of whose forces we know, and to a part only do our sense-organs respond. And these forces, of which we are not at present cognizant, may involve nothing supernatural whatsoever, and yet they may account for the alleged facts of the occult phenomena of psychical research. Mr. Crookes offers a tentative hypothesis, as follows: That ether waves of far more rapid vibrations than those of the Roentgen rays may directly affect certain brain centers sensitive to them, without the intervention of the ordinary channels of the senses, and that such rays moreover may be freed from the limitations of space, as for instance the law of inverse squares. Thought may therefore be communicated at a great distance and without the physical connections and sequences which we deem indispensable to all communication between man and man. Mr. Crookes's speculations can not rank, however, as an hypothesis. At best he establishes merely the possibility of his speculation, for he presents no facts to indicate its probability or to save it from being relegated to the sphere of bare conjecture.

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A Study in Apperception. WALTER B. PILLSBURY. *Am. Jour. Psychology*, VIII., pp. 315-393. April, 1897.

In this paper Dr. Pillsbury is engaged in the praiseworthy but difficult task of throwing light upon the problem of apperception versus association. He does this in a way that is extremely suggestive; namely, by analyzing the elements involved in the reading of a word. This, of course, involves both subjective and objective factors. The former may be analyzed into six or seven factors: the association between the letters of the word; the word as a whole; the preceding word; the events of the preceding day and hour, etc. The objective factors came from the letters themselves. The general scheme of the investigation was "to determine the amount of change which might be made in an object ordinarily perceived or assimilated in a certain way without change in the character of the resultant perception or assimilation." The object to be changed is a type-written word photographed and printed on a lantern slide. This was projected upon a ground-glass screen in front of the subject. After two-tenths of a second it was cut off, and the subject recorded what he 'saw.' Comparison of this record with the word exposed furnished means of determining the value of the various objective and subjective factors in the perception of the word. The influence of the ob-

jective factors was altered by omitting a letter or by substituting another letter or by printing an 'x' over the letter and so blurring it. The subjective factors were varied largely by Professor Münsterberg's method of calling a word, associated with the one to be shown, immediately before this one was given. The other subjective factors were the accidental variations which were noted in connection with the various experiments. The nature of all these experiments is such that the results do not admit of any complete tabulation. The tables given are merely so many examples of individual experiments, and it would be impossible to draw any conclusion from them alone. They do, however, show the comparative value of the various alterations in the conditions of subject or object. The omitted letter is most often noticed, the changed letter next often, and the blurred letter is more easily overlooked. Any change in the beginning of a word is more often noticed than if the change came later in the word. The experiments made with and without an association show that the percentage of misprints overlooked is greatly increased under the influence of the association.

The general conclusions of this study should be said to follow from the experiments, not to rest upon them. The author has taken Wundt's treatment of the theory of apperception and its relation to other mental states as a standard, and he begins his paper by a very good résumé of Wundt's theory. In the statement of the general theoretical results of his experiments, Dr. Pillsbury brings his own formulation of the process of perception into sharp contrast with Wundt's theory. "Wundt reduces the process to an associative part-process of *identity* between the parts seen and letters of the correct word, and an associative part-process of *contiguity* between these letters of the correct word and those usually combined with them to form the entire word. Apperception is present only in the passive form in which the objective or mechanical factors are alone determinant. We, on the contrary, have reduced association to a very subordinate place, and find active apperception to be the truly controlling factor." The scheme of psychology here advanced is: (1) *Sensation*, the element of all cognitive states. (2) The *idea*—a complex of sensation. (3) *Association* connecting ideas. (4) *Apperception* connecting this idea with general experience. These processes are all abstractions. The first concrete conscious process is (5) *Assimilation*, or *perception*. "This includes Wundt's association synthesis, assimilation and complication, *i. e.*, all of his associative connections, as well as the apperceptive connections of apperceptive

synthesis, the concept, the greater part of which is known as judgments, and probably agglutinations also." (6) Succession associations and (7) the highest stage of all, the true judgment; the general conclusion of the paper being "that conscious processes and their connections are not so simple as is usually supposed," and "and that what are ordinarily known as the 'higher' and 'lower' processes are not different in psychological structure and mode of composition."

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Comparative Observations on the Involuntary Movements of Adults and Children. M. A. TUCKER. *Am. Jour. Psychology*, VIII., pp. 394-404.

These observations were made upon 18-36 adults and 13-38 children, by means of a Jastrow's automatograph. The experiments are considered in connection with the investigations of Stricker, Lehmann, Féré, and Jastrow. On the whole, the results of Féré and Lehmann are substantiated.

The results of the experiments are shown in a number of tables and cuts. As a final summary we find:

"1. There is physiological tendency for the hands and arms resting in front of the body to move inward toward the median plane of the body.

"2. There is no certainty that when we see an object we tend to move toward it. We may think of it simply as an object at rest, and the idea of motion is necessary to cause movement in that direction.

"3. Involuntary muscular movements may be controlled by the influence of the sight or visual remembrance of moving objects, and the imitation of the direction of the moving stimuli is the result.

"4. Children are governed by and subject to the same laws as adults, but to a less extent.

"5. There is no sex or age difference in children, either in involuntary or controlled muscular movements."

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Psicologia per le Scuole. GIUSEPPE SERGI. 2d edition. Milan, Fratelli Dumolard, 1895. Pp. vii + 227.

This little book, designed for the use of high schools, has, as a textbook, the merit of clearness, directness and consistency of method. The first part is purely physiological, and the physiological point of