Table of Contents

A Demonstration of "Character Reading," by M. R. Trabue .................. 521
Right Air for Workers Easily Secured, by Thomas D. Wood and Ethel M. Hendriksen .............................................................. 525
Eye Strain in Various Occupations, by Joshua Eyre Hannum ............. 529
Are We a Nation of Morons? by Florence M. Teagarden .................... 535
Guest Psychology Makes the New Man at Ease, by Glenn L. Gardiner .... 544
Germany Finds a Psychological Center Useful, by W. Moede ............... 551

Industrial Fatigue Research Board ............................................. 514
One Secret of High Wages ....................................................... 518
Psychology's Greatest Need ................................................... 553
Freudians and the Oedipus Complex ........................................ 555
Effects of Long Spells of Repetitive Work .................................. 556
Sex Differences ................................................................. 556
The Blind Giant .................................................................. 557
New Books to Read .................................................................. 558
Are We a Nation of Morons?

Florence M. Teagarden

ONE of the most indisputable statements that could be made in this controversial age is the self-satisfying dictum, "There is nothing so interesting as human beings."

Self-satisfying? Well, every one who makes the assertion is a member of the species himself and, of course, he is interesting to himself. Because he is interesting to himself, he is interested in making comparisons between himself and other persons. For this latter reason he observes other people and, in so far as he feels himself one with them, he is annoyed when he hears any reflection on people in general; and, in so far as he feels himself removed from them, he finds satisfaction in thinking he is more favorably endowed than others whom he observes.

It is perhaps our feeling of these physical and mental likenesses which brings it about that all one ever need do in order to arouse immediate attention and interest is to make a statement relative to human intelligence. Has not that subject been discussed from the beginning of time, at least so far as can be ascertained from written records?

In the fourth century, B. C., Plato and Aristotle were concerning themselves with the nature of intelligence, and Machiavelli in his The Prince, written in 1513, definitely suggests measurement of intelligence. He writes, "There are three scales of intelligence: one which understands by itself, a second which understands what is shown it by others, and a third which understands neither by itself nor on the showing of others."

Without attempting to trace the development of our conceptions of intelligence, it is well to remember that our modern inquiry into the nature of intelligence and its growth is simply an example of history repeating itself. It is a satisfying thing for modern day inquirers whose souls are being disturbed by questions of fundamentalism to learn that exactly the same questions have vexed other ages of men, and yet the world still moves on. Let him who will take comfort from the thought that our present day interest in intelligence is "nothing new under the sun."

True, the World War did revive our interest in intelligence and did put a slightly different slant on some questions relating to intelligence, but unfortunately we are not as yet sufficiently removed from the results of the army-testing to view the matter in proper perspective.

In his recent book, Why We Behave Like Human Beings, Dr. Dorsey says, "The great by-product of our participation in the World War was the startling discovery that 'America is a nation of morons!'" From other sources also we hear disconcerting statements. An American educator of great prominence a few years ago quoted an eminent English authority (who claims, however, to have been misquoted) to the effect that "70 per cent of the children of England will never develop any more intel-
ligence than that which should be possessed at the age of fourteen and consequently further education would be wasted on them.”

When we read statements like either of the above we are bound to inquire into the truth of the charges. Is it true that we are a nation of morons? Does intelligence stop developing, and, if so, when? Is there anything that can be done about it? Is there any use of attempting to educate after intelligence has ceased increasing in amount?

What is Intelligence?

Before trying to answer any of these questions, let us ascertain what is intelligence. We all probably have a feeling that Artemus Ward was on the right track when he said, “One thought you have born and raised on your own premises is worth a whole orphan asylum of other people’s thoughts.” True as it may be, however, the description does not take us far towards a definition or measurement.

Ability to learn has been rather commonly accepted as a definition of intelligence. Peterson, however, has recently well expressed a feeling which some of us have less clearly felt for a long time; namely, that this definition “seems to have been taken up too uncritically by the majority of educators, and even psychologists at the present time.” He goes on to say, “The correlations among learning rates in different kinds of performance are not encouragingly high. Learning ability seems to be no more homogenous and simple than is the collection of mental operations known as sensory discrimination, attention, imagery, memory, judgment, reasoning, etc. Ability to learn is undoubtedly one of the facets of intelligence, but can we say it is a definition?

It is possible that others have had the experience of the writer. There are times when some one human ability seems to be the sine qua non of intelligence, while in another frame of mind a different aspect would seem to be the predominant feature. Recent experiences have been leading the writer to lean strongly to the opinion that one of the most essential elements of intelligence is the ability to reach down into one’s own consciousness and pull up bare-handed one’s own motives; hang them up along a mental line, as it were; examine them closely; label them; and accept some as worthy, laugh at others, and dismiss still others as deserving a mill-stone to be hanged about their necks. Try it and see how much intelligence is required!

On the whole, the definition of intelligence which seems to the writer to take all facts into account and give to each its appropriate value, in the highest degree, is Meumann’s statement of “the power of independent and creative elaboration of new products out of the material given by memory and the senses—the ability to avoid errors, to surmount difficulties, and to adjust to environment.”

We shall not extend our list of definitions, but instead shall name certain attributes of intelligence which shall be assumed in the discussion which follows.

(1) Intelligence is here being assumed to be an innate, inherited sort of thing that can be influenced by environment only in about the same way that one’s innate physical tendencies toward a certain ultimate stature, eye-color, or resistance to disease are modified. It is assumed that either intelligence or innate physical tendencies may conceivably be handicapped by disease or trauma, but it is also assumed that no amount of educational opportunity on the one hand or courses of gymnastics or
balanced meals on the other hand will increase by one with the potential tendencies.

(2) It is further assumed in this discussion that intelligence at birth has back of it the potential tendencies referred to above, but that growth will enable these tendencies to attain their maximum degree, much as growth will finally make out of an Italian child a man of a certain height, but will make out of a Norwegian child a man of a different height. The potential growth rate, we say, is present at birth for both body and mind, but growth itself is far from complete at birth.

(3) It naturally follows that growth will be complete some day, possibly long before death or even before middle age, and this in intelligence as well as in bodily equipment. We need not produce graphs or charts to convince any one that on the average people attain their final height at from 18 to 21 years of age. We do not grow indefinitely. If we could know all the facts beforehand, we might even be able to predict in certain cases what the ultimate height of an individual would be. The eugenicist, in a large measure, can do so.

(4) A further hypothesis is necessary. What does it mean to say that a boy has attained his full height or his full growth at, let us say, 19 years of age? We may, as some families do, measure him on the door-post on subsequent birthdays and find no change whatever on his succeeding birthdays. He has grown all he ever will. What does this imply? Does it mean he will never be able to learn to do new things with his own height and length of limb thereafter? Surely not. He may learn to dance at 20, to skate at 25, to ski at 30, and to play golf at 40. In these latter cases he is simply learning to do new things with the amount of body which he has had for some time and of which he will never get any more (unless it be mere adipose tissue). The ultimate destiny of his body, furthermore, as regards size, was written in the germ cells of the parents from whom he sprang.

(5) One further point we must postulate. At 19 the boy may be as tall as his father. Does it follow, because he has the same length of bone and muscle—even his arms may be the same size as his father’s—that he can endure the same strain as his father or can even use his muscles to as good advantage as his father can? Our inevitable answer to such a question is, ‘‘Why, of course not. His muscles are not developed yet as are those of his father.’’ Oh, so there is something else besides mere growth! There may also then be development! And if so in body, why not in intelligence?

What, then, can be said about the intelligence of this same boy? (1) The quality and the quantity of his intelligence are determined at birth as is his ultimate height (barring, of course, as before, the effects of certain sicknesses or accidents). (2) His intelligence grows in amount as his body grows, not necessarily at the same rate, but probably somewhat after the same fashion. (3) His intelligence also stops growing sometime, just as his body does. (4) Learning is still possible after maximum quantity of intelligence has been attained. (5) There is also the possibility of development of some of the physiological factors of intelligence, such as brain connections, quite aside from mere growth of these parts.

The Work of the Brain

Having fortified ourselves with these fundamental conceptions, let us examine briefly the scientific facts for the
backing of such theories. Regardless of one's own particular philosophy as to the causal connection between mind or intelligence on the one hand, and brain or nervous system on the other hand, we can safely agree on some such general statement as this: "The nervous system, and particularly the brain, is the organ of intelligence."

Fortunately, we know rather definitely some features about the brain. We know, for example, that it is made up of layers of nerve cells or neurones and that the number and character of these cells has something to do with distinguishing grades of intelligence. We further know that the number of neurones assigned to any one individual is determined some five or six months before birth. We also know that these neurones have intricate endings which make possible, after their full length and size have been attained, innumerably vast numbers of connections with each other. Higher thought processes are believed to depend upon these connections.

We know that at birth, while the number of nerve cells is complete, their sheathings are not all complete and that they themselves have not all attained full size. It is interesting in this connection to note that at birth the weight of the brain is about one-fourth of what it will ultimately be. This, of course, is much in excess of the birth-development of other parts of the body. During the first year of life the brain more than doubles its weight and by the age of five it has attained about 90 per cent of its final weight. Growth does go on slowly, however, until final brain weight is attained at about 15 years and in some cases even earlier.

Aside from actual changes in size, there are other changes in the brain that may be of even more significance, such as changes in shape of cell; change in texture of cell-bodies and in the enveloping sheaths; and changes in the length and intricacies of the fibres and their connections. The so-called pyramidal nerve cells which are thought to be closely connected with intelligence are definitely known to undergo changes for several years at least.

But suppose all growth and structural change in the brain and nervous system are complete at a certain time, what then? Does it follow that intelligence stops increasing in amount at the same time? No one knows. That is to say, no one knows definitely whether there may be delicate structural changes which take place synchronously with increase of intelligence and whether the two things stop simultaneously or not. But that need not worry us. Suppose we should find, leaving the brain aside for the time, that even intelligence itself stops increasing in amount at some specific time fairly early in life. What of that? Probably no more of it than when we found that our 19-year-old boy had stopped growing.

In passing, it is interesting to note what seems so far to have escaped the attention of most thinkers on the subject, namely, that there is nothing incongruous in the idea that intellectual maturity and physical maturity (as regards amount) might reasonably be expected to be attained at about the same time. Just why should we expect physical growth to go on for several years beyond intellectual growth?

In fact, the present writer is willing to predict at this point that some day we shall find the age for the attainment of ultimate individual physical growth (in matters other than height also) and the age for the attainment of ultimate intellectual growth in the same individual to be very closely correlated. If
this be true, then the age for the cessation of increase in amount of intelligence will be found to be later by several years than is at present supposed by many writers on the subject.

In addition to this point, it is also necessary for us to keep reminding ourselves that even when we do stop increasing the amount of our intelligence, we do not have to stop either learning or developing. We can learn French at 20, bridge at 25, and shorthand at 35. Or we can develop a scientific attitude at 25 (Does any one ever have it before that time?) or develop self-analysis at 40.

*Why the Army Tested Low*

And now what evidence do we have from intelligence testing as to the growth of intelligence? Perhaps we would better get the army data out of the way first. It may be necessary to recall that during the recent war there were some 1,726,966 men in the United States Army who were given group intelligence tests. Out of this large number of men 653 were also, for scientific purposes, given the *Stanford Revision* of the individual *Binet-Simon Tests*. These tests had been previously standardized on children.

From these individual tests a mental age was found for each man and opposite each man's mental age was placed the score which he had obtained on the group test. In this manner scores from the group test results were converted into mental ages. It is to be noted that scores were obtained from over one and one half million men, but the data by which these scores were converted into the mental ages, which have so disturbed the public ever since, were obtained from only 653 men.

The results from the army tests were surprisingly low. There are several factors which may have a tendency to make these mental ages spuriously low. In the first place, the question has never yet been settled as to whether the men upon whom these tests were applied were selected from the upper or from the lower end of society's intelligence. We shall not attempt to settle that issue at this point, but there are those who think that mental ages derived from an absolutely average American population would be higher than that obtained in the army.

In the second place, as remarked above, the individual tests used for determining mental ages in the army were for the most part standardized on children. Just what effect this fact may have upon the validity of the mental age of adults so examined we shall likewise ignore at this time. It is possible, of course, that adults are penalized by a process which may not give them sufficient opportunity for showing their total superiority over children, in a wide range of mental activities.

A third reason for thinking that the army mental ages are too low, is the fact that the abbreviated scale was used almost exclusively for examining soldiers. It has been claimed by some critics that the effect of this process of shortening an individual examination is to lower the mental age so obtained.

In the fourth place, quite aside from the fact that the *Stanford Revision* was standardized upon children, is the added consideration that this scale allows for a high mental age of only 19½ years. In making a study to be discussed below, the writer examined 408 cases of ages 12½ through 20 years. Of these subjects, 25 per cent were inadequately tested, because they were still having passes or successful responses at the highest level provided.

There is no way of knowing how many of them might have raised their mental
age had there been more worlds for them to conquer. Providing that they were equally unselected, soldiers whose median life age would be much higher than that of the group just cited must have had an even greater percentage who did not have an opportunity to score their own real mental age.

Dr. Mateer has also pointed out the fact that among our soldiers there was probably a considerable number of psychopathic cases, as proved by later events. Under the strain and stress of the terrific readjustment made necessary by army life, the intelligence of such men was not functioning with 100 per cent efficiency, and hence their real mental ages were not secured by the tests.

Finally, while all scientists agree that a prodigious amount of material of great value was obtained through the army testing, nevertheless, there are facts which can not be overlooked by a psychologist. One has only to look through the pictures in the Memoirs, or to read the accounts of the rapid training given to examiners, or of the conditions under which both group and individual examinations were administered, to make him have a qualm about accepting for hypotheses any conclusions so deduced.

On the whole, therefore, the low figure which was found to be the median mental age of the American Army has sufficient questionable facts in its derivation to have made us long since cease to worry and only be thankful the army testing at least rid our ranks of many men who were mentally unfit to defend our country.

When Does Intelligence Halt?

What other evidence have we as to the age at which intelligence ceases to increase in amount? It seems curious that, so far as the writer knows, no one taking part in this controversy has ever mentioned this fact. Many of our psychologists who have devised scales for measuring the intelligence of persons past mere childhood, have so arranged their materials as to provide opportunities for securing mental ages far in advance of the army age of 13 or even of Terman's assumption of 16 years. As a matter of fact, Terman's own Stanford Revision provides for a maximum mental age of 19½.

The writer has at hand at this moment several tests in which this condition maintains, and search would reveal still others. It is interesting to note the possibilities as provided for in the following tests:

Why should intelligence scales provide for mental ages beyond 13 or 16, if intelligence stops increasing in quantity at even the more advanced of these two ages?

Before leaving this question of the age of the upper limit of the development of intelligence, the writer wishes

<table>
<thead>
<tr>
<th>Test</th>
<th>Highest mental age for which norms are available</th>
<th>Highest possible mental age, or score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stanford Revision of Binet-Simon Test</td>
<td>19 years—6 months</td>
<td>Score 320 (mental age 26—87)</td>
</tr>
<tr>
<td>Miller Mental Ability Test</td>
<td>19—0 (score 74)</td>
<td>Score 172 (Form A)</td>
</tr>
<tr>
<td>National Intelligence Test</td>
<td>15—6 (score 136)</td>
<td>Score 206 (Form B)</td>
</tr>
<tr>
<td>Otis Group Test</td>
<td>18—0 (score 130)</td>
<td>Score 220</td>
</tr>
<tr>
<td>Otis Self Administering Mental Ability Test</td>
<td>18—0 (score 59)</td>
<td>Equivalent to Stanford Revision 19—6</td>
</tr>
<tr>
<td>Terman Group Test</td>
<td>19—6</td>
<td>. . .</td>
</tr>
<tr>
<td>Dearborn Series II</td>
<td>20—8</td>
<td>. . .</td>
</tr>
<tr>
<td>Dearborn Examination C</td>
<td>20—2</td>
<td>. . .</td>
</tr>
<tr>
<td>Dearborn Examination D</td>
<td>21—2</td>
<td>. . .</td>
</tr>
</tbody>
</table>
to present briefly one other line of evidence as to the age of the cessation of the development of intelligence. This study has already appeared elsewhere. In 1923, the writer gave more than four hundred subjects with ages ranging from 12½ through 20 years the Stanford Revision of the Binet-Simon Test, the Army Alpha Test, the Pressey Senior Classification Test, and the Stenquist Mechanical Aptitude Test. The first of these four is an individual test and the last three are group tests.

It will be noted that the subjects here mentioned are only slightly less in number than the soldiers upon whom the army standardization was made. Moreover these subjects were known to be perhaps as nearly unselected as it would ever be possible to find in a group of its size. The mechanical conditions for testing were nearly ideal and all examinations were administered and scored by one person, the writer.

In order to check results in this study from all possible angles, six different and elaborate statistical treatments were applied to the results of all four tests. The results show that for this group the line of increase in intelligence is practically flat by 18 years, but they show undoubted evidence of increase up to 17½ or 18 years.

Since in this group there were only a few subjects past 18, the flatness of the line of mental growth at that point does not necessarily mean that growth does not occur beyond that age. However, the line was flattening so perceptibly by 17½ and 18 that there seems little reason for thinking there would have been any acceleration beyond that point even with more cases.

This evidence of the cessation of increase in the amount of intelligence at about 18 years coincides beautifully also with the average slowing up and cessation in physical growth. As remarked before, this phenomenon could be so easily expected, but has been so much neglected.

The study referred to above also reviews most of the research work with the Army Alpha Scale which had been done up to that time. The evidence from these studies, while not entirely in agreement as to where the upper limit of the development of intelligence occurs, agrees in the fact that cessation is not found until well past 16.

The longer the writer ponders over questions as to the nature of intelligence, the age at which it ceases to increase in amount, and kindred questions, the more convinced she becomes that she has very little idea of what average intelligence really is. Those of us who are interested in either reading or writing articles on intelligence are, frankly, above the average in intelligence. One has only to look over census figures on school mortality to convince himself that the possession of a high school diploma or of a college degree is a certificate of more than average intelligence. Inferior intelligence is certainly the largest single factor in producing elimination in our schools below high school. That statement needs no defense in this discussion. Average intelligence in the United States, at least, is certainly far below that of high school level.

What is or how much is “average” intelligence? We shall have to let some one who has given the question very little thought answer the question, for no one who has studied it will be willing. It is to be noted, however, that when we say average intelligence is below that of high school level, we are not reversing our former statement that intelligence continues to increase in amount up to and perhaps beyond 18. Some types of feeble intelligence may cease to develop, of course, long before that time, and pre-
sumably some types of intelligence may continue to develop long after the rest of us have ceased to increase our amount.

When we say that, on the average, intelligence increases in amount up to about 18 years of age, we do not mean that at 18 all intelligences, even average intelligences, have reached exactly the same point. That very fact, of course, constitutes one justification for providing examination ranges beyond year 18. It is a serious question, however, whether anything beyond 18 should be called mental age.

**The Peril of Perils**

The social implications of such involved questions are far from clear. We are, at the present time, going through a perfect orgy of rabid pessimism at the hands of certain writers. Simeon Strunsky, a few weeks ago in the *New York Times*, refers to Vernon Lee's Proteus, or The Future of Intelligence. He quotes the following: "Nowadays encyclopaedic science and journalistic emphasis are being applied to making our flesh creep with prophecies of Perils. There is Peril from black, brown, yellow races; from Semites, Mongols, Latins (in Nordic countries), Teutons (in Latin countries), Celts all over Anglo-Saxondom, Jews throughout the globe; Bolsheviks, Fascists and Junkers, International Communism and International Finance, Militarism. . . . . There is Peril from the multiplication of Idiots and the multiplication of Supermen; Peril from depopulation and Peril from overpopulation, from unsexed women and over-sexed women; Peril from over-much altruism and Peril from insufficient altruism." To this Strunsky facetiously adds, "If Vernon Lee had included the white bread diet and pyorrhea, her list would be virtually complete."

It is true that biologists, sociologists, and economists, to say nothing of moralists, have been haranguing us in fearing that civilization and the human race are doomed. Intelligence has come in for its share of blame. Lothrop Stoddard, Charles Richet, Stanton A. Coblenz, Madison Grant, C. C. Brigham, F. S. Marvin, Henry Pratt Fairchild, F. C. S. Schiller, Oswald Spengler, Flinders Petrie, and Albert Wiggam would all have us think that if intelligence is to be saved for the future of the race something must be done immediately, if, indeed, it may not already be too late. Petrie and Spengler think, by a review of history, that they can even tell us the approximate date on which our doom is to fall.

On the other hand, such authorities as Samuel J. Holmes, William McDougall, John Langdon Davies, H. S. Jennings, Vernon Lee (pseudonym for Violet Paget), Judge Ben B. Lindsey, Theodor Christianson, A. M. Low, Raymond Pearl, Edwin E. Slosson and Ludwig Stein, in their respective fields, see hope for the future of man. The arguments in this debate are too involved to be taken up in this space, but, to the writer, at least, an impartial weighing of the evidence leads only to the conclusion that if intelligence has a chance to operate and does apply itself, solutions will be forthcoming to present difficulties as in the past.

One lesson we can learn from history is not to adopt a saccharine optimism that is blind to facts, but is simply an attempt to evaluate in terms of evolution, both biological and historical. Slosson, at least, is optimistic enough to say, "Personally, I have as little confidence in the predictions of the date of the death of our civilization by Petrie and Spengler as I have in the prophecies of the date of the end of the world deduced from Daniel and Revelations."

For readers of this magazine particu-
larly, an article by Prof. J. F. Duff of Armstrong College, England, (New York Times, April 11, 1926.) is very well worth the reading. The contention of the article is that, in order to lessen "the discordance between intelligence as operated upon by education and the world's treatment of its educated intelligence" there must be a "modification of one of the factors involved. These factors are three: innate intelligence, education, and the organization of the working world."

Professor Duff shows that it is out of reason to think we can improve the world by a lowered intelligence, but that on the other hand, as he claims, civilization is not ready for and could not stand that we suddenly "raise the level of intelligence all around the world."

He further shows that there is little need for our expecting a solution by attempting to educate for employment. In the first place, he says, we do not need to "educate a boy for years to become a biscuit packer, a tram conductor, or a stevedore." Perhaps the best we can do, he suggests, is to educate such a boy for the "worthy employment of leisure." In the second place, when we do educate certain favored boys and girls for "black coated employments," as Professor Duff calls our white shirt jobs, "these employments do not guarantee worthy work for all the brains they undoubtedly attract."

Education can not be used for preventing "the waste of intelligence while at work, but by giving scope for intelligence outside work in leisure hours. Our main quest to find scope for intelligence in the everyday work of the world is still unachieved, and it now is with the third of our three factors the organization of industry—to modify itself to achieve this task." This sounds at present like a Herculean task but what can not organization of industry accomplish when it sets its intelligence to work?

And now where are we? What about the upper limits of the development of intelligence? Where are we and where are we headed for? (1) We seem to have intelligence which, as life is constituted at present, ceases to increase in amount at about 18 years of age or slightly later. (2) We seem, however, to continue to develop and to learn much later. (3) We seem to be struggling along through life without using anything like the maximum intelligence which we do possess. (4) We seem, furthermore, to be face to face with social and economic problems which make us heavy hearted.

But—and here lies the hope—at last man has turned the light of his intelligence upon the question of his own intelligence. Under such conditions nothing that we now know of can prevent the sure, ultimate solution of our problems, however intricate they may be. Increase in amount of intelligence has made the difference between the amoeba and the anthropoid ape. Increase in amount of intelligence has made the difference between the ape and man. Perhaps increase in amount of intelligence will make the difference between the man of today and the man of fifty thousand years henee.

In the meantime, a fuller use of the intelligence which we now have, particularly our average and superior intelligences, can within the space of a few generations take us from the worst that Mencken foresees to the best that Tantalus, through the eyes of Dr. Schiller, sees.