithmetical operations. The frequency of these errors is also determined in order that the teacher may be able to apply the proper amount of emphasis at the various points of difficulty. Because of inability to isolate kinds of errors made in connection with some types of examples, since the study was confined to an examination of records made by pupils, this study is incomplete. It is necessary that it be supplemented by experimental data.

The problem presented by the study in chapter v is, in the first place, the problem of measuring the attainments of various groups of children for the purpose of discovering differences in four age groups throughout Grades 3-8 inclusive. In the second place, a study is made of certain promotion groups for the purpose of discovering differences. This division of the study has three parts: the first relates to the fast and slow pupils and is confined to the records of pupils in Grade 8-2; the second is concerned with a group of pupils repeating because of failure to do the work of the grade, a group repeating because of sickness, transfer of school, or similar cause, and a group of pupils making normal progress, the data for this study being secured from pupils in Grade 7-2 only; the third has to do with a group of pupils in Grade 8-2 who had failed below the sixth and another group who had failed above the fifth grade. The differences found are analyzed and interpreted.

In chapter vi a problem of the same general type as that of the previous chapter is encountered. The problem here is to deter-

mine whether or not there are differences in arithmetical attainments which follow racial lines. Owing to the meagerness of the data, this study is confined to five races, or nationalities, Americans, Hollanders, Germans, Swedes, and Slavs.

Owing to the fact that this entire study has been made on the basis of records made by pupils, it is in many particulars incomplete and tentative, for there are many matters that cannot be determined by an examination of records. Furthermore, the conditions under which the records were made were not sufficiently under control. It is therefore evident that it is necessary to supplement this study by experimentation.