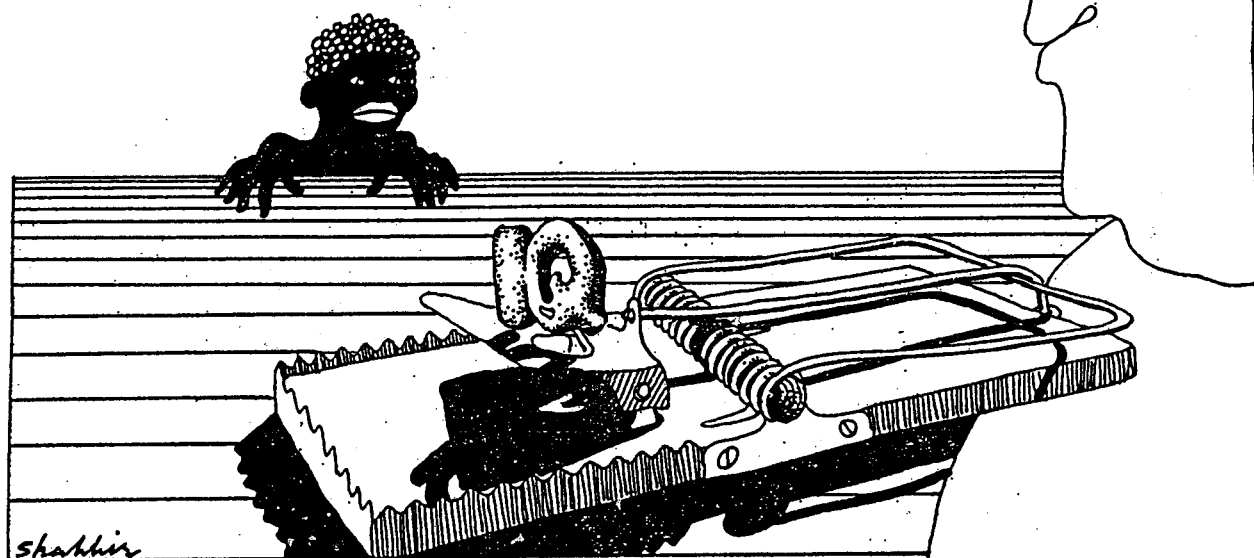


HOW OBJECTIVE ARE IQ TESTS?



INTELLIGENCE Quotient or IQ is a term which appears to have a well defined meaning for millions of people. The idea of testing what is commonly called "intelligence" and basing upon the test a so-called intelligence scale, has been used in the United States since the early 1900s for classifying the population into categories, depending on how a particular segment representative sample performed on the test.

In India IQ tests have not yet gained the stature they enjoy in the West. However, there is definitely a tendency to import certain ideas from the West, without analysing the basis for these ideas, or whether they are relevant to conditions in the country. This is particularly true in the field of education. Hence there is a definite possibility that given the fantastic ease with which our society absorbs processes which create hierarchies and distinc-

tions, IQ tests will some day become part of the educational scene.

In this article I propose to examine the nature of the standard IQ tests conducted in the U.S. and how they have been standardized, and to critically investigate the conclusions that have been drawn based on test scores.

I would have to agree with the reader who points out that given the present conditions in the country, it is meaningless to talk about IQ as only a very small fraction of the population would be affected by them. However some of the criticisms voiced in this article are probably valid for certain common presumptions that are very much a part of the Indian educational scene.

The idea of setting up an intelligence scale based on a test was first put forward by Alfred Binet and Theodore Simon in 1905. Binet avoided any explicit definition of intelli-

gence, but assumed that whatever it was, it developed with age. If a child performed as well on a test as an average child of his age group, then he was considered normal. If he did better than the average child, then his mental age was said to be greater than his chronological age; if he did less well than the average, his mental age was less than his chronological age. This interpretation of the test results sounds reasonable. However, some of the presumptions underlying these tests have to be mentioned. In setting up the tests, the criteria used by Binet to judge whether an item should be included was not only whether an average child at a certain age level could pass it, but whether the score achieved on such a test correlated with other measures of success, like school performance.

The actual term Intelligence Quotient or IQ was coined by the American

One peculiar feature of the twentieth century is the attempt to quantify the varying 'intelligence' among human beings by the use of an intelligence quotient or I.Q. PREETI SHANKAR argues that I.Q. tests are based on the culture of white Anglo-Saxon Americans, and can hardly be considered objective.

psychologist Lewis M. Terman, who, followed by contemporaries like Berkeley Professor A. R. Jensen, Harvard Psychologist Richard Herrnstein, psychologist H. J. Eysenck and Stanford electrical engineer William Shockley, used the scores achieved on IQ tests to support his claim that some races were genetically inferior to others in terms of native intelligence. The Stanford - Binet test was a revision of the Binet test carried out by Terman in 1916, which even today is a standard against which many intelligence tests are checked (1).

The normal procedure for standardizing the tests was by comparing the scores with the average performance of *white* individuals, who by "independent criteria" had been assigned a mental age according to their test solving ability. The IQ score was obtained by dividing mental age by chronological age and multiplying by 100.

It is instructive to look at certain sample questions from the Stanford-Binet test. One of the most often used terms in the Binet test is vocabulary. In the 1960 version of the Stanford-Binet test, vocabulary tests are included for children as young as six. At that age, in order to pass the test, they must know six of the following words:

orange; envelope; straw; puddle; tap; gown; roar; eyelash; Mars; juggler; scorch; lecture; skill; brunette; muzzle; haste; peculiarity; priceless; regard; tolerate; disproportionate; lotus; shrewd; mosaic; stave; bewail; ochre; repose; ambergris; limpet; frustrate; flaunt; incrustation; retroactive; philanthropy; piscatorial; milksop; harpy; depredation; perfunctory; achromatic; casnistry; homunculus; sudorific; parterre.

Most children aged six can probably get about six of the first ten words right, *provided English is their mother tongue*. The word list is used as a test right up to adulthood. It is clear that on a test of this kind, the students who would do better would be those who spent a lot of time reading on their own, or who lived in an environment

where such words were used all the time - in the English language.

Another test administered to children at age 14 years 6 months involved showing the child three sets of pictures and asking which one is prettier. One of them is shown below:



Quite clearly, the children who closely resemble the stereotype of the white upper-class Anglo-Saxon breed are supposed to be prettier.

Questions that test comprehension, given at ages 7 and 8, involve asking the child how he would behave, given certain situations. Even for this there are "correct" and "incorrect" answers. Some of the questions and examples of correct and incorrect answers according to the manual are listed below:

Question: "What's the thing for you to do when you have broken something that belongs to somebody else?"

Correct: "I'd be scared that I had to buy another one for 'em".
"Pay for it"

Wrong: "Feel sorry"
"Tell my mother"
"Tell 'em I did it"

Question: "What's the thing for you to do when you are on your way to school and notice that you are in danger of being late?"

Correct: "Hurry"
"Take the street bus".

Wrong: "Go on to school and tell my teacher why I'm late".
"Just keep on going".

Question: "What's the thing to do if another boy (girl, person) hits you without meaning to do it?"

Correct: "Tell them it didn't hurt"
"Go and tell my mother they didn't mean to do it."

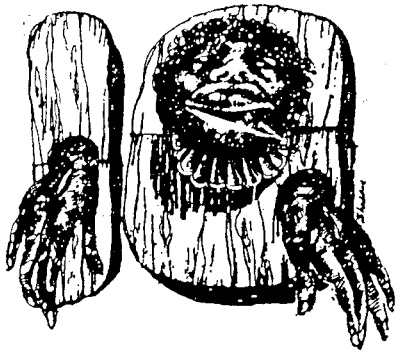
Wrong: "Would not play with him."
"I would hit them back."

Obviously, most of these questions *measure attitudes and not intelligence*. If we analyse what attitudes the testers are looking for, they are docility, obedience, politeness and respect for property and authority - attitudes that are characteristic of children of the upper and middle classes, rather than of the working class, and that too, the more docile variety.

The other items on the IQ test are not significantly different from the ones selected. It is clear that the test is hardly the model of an objective and fair test that those who apply it claim it is. It is evidently standardized upon the culture of the white Anglo Saxon American, and hence unfair when applied to members of other ethnic groups, particularly when comparisons of so called intelligence levels are being sought. As one commentator put it, "If one race, or class, is being systematically suppressed by another, rebellion might be their most intelligent response. It would also be intelligent on the part of the ruling group to perpetuate their rule, and justify the status quo by reinforcing docile behaviour and treating the non-conformists as stupid."

Are the conclusions based on IQ tests justifiable? From 1916 to 1973 the idea that intelligence is a fairly fixed entity was propagated by the so-called engenicists, among them Jensen, Herrnstein, Shockley and Eysenck. Based on their interpretation of IQ test scores, they claimed that certain races were doomed to "feeble-mindedness". We quote from some of their works:

"Their dullness seems to be racial, or at least inherent in the family stocks from which they come. The fact that one meets this type with such extraordinary frequency among Indian Mexicans and Negroes suggests quite forcibly that the whole question of racial differences in mental traits will have to be taken up anew. The writer predicts that when this is done there will be discovered enormously signi-



ficant racial differences in general intelligence which cannot be wiped out by any scheme of mental culture".

Lewis Terman, 1916 (2)

"There are intelligence genes which are found in populations in different proportions, somewhat like the distribution of blood types. The number of intelligence genes seems lower, overall, in the black population than in the white"

Arthur Jensen, 1969 (3)

"Nature has colour coded groups of individuals so that statistically reliable predictions of their adaptability to intellectually rewarding and effective lives can easily be made and profitably used by the pragmatic man in the street"

William Shockley, 1972 (4)

Thus all these authors assume two things: (1) That the so-called intelligence tests measure intelligence; (2) That the tests satisfy the conditions to permit valid inferences to be drawn as to the quality of intelligence of those being tested. Based on these two assumptions and the fact that there is an average of about 15 points difference in the test scores of blacks and whites, they conclude that the measured intelligence is largely determined by genes. Jensen's article "How Much Can We Boost IQ And Scholastic Achievement" points out two facts: that black people perform, on the average, more poorly than whites on standard IQ tests, and that special programmes of compensatory education so far tried have not had much success in removing this difference. His explanation is that IQ is highly heritable with most of the variation among individuals arising from genetic rather than environmental sources. Hence, he concludes, there is no use in trying to remove the differences in IQ by education, since its main cause is genetic.

In the analysis of the two assump-

tions made above, the first question that naturally arises is: "What is intelligence?". Most people would agree that intelligence is a rough measure of certain problem-solving abilities. But abilities are largely dependent on training, and experience and learning certainly enter into their development. Thus a measurement of the ability could not possibly provide much information about the original quality of the capacity. As to the second assumption, I leave the reader to draw his own conclusions in view of what has been described in the previous sections.

Regarding the conclusions — it is certainly possible that genetic factors play a substantial role in producing differences in mental abilities. But since genes never function in isolation but always in interaction with the environment, it does not seem likely that anyone will ever be able to completely separate out the influences of the two. After all, 'genetically determined intelligence' can only be defined negatively, if at all, as that part of intelligence which is *not* due to social and environmental interaction. It follows that a prerequisite for any such investigation is a thorough and unbiased study of social factors influencing psychological behaviour—but this is precisely the most neglected, and weakest area of current psychological research. Most 'social psychology' in our universities is nothing but a thinly disguised apologetic for the status quo. And scientific analysis of social psychology is precisely what modern 'scientists' like Jensen and Herrnstein do not undertake, though this does not seem to prevent them from arriving at "far-reaching conclusions" about society.

IT is quite clear that there are many factors involved in the development of intelligence — physiological, biochemical, neurological and social conditions, and even these are closely interrelated. Adverse circumstances relating to health, nutrition, child rearing practices, mental stimulation and opportunities for interaction with the cultural environment are all proven to have effects and the earlier their impact, the less reversible their effects appear to be.

The evidence suggests that for various functions there are critical periods during which physical well being, mental stimulation, and envi-

ronmental interaction have their optimum effect. Those who are denied any of the above during these critical periods (regardless of race) are likely to have their potential, with regard to the functions above, permanently affected, and hence possibly would be unable to take full advantage of later favourable opportunities.

Experiments have been conducted on animals to observe the effects of nutritional deficiencies on their maze running abilities. The following quote from Bieshenvel (5) may be of interest:

"Successive generations of laboratory rats were reared on a protein deficient diet. Considerable deterioration occurred in their maze running ability, and affective disturbances also made their appearance. When litters born from normal mothers were changed at birth to protein deficient lactating mothers and vice versa, both groups subsequently showed impairments indicating that protein deficiency could exercise its effects both prenatally and during the neonate nursing period. . . . Similar effects on the more complex brain of man could be even more enduring. In another investigation, again at NIPR, encephalograms were recorded from African infants suffering from acute Kwashiorkor, a protein deficiency disease which tends to occur after weaning. Retardation in the normal pattern of brain rhythm development was noted, as well, as a high frequency of focal disturbances in the temporal lobe. These findings suggest that protein deficiency may be responsible for persistent retardation of brain development and/or irreversible brain damage, at least in some cases."

Bieshenvel also points out that it took more than one generation to recover from chronic protein deficiency. In particular, pups with protein deficient grandmothers, but born from mothers who had been brought up on a normal diet, still continued to show a learning deficiency. There are innumerable examples to suggest that nutritional deficiencies are a significant cause for retarded mental development.

Yet even within Jensen's limited (and as we have seen, presumptuous) framework there is a major error that he commits. This elementary error is hard to understand in a 'trained researcher' like Jensen, who is professor of psychology at the University of California, Berkeley.

The following paragraphs are a little technical, but are worth a careful reading. The heritability of a measurement is defined as the ratio of the variance (6) due to the differences between the gene types to the total variance in the population. Roughly, it is supposed to measure the importance of genetical factors in relation to the sum total of all factors influencing a measurement. Jensen's claim is, in effect, that for the trait called intelligence the variations in environment have little effect, so that once the gene type is known, the eventual level of intelligence is pretty well specified (to the order of 80%). The basic flaw in Jensen's argument as pointed out by Lewontin (7) is to confuse heritability of a character within a population with heritability of the difference between two populations. In fact, the second quantity is meaningless, because in calculating the heritability of the difference between two populations we cannot separate out the two components of the variance — one due to genes and the other due to environment. Particularly so in a racist society where the environmental (i.e. social) factors are widely different for different races. With a little thought it is seen that the same comments apply to any stratified society including a society divided into castes and classes. The genetic basis of the difference between two populations cannot therefore be inferred from the heritability within populations. We quote a very relevant example from Lewontin (7):

"Let us take two completely inbred lines of corn. Because they are completely inbred by self-fertilization, there is no genetic variation in either line, but the two lines will be genetically different from each other. Let us now plant seeds of these two inbred lines in flower pots with ordinary potting soil, one seed of each line to a pot. After they have germinated and grown for a few weeks we still measure the height of each plant. We still discover variation in height from plant to plant. Because each line is completely inbred the variation in height within lines must be entirely environmental, a result of variation in potting conditions from pot to pot. Then the heritability of plant height within both lines is 0.0. But there will be an average difference in plant height between lines that arises entirely from the fact that the two lines are genetically different. Thus, the difference between

lines is entirely genetical even though the heritability of height is 0!

"Now let us do the opposite experiment. We will take two handfuls from a sack containing seed of an open pollinated variety of corn. Such a variety has lots of genetic variation in it. Instead of using potting soil, however, we will grow the seed in vermiculite watered with a carefully made up nutrient, Knop's solution, used by plant physiologists for controlled growth experiments. One batch of seed will be grown on complete Knop's solution, but the other will have the concentration of nitrates cut in half and in addition, we will leave out the minute trace of zinc salt that is part of the necessary trace elements (30 parts per billion). After several weeks we will measure the plants. Now we will find variation within seed lots which is entirely genetical since no environmental variation within lots was allowed. Thus heritability will be 1.0. However, there will be a radical difference between seed lots which is ascribable entirely to the difference in nutrient levels. Thus, we have a case where heritability within populations is complete, yet the difference between populations is entirely environmental.

BUT let us carry our experiment to the end. Suppose we do not know about the difference in the nutrient solutions because it was really the carelessness of our assistant that was involved. We call in a friend who is a very careful chemist and ask him to look into the matter for us. He analyzes the nutrient solutions and discovers the obvious — only half as much nitrates in the case of the stunted plants. So we add the missing nitrates and do the experiment again. This time our second batch of plants will grow a little larger, but not much, and we will conclude that the difference between the lots is genetic since equalizing the large difference in nitrate level had so little effect. But, of course, we would be wrong for it is the missing trace of zinc which is the real culprit. Finally, it should be pointed out that it took many years before the importance of minute trace elements in plant physiology was worked out because ordinary laboratory glassware will leach out enough of many trace elements to let plants grow normally. Should educational psychologists study plant physiology?"

Thus Lewontin effectively disposes of Jensen's conclusion that the high heritability of IQ (and even this is being seriously questioned by some researchers though it is not possible to go into this debate here) and the lack of effect of correction are presumptive evidence for the genetic basis of the difference in the intelligence levels between blacks and whites.

It is clear from the above discussion that the work of Jensen and others of his type is thoroughly unscientific — not only because of its presumptions, but even *within* its presumptions. It would be more appropriate to term it pseudo-scientific, for, since it comes in the garb of science, complete with the regalia of tables, statistics and technical jargon, it sometimes succeeds in confusing many an unwary reader including professional scientists. Since it makes statements that *apparently* conform to immediate appearances, it also has the element of plausibility — but most important since it 'justifies' a certain pattern of society it is immediately seized upon
(Continued on page 34)

Notes and References

- (1) Maud Merrill and Lewis M. Terman *The Stanford - Binet Intelligence Scale Manual* (Boston, 1960).
- (2) Lewis M. Terman *The measurement of Intelligence*, Boston, Houghton, Mifflin, 1916.
- (3) Arthur R. Jensen "How Much Can We Boost IQ and Scholastic Achievements?" *Harvard Educational Review* Vol 39, 1969.
- (4) William Shockley "Dysgenics, Geneticity, and Raceology" *Phi Delta Kappan*, January 1972
- (5) S. Bieshenvel, "An Examination of Jensen's Theory Concerning Educatibility, Heritability and Population Difference," *Race and IQ* Ashley Montagu, Ed, Oxford University Press, 1975, Chapter 5.
- (6) The formula for variance is:

$$V = \frac{(x_1 - m)^2 + (x_2 - m)^2 + \dots + (x_n - m)^2}{n}$$

n
 where V = variance
 m = mean of all x's
 n = number of x's

- (7) Richard C. Lewontin, "Race and Intelligence," *Race and IQ* Chapter 11.

(Continued from page 11)

by the mass media of the 'ruling-c
' and soon enough acquires an
' element of respectability. Are there
' social inequities? Here we have 'scien-
' tific proof' that it must be sol

It is precisely the task of science,
including social science, to penetrate
the convenient mist of 'appearances'.
But even when this is done it may be
a long time before a truly scientific
understanding replaces a pseudo-
scientific theory. Lewontin (and
others) debunk Jensen and Shockley
--but it is Jensen and Shockley who
get all the publicity. Why? The reader
will not miss the obvious conclusion.

But why pseudo-science exists and
is propagated is an important ques-
tion that requires fuller investigation,
perhaps in another article. Let us only
assert here that it is probable that real
social science will replace pseudo-
science only in a new society which
has no need to justify the rule of a
minority. □

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