

involving choice; but an unambiguous case is hard to find. (VI) *Will as Imperative*. So far from it being true that volition is essentially determined by the judgment, I am going to do something, some volitions are expressed, not by a judgment at all, but by an imperative. Such imperative volitions always have for their object the control of another's conduct, and though usually simple, they may, by sympathy, be complex and involve choice. This type cannot be eliminated by assuming that imperatives are merely means for getting preformed volitions accomplished, for in some cases the conation issues in the imperative too suddenly. Nor can it be resolved into any of the judgment types; it is a unique differentiation. The judgment is either true or false, the imperative is neither true nor false. Finally (VII) *Desire and Will* do not always have the relation ascribed to them by Mr. Stout. Will is sometimes determined, not by desire, but by the less strong aversion. Thus the condemned man allowed to choose the form of his execution, actually wills to do what he desires not to do, since he desires to escape death in every form. There are in fact three types: (1) desire is the motive; (2) desire is effaced from the motive (*e. g.*, 'duty for duty's sake'); (3) desire is replaced by aversion.

Issue may fairly be taken with some of these contentions. If, *e. g.*, the condemned man choose to be shot rather than hung, it seems incorrect to say that his will is contrary to his desire because he does not desire to be shot. He does not will to be shot simply, but to be shot rather than hung. He is averse to being hung, he is also averse to being shot; but he has, among other stronger desires, this desire also, to get through with the disagreeable necessity in the least obnoxious way possible under the circumstances, and he resolves accordingly. In regard to 'imperative volition,' it may be doubted whether, *e. g.*, the command 'Do this' expresses more than a mere wish or desire apart from the implied consciousness, "I am determined that, as far as I can control your conduct, you shall." Finally, as regards the interpretation of the soldier's involuntary cough or sneeze, it seems beside the mark to say that it proves that the fore-knowledge, I am about to do this, is not the essential character in will; for nobody, certainly not Mr. Stout, said that it was.

H. N. GARDINER.

SMITH COLLEGE.

Genesis of Number Forms. D. E. PHILLIPS. Amer. Jour. of Psychol. VIII., 4, p. 506. July, 1897.

This study is noticeable for the fulness of its material, comprising returns from about two thousand persons. Half of these (974) were

from children of ten to sixteen years in the Worcester grammar schools, and one-sixth (332) were from students in a normal school. Most of the children were privately questioned and precautions were taken against their 'imagining forms for the occasion.' The writer of this notice, from her own experience, cordially endorses the conclusions of Mr. Phillips, from this verification, agreeing with him that "after giving the slightest explanation, a close observer will hardly fail to distinguish every one having distinct number forms. Those who have no form," the author adds, "have no idea of what you are speaking. * * * Those having a form show an entirely different attitude."

The most significant result of the paper is the conclusion of Mr. Phillips that the possession of mental forms is no sporadic aberration of a few individuals, but merely the pronounced manifestation of a very general characteristic. "There is no more reason," he says, "for isolating these mental activities from a much larger field, than there is for isolating exceptional cases of memory or imagination from these general powers of the mind." The statistics of the study do not at first sight lead to this result, for only sixteen per cent. of the subjects claimed a number form, when originally questioned. But the attention of Mr. Phillips was attracted by the experience of Dr. Story who "denied that he had a number form, but remarked that large numbers appeared far off" This led to a re-examination of 250 of the adults of the former investigation who had denied having a form, and to the discovery that 210 of these "have a feeling that numbers in some way recede from them."

This result, as Mr. Phillips suggests, not only shows that "nearly all persons possess some idea of extension of numbers, more or less indefinite," but it throws some light on the baffling subject of the psychology of numbers. The fact that the most primitive number-form seems to be a 'sensation of following in some particular direction' allies the numerical series with the tendency of motion. The number-form is thus an indication of the close connection between the motor and the spatial image, and between the arithmetical and the geometrical unit.

The universality and the thoroughly 'normal' nature of the number-form is indirectly suggested by other results of the study with which, in general, the statistics of similar investigations by the writer of this notice very definitely agree. In the first place, all those who remember the origin of these forms refer them to ordinary experiences in learning to count and to read (p. 514). Furthermore, inquiry

fails to reveal a greater proportion of forms among the 'intellectually active,' or the 'imaginative,' which suggests that the form is not the adjunct of the riotous fancy merely. The permanence of forms is shown by the discovery of 14 per cent. among adults, as over against only 18 per cent. among children. Finally, the utility of forms points to their general occurrence, and 97 of the 212 who answered the questions of Mr. Phillips are sure that forms are helpful in the mental life, while only one counts them 'troublesome.'

The study of Mr. Phillips is valuable, therefore, because it tends to lure the number-form from the *terra* more or less *incognita* of the abnormal, into the familiar domain of the normal psychic life.

MARY WHITON CALKINS.

WELLESLEY COLLEGE.

Sull'Importanza delle Ricerche Relative alla Storia delle Scienze. GIOVANNI VAILATI. Torino, Roux Frassati e Co. 1897. Pp. 22.

This is a lecture introductory to a special course upon the history of mechanics. The author insists that an intimate knowledge of the historical development of a science is absolutely necessary to a thorough understanding and right appreciation of its present day methods and results. By many historical instances he shows how the men of one generation have been indebted to the labors of those of preceding generations, for methods of observation and experiment, for proved and established principles and laws, for working formulæ, and for a vast and ever increasing accumulation of classified facts, and arranged material. He illustrates this dependence upon the past by references especially to the history of mathematics naturally leading to a special disquisition upon the development of the science of mechanics, the latter being the author's objective end in view throughout this introductory lecture. He draws attention to the fact that in the European universities there is an increased number of courses offered this year in the history of the various sciences. This signifies the importance which is now attached to historical research as an aid in the present development of science.

JOHN GRIER HIBBEN.

PRINCETON UNIVERSITY.

Die Assoziationsfestigkeit in ihrer Abhängigkeit von der Verteilung der Wiederholungen. ADOLF JOST. Zeitschrift für Psychologie u. Physiologie der Sinnesorgane, XIV., 6. pp. 436-472.

This paper gives an account of experiments carried on in the Göt-