

is making the subjective objective. School-room methods are too much occupied with getting a clear language expression of the content of children's minds. In the hurry to complete a given topic time enough is not allowed for the ideas to expand, subconsciously, in the child's own way, and this hot-house growth gives an artificial product. Everything that exists for our consciousness has to be worked over in our own brain. The teacher cannot take it for granted that the pupil has the same consciousness in dealing with exactly the same material, and even in the same form, when learning, that exists later when the subject is learned.

By the structure of consciousness the author means memory, imagination, inductive and deductive reasoning. She agrees that memory is necessary where the aim is to solidify the objective language statement, but this comes after the learning process is completed, when the subjective has been made objective, and conforms to the definite relations of time and space, of cause and effect. Learning, on the other hand, is a condition of mental integration and disintegration in which the ideas are as yet too indefinite and vague for memorization, and here imagination, the prevailing organization of children's minds, as the author finds, must have free scope.

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*The Psychology of Chess and of Learning to Play it.* ALFRED A. CLEVELAND. Amer. Jour. of Psychol., 1907, XVIII., 269-308.

Like many other games which arouse intense interest, chess owes its popularity to its appeal to the fundamental instinct of combat and to the fact that it opens the way for origination and invention. Cleveland describes the game of the average player and cites instances of remarkable feats of well-known chess masters, and then takes up the learning process as illustrated by the game. The player, after passing through the various stages of growth in skill from a condition in which he can plan only the next move, reaches a condition in which he is able to think out a long line of defense and attack. The preliminary details are now becoming automatized and the mind is left free for the larger aspects of the game. At this stage of the learning process the beginner has more knowledge than he can put to practical use; his mind has grasped many details which it has not yet organized for ready employment. The player who has reached a reasonable degree of skill has learned to use large units of thought. He is enabled to make short cuts in planning by ignoring the intermediate steps which would otherwise hamper his outlook.

Cleveland agrees with Swift in finding that skill, instead of being diminished, is more often increased by a period of rest.

In conclusion, Cleveland considers that the progressive organization of knowledge is the most important psychological feature in learning chess, though a good visual imagination or its substitute in some other form of imagination, such as auditory, is desirable.

The article, while complete in other ways, does not give in sufficient detail the factors of the learning process which are peculiar to chess. For instance, attention and association are used in too comprehensive a way without sufficient analysis to determine the other mental processes involved in the group of activities to which these terms are applied. The article, however, is valuable as a contribution to the psychology of learning.

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*Mathematical Prodigies.* FRANK D. MITCHELL. *Amer. J. of Psych.*, 1907, XVIII., 61-143.

The object of this paper, as stated by the author, is three-fold: "(1) To give a summary of the mathematical prodigies described in the literature of the subject. . . (2) To give a brief account of the writer's own case. . . (3) To set forth a new theory of mental calculation."

We may pass over the first two sections of the work with a few words. In the first the various prodigies recorded in history, some twenty odd, are treated of in detail with respect to their mathematical abilities, heredity, education, etc. The source for these accounts appears largely to have been found through references in Scripture's earlier article on 'Arithmetical Prodigies' (*Amer. J. of Psych.*, 1891, IV., 1-59). This original work of Scripture is treated throughout with a rather carping criticism, to some extent no doubt justifiable, but on the whole rather annoying in its petty detail.

In the account of his own case the author reveals certain of the methods and tricks of calculation, and lays the basis for his theory by deriving the calculating ability from a natural interest quite prior to all knowledge of or education in mathematics. As to the theory, he develops it from counting, and lays stress on the natural tendency towards a precocious skill in this direction. Education, therefore, is of little avail, and indeed may act as a hindrance to the development of this natural tendency.

Three grades of ability are differentiated: (1) Pure counting in abbreviated form, which takes into account the properties and short-