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Intelligence as the Tests Test It*

IF you take one of the ready-made tests of intelligence and try it on a very large number of persons, you will find that they succeed with it in very different degrees. Repeat the test, and you will find that they cannot, with the best will in the world to do well, alter their scores very greatly. Then give the same group another intelligence test, and you will discover that the differences among individuals are approximately, although not exactly, the same. And you can go on. You will find that an adult, after continued exposure to his social and educational environment, does not greatly alter his score on a given test; that children, however, do steadily improve their performances until somewhere between ten and twenty years old; that the average age at which improvement stops is about fourteen years; but that children while improving tend to maintain the same individual differences, so that in a given group every child would keep about the same rank within the group. These are basic observational facts of the psychology of intelligence. What do they mean?

What the Tests Test

They mean in the first place that intelligence as a measurable capacity must at the start be defined as the capacity to do well in an intelligence test. Intelligence is what the tests test. This is a narrow definition, but it is the only point of departure for a rigorous discussion of the tests. It would be better if the psychologists could have used some other and more technical term, since the ordinary connotation of intelligence is much broader. The damage is done, however, and no harm need result if we but remember that measurable intelligence is simply what the tests of intelligence test, until further scientific observation allows us to extend the definition.

An observational method for extending knowledge of intelligence as the tests test it is the method of statistical correlation. The relation to intelligence of any measurable capacity at all can be determined by comparing the relative performances of a large number of persons in an intelligence test with their achievement in the measure of capacity in question. If the correlation is considerable, yet not perfect, say 60 percent, we say that the particular capacity is partly dependent upon intelligence and partly independent of it. We shall not be far wrong if we think of such a capacity as complex, involving 60 percent of intelligence and 40 percent of some special ability that is not intelligence.

The method of correlation gives us at once some insight into the nature of intelligence as the tests test it. No satisfactory intelligence test exists at present which employs a single type of mental operation. Most tests for intelligence, like the army tests, consist of batteries of single tests, every one of which appears, on inspection, to test some special ability, like arithmetical ability, or an appreciation of verbal relations or of logical relations. When one obtains the correlations among the different tests that make up the battery called an intelligence test, one finds that the separate tests do not correlate with one another so very highly—not so highly as a rule as does one combined intelligence test with another. These results are explained by saying that the separate tests are really tests of separate abilities, and that each of these abilities involves, in part, intelligence, which is a factor common to all the tests, and in part a special ability, which is not intelligence and which therefore explains the failure of the tests to correlate very highly. When the separate tests are combined in a total score, the special abilities, being unrelated, are supposed to cancel out, leaving the score to represent the "common factor," intelligence.

Thus we see that there is no such thing as a test for pure intelligence. Intelligence is not demonstrable except in connection with some special ability. It would never have been thought of as a separate entity had it not seemed that very different mental abilities had something in common, a "common factor."

A Confusion of Meanings

One of the most frequent reasons for the misunderstanding of the tests is the fact that the existence and importance of these special abilities are usually lost sight of. The psychologists themselves are very apt to forget them and it is no wonder that their lay audiences are scarcely aware of them. Yet it is not even possible to understand the nature of tested intelligence without considering them. They are forgotten in part because the "common factor" has seemed especially important and the interest of the testers in the last decade has centred in it. Words, however, have also helped to obscure their existence. The tested intelligence of an individual is often called his "mental age"; the increase of intelligence in childhood is generally called "mental growth." In this way psychologists have inadvertently equated the "intelligent" to the "mental," overlooking in their terminology the vast number of special abilities that help to make up the "mind." It is high time for a change of words here. The present usage requires us to say that the average adult has a "mental age" of

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about fourteen and that "mental growth" on the average stops at fourteen. Nothing could be more untrue. The statement can be true only of intelligence as the tests test it. The special abilities, which make up skill and knowledge, continue to cumulate presumably throughout all adult life.

A very useful conception of intelligence, and one that is approximately correct in the light of our present knowledge, is that intelligence is like "power" as the physicist uses the word: the amount of work that can be done in a given time. All intelligence tests involve the maintenance of time-limits to some extent, and most tests are "speed" tests where all the work is performed against time. We may think, then, of intelligence as power and of a special ability as a machine that utilizes the power for a particular purpose. No machine can operate without power, and power is actually demonstrable only when it has a machine through which to operate. It is idle to speculate as to which is the more important, the power or the adaptive device for the utilization of the power; and it is folly to bet one's fortune on the power, forgetting the machine.

Up the Hill on Low

A frequent complaint made of the tests is that they place too much emphasis upon speed. It is argued that some people, who do poorly in the intelligence tests, are persons who naturally work slowly but very accurately, and that the tests penalize them unfairly. If, however, intelligence is like power, this contention is not an argument. If these people have less power, they have to go up the hill on low gear and it takes them longer; that is all. Of course they "get there" just the same, but when they "get there" their powerful rivals are on and somewhere else. If they ride more smoothly as they go, that is an entirely different matter from the one under discussion; they have a special ability which is not intelligence as the tests test it. They probably never would have complained at all if they had not been misled into thinking that the intelligence-rating characterized their entire mental make-up. There were, for instance, competent surgeons in the army who rated low in the tests. There was no question about their value to the army; they had the requisite knowledge and skill. The conception of intelligence as power implies merely that they had gained their professional competence relatively late.

There has been much public concern since the war over the discovery of the army psychologists that the average "mental age" of Americans is about fourteen years. This concern is founded on ignorance, although it must be admitted that some psychologists have shared it. Before the war less adequate investigations had led the psychologists to suppose that the average "mental age" was about sixteen. No one was concerned on account of this tenet, largely because it did not get public attention. Now the army results correct the earlier finding, and everyone exclaims: "We are a nation of fourteen-year-olds!" Well, with respect to stature we are a nation of twenty-year-olds. There is no reason for concern because it is discovered that a given mental capacity, intelligence, attains its maximal development in adolescence. If there were some reason to believe that we ought to be sixteen or that other nations are on the average sixteen, there might be some cause for alarm, but there is not. We ought to be congratulating ourselves that we now have a more accurate knowledge concerning one mental capacity, and hoping that success in the field of intelligence promises eventually a detailed knowledge of the special abilities, which are equally important factors in mental life and in the value of the individual to American civilization.

The place where observation often yields too readily to inference is in the answer to the question: Is intelligence inherited? Psychological belief has been that it is, though recently some psychologists have been doubting. The question cannot be answered with assurance until there are observational correlations between parents and their offspring. It may well be that only a tendency toward intelligence is inherited, just as a tendency toward some diseases is inherited, and in such a case we should need to state, in terms of a correlation, the strength of the tendency. Experiments upon animals are in progress, but the results can hardly settle the problem for human beings. The test of intelligence in an animal is a maze to learn or a puzzle-box to open. Such a performance measures a special ability along with the "common factor," and it cannot be considered as a test of intelligence, as we have been using the word, unless observational correlation establishes a relationship. The positive answer therefore still lies in the future, and the person who states dogmatically that the man who consistently scores low in intelligence tests has only his ancestors to blame is not stating an irrefutable fact.

Intelligence Is Largely Predetermined at Five

It is obvious, however, that the intelligence which the tests test is at some time predetermined. If it stops developing in adolescence, it is predetermined for the adult as much as is stature, and no man by taking thought can add ten percent to his intelligence quotient. The intelligence tests begin to be fairly accurate at about five years of age, and we have seen that the child's relative position in intelligence with respect to other children of his age does not alter greatly as he grows up. This fact is expressed by saying that the intelligence-quotient of the child (the ratio of his tested intelligence to his physical age) does not usually vary greatly. It would seem then that intelligence is predetermined at five years of age.

We are left with several possibilities. The actual time of the predetermination may be in infancy, in utero, or in the germ-plasm. The Freudians have shown the importance of infantile life in its effect upon adult life, and it might not seem strange if the predetermination occurred then. Psychologists, however, do not generally regard this argument seriously because the Freudian mechanisms are all of the order of the special abilities. Almost nothing is known about prenatal determinants, but one psychologist has recently suggested them as accounting for his seeming failure to obtain high correlations between the intelligences of children of the same family. Predetermination by inheritance is supported most strongly by the family histories of the feeble-minded: the Jukes, the Kallikaks, and similar studies. These cases, however, are not conclusive against environment in infancy as a determiner. Degenerate strains naturally grow up in an environment of degeneracy. Strangely enough the argument from correlation is sometimes inverted. Bright parents have a stupid son, and it is suggested that this is just what would sometimes happen if a Mendelian law applied to intelligence. There is no doubt that the argument from authority is for the inheritance of intelligence. It is better, however, to wait upon more research.

If we agree, then, to define intelligence as what the tests of intelligence test, there is a good deal that we can say about it. We can say everything that has been experimentally observed. We can say that it is a "common factor" in many abilities, that it is something like power, that it can be measured roughly although not very finely, that it is only one factor among many in the mental life, that it develops mostly in childhood, that it develops little or not at all in adult life, and that it is largely predetermined at five years of age. Only with more observation and less inference shall we eventually know much more about both intelligence and the special abilities.

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