memory. It is of course quite probable, and in fact almost certain, that an individual's memory for various types of experience differs considerably. On the other hand, it seems to me to be a hypothesis worthy of investigation that the memory or retention of experience is a characteristic of an individual's mental life which is rather distinctive and which is a more or less constant factor in his various mental processes. At any rate, no systematic experiment has been made to determine whether this is true.

Two important "next steps" appear to me, therefore, to be to meas ure broader aspects of intelligence, and to devise specific measures of significant components of ability.

IV. By S. S. COLVIN,
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1. Nature and measurement of general intelligence. General intelligence has been defined as "general mental adaptability to new problems and conditions of life." To my mind this definition is somewhat too narrow. In a very true sense intelligence is mental adaptability to environment. This conception, however, is in one respct too broad since it includes instinctive adaptations as well as those that have been acquired through experience. Of course, psychologists sometimes speak of the psychic life of micro-organisms and frequently use the term intelligence in connection with instinctive acts of such animals as ants, bees and wasps, whose adaptations to environment seem to be almost entirely on the plane of instinct. On the whole, I consider the most helpful viewpoint from which to consider intelligence is that it is equivalent to the capacity to learn. *An individual possesses intelligence in so far as he has learned, or can learn to adjust himself to his environment.* In a sense this conception is substantially the same as that quoted in the definition first given. However, it does not unduly emphasize the problem aspect of intelligence and rightfully attributes intelligence to those animals whose sole ability to learn is confined to the hit-and-miss try-out of experience ("trial and error").

Psychologists have accepted this definition practically if not theoretically. An inspection of intelligence examinations clearly shows

that those who framed them have not confined their tests to problem solving, even in its rudimentary forms. These tests measure an individual's intelligence largely in terms of what he has learned, thus obtaining indirectly a measure of his learning ability. Vocabulary tests, range of information tests, "same and opposites" tests, tests of fundamental operations in arithmetic, and the like, call for little ingenuity. If the individual has the requisite skill and knowledge he can satisfactorily perform these tests. They are appropriate tests for intelligence only on the theory that they test ability to learn by discovering what has already been learned. Even those tests that demand verbal and mechanical ingenuity are valid only in so far as individuals taking these tests have had common opportunities to learn the elements necessary in solving the problems involved in sentence completion, thought interpretation and the like. It must be remembered that even the ability to think in a sustained and logical manner is based on having learned how to think. Thought is a habit and is acquired through learning. In a word, the validity of all mental testing rests on the fundamental assumption that those tested have had a common opportunity to learn the skills, facts, principles and methods of procedure exemplified in the tests. It follows for this reason that many of the standard school tests now in use are reasonably good measures not only of specific aspects of acquired intelligence, but also of general (innate) intelligence. All the individuals in the school group tested have had the same training, or at least very similar training. Some have learned more, others, less; those who have learned less possess less learning capacity,—hence less general intelligence.

Since, however, general intelligence cannot be considered as a single unitary factor (according to the Spearman-Hart-Burt hypothesis), but as a common average of many different factors positively, but by no means perfectly correlated, intelligence tests should explore as many aspects of human ability as possible. This is important for prognostic purposes. It is even more important if intelligence tests are to be employed to diagnose varieties of mental abilities. The investigator frequently finds individuals who do well in certain kinds of mental tests and who do poorly in others, not because of difference in opportunity, experience or interest but because of difference in native ability. We need the simpler tests, tests involving specific knowledge of facts, memory, perception and the like,

but we need also, and in a greater degree, tests to measure the higher intellectual processes,—tests that will give the individual who thinks carefully, accurately, but sometimes ponderously, an opportunity to show his ability. Doubtless speed of learning and efficiency of learning are positively, but by no means perfectly, correlated.

2. *Next steps in research.* As I have already pointed out in the previous discussion, we need at present test elements that emphasize, more than any now existing do, deliberation and substained rational ability,—tests in which speed is relatively unimportant and in which analysis, synthesis and an extensive attention-span are the chief factors of importance. Pioneer work in this field, as indeed in many others, has already been done by Thorndike, particularly in his tests for college freshmen.

In one sense of the word there are too many mental tests at present. This plethora is doubtless valuable and necessary, as far as theory of mental testing is concerned, but it has definite practical drawbacks. The tests now "on the market" (and doubtless their commercial value has had something to do with their recent rapid development), while in general valuable, have too many features in common and are too nearly of equal value for practical purposes to make them all necessary. I hope the time will soon come when a committee of skilled psychologists will select the elements most valuable in the tests now existing, add others that are lacking, and after carefully standardizing this complete test, will issue it as the one recommended for general use in the grades and for the ages for which it has been devised. Of course, there would still be several tests,—one for the primary grades, another for the intermediate and grammar grades, one for the high school and one for the college,—but there would not be a multiplicity of tests for each level of school development, and there would be definite norms established for the guidance of teachers. At present either norms are lacking or they have been imperfectly and inadequately devised. And, by the way, would it not be well in arriving at standards to check back the results of the tests on groups of known intelligence and ability?

A further step that is necessary from the standpoint of the practical value of mental tests is that teachers and administrators should be more carefully informed as to the value and limitations of the results of intelligence testing in solving problems of instruction and supervision. Frequently tests are given and the results are in no

way utilized. Often tests are given and the results are wrongly interpreted and applied.

The most important "next step" for purposes both of prognosis and diagnosis is the formulation of a test that will inform us of the character qualities of those tested. It is true that there is a positive correlation between the results of intelligence tests and character, partly because intelligence and character are related and partly because our so-called intelligence tests are to an extent character tests as well. However, there are many instances in which intelligence tests fail to be of value practically because they give only slight indication of those qualities of character and temperament that are vital in all human achievement. In my work with students at Brown University, I have found scores of instances in which intelligence tests have not only failed to indicate in a positive way college performance, but have also shown results at variance with this performance. In a considerable number of instances the lack of relation has been clearly due to the fact that qualities other than intelligence have played a deciding role. The psychologist who devises a character test that has a reasonably high validity will earn for himself a position in the field of ability testing equal to that of Binet,—yes, even higher, for his problem is more complicated and his task more difficult. However, until such character tests are available we shall have solved only one-half of our problem in the prognosis and diagnosis of those elements which lie at the basis of human achievement.

V. By Rudolf Pintner,

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1. Nature and measurement of intelligence. I have always thought of intelligence as the ability of the individual to adapt himself adequately to relatively new situations in life. It seems to include the capacity for getting along well in all sorts of situations. This implies ease and rapidity in making adjustments and, hence, ease in breaking old habits and in forming new ones. Fundamentally, this leads us back to the general modifiability of the nervous system. An organism whose nervous system is very modifi-