

Back in 1969 the graduate students who edit the quarterly *Harvard Educational Review* were harshly criticized for publishing A. R. Jensen's 123-page article, "How Much Can We Boost I.Q. and Scholastic Achievement?" A good deal of the criticism came from blacks who regard Jensen as "racist" because he concluded on the basis of questionable evidence that Negro I.Q. inheritance is inferior to that of whites.* Some of it came from academicians who thought the editors should have presented, simultaneously, contrary views, theories, and research findings. (Such material was published in the next issue.) A good deal of the criticism came from people who don't like the social and educational implications of Mr. Jensen's belief that heredity accounts for some 80% of I.Q. variance, environment for no less than 20%. Not all of the critics questioned the value of publishing the article, but — considering that open-mindedness is one of the strongest of the scientist's values — a surprising number of them did.

At our request, William Shockley wrote the first article presented in this supplement to the theme issue assembled by James A. Banks. Mr. Shockley's views on the heritability of intelligence are very similar to those of Mr. Jensen. When he tries to express them publicly he is sometimes subjected to the same kind of harassment that has been Mr. Jensen's burden since the *Harvard Review* article was so widely publicized. On November 22, for example, Mr. Shockley was forcibly prevented from speaking on the campus of Sacramento State College at the invitation of the student association.

When we invited one prominent sociologist to respond to Mr. Shockley's paper, he promptly refused, arguing first that Mr.

*The attitude is perhaps best explained by W. H. Grier and Price M. Cobbs in *Black Rage*. Among their comments: "For a black man survival in America depends in large measure on the development of a 'healthy' cultural paranoia. He must maintain a high degree of suspicion toward the motives of every white man and at the same time never allow this suspicion to impair his grasp of reality. It is a demanding requirement and not everyone can manage it with grace."

Shockley is not qualified to write on this topic, then that his notions on heredity and race are "wrongheaded" and "obscene." The implication was that wrongheaded and obscene theories should be suppressed, or at least denied a prominent forum. Fortunately, such objections do not impress Mr. Gage and he readily consented to write when we appealed to him. Our arrangement with the authors is that Mr. Shockley will comment on Mr. Gage's paper in a brief article to be published in the March *Kappan* and Mr. Gage will have an opportunity for final brief comments in the same issue.

The editors themselves have no intention, in these introductory remarks, of taking sides on the substantive questions addressed here by Mr. Shockley and Mr. Gage. But we are quite sure they are important questions and we see no reason why they should not be discussed and examined in a professional journal.

Like most educators and meliorists, however, we are drawn to environmental determinism: If you ameliorate the conditions of life, you transform humanity. We believe that bad conditions make bad people. We prefer to regard genetic inheritance, over time, as simply one more factor in environment and therefore, in a world of reason and certainly in the world of genetic marvels to come, ultimately manipulable.

We hope that *Kappan* readers of all persuasions will view the Shockley-Gage encounter as what we have tried to make it: an examination of questions fundamental to enlightened educational policy. Even in a period of great racial tension, the investigation must proceed. Last May 10, *Newsweek** reported the defeat of Mr. Shockley's five-year effort to persuade the National Academy of Sciences to sponsor studies of the relative influence of heredity and environment on human intelligence. A special committee headed by Kingsley Davis reported that the study of human racial differences is "a proper and socially relevant scientific subject." It recommended that the academy set up a working group of scientists to study the feasibility of a long-term

**"Is Intelligence Racial?," pp. 69, 70.

research program on the interaction of genetic and environmental factors in human performance. (Note that both Shockley and Gage, in addressing the heredity-environment question, rely heavily on one inadequate study — Newman, Freeman, and Holzinger — now more than 30 years old.

When the committee's report came up before the NAS membership, they accepted the proposition that the study of human racial differences is a relevant one, but rejected the recommendation urging the NAS to get to work on such studies.

There may be good political reasons for this decision. There can hardly be good scientific reasons, for the first duty of scientists is to inquire. In a fascinating article full of illustrations from the history of science, Bernard Barber explains why scientists resist scientific discovery.* One source of resistance is the pattern of specialization that prevails in science at any given time. Ordinarily specialization concentrates and focuses the requisite knowledge and skills where they are needed. "But occasionally," says Barber, "the negative aspect of specialization shows itself, and innovative 'outsiders' to a field of specialization are resisted by 'insiders.'" Thus, as an electrical engineer (co-inventor of the transistor) and a brilliant statistical analyst, Mr. Shockley has been attacked by psychologists and geneticists for "trying to take the stringent disciplines of mathematics and physics and bring them to bear on heredity, environment, and genetics." A hundred years ago Gregor Mendel's auditors were repelled by his strange linkage of botany with mathematics. Today a good many of William Shockley's auditors are repelled by his approach to questions of race and intelligence. We do not ourselves endorse his conclusions. But we believe that we must face repellant — or at least tedious and unseductive — facts in order to find and disseminate the truth. As James Madison put it, "A people without information or the means of access thereto is but the prelude to a farce or a tragedy, or perhaps both." — *The Editor*

*Bernard Barber, "Resistance by Scientists to Scientific Discovery," *Science*, September 1, 1961, pp. 596-601.

DYSGENICS, GENETICITY, RACEOLOGY: A CHALLENGE TO THE INTELLECTUAL RESPONSIBILITY OF EDUCATORS BY WILLIAM SHOCKLEY

Do our nobly intended welfare programs promote dysgenics — retrogressive evolution through the disproportionate reproduction of the genetically disadvantaged? One incident that led me to express my worries publicly was a news story of an acid-throwing teen-ager, one of 17 children of a mother with an I.Q.

of 55. Later I learned of Denmark's sterilization programs with their eugenic implications. The rising per capita homicide rate of Washington, D.C., is 50 times Denmark's falling one. Dysgenics?

My inquiries unearth no support of studies of dysgenics by a government agency or a major foundation. But

conspicuous hints of dysgenic worries do occasionally emerge. In 1964 Secretary of Labor Willard W. Wirtz said: "There is a strong indication that a disproportionate number of unemployed come from large families, but we don't pursue evidence that would permit establishing this as a fact or

evaluating its significance.”¹ Early in 1971, Vice President Spiro T. Agnew mentioned forbidding welfare mothers to have more illegitimate children and suggested that welfare problems might require willingness “to take on the hard social judgments that very frankly no one that I know in elective office is willing to even think about.”² This unwillingness is not restricted to politicians. Agnew’s thoughts were rejected with the adjectives “punitive” and “inhumane” in an article in *Science*.³

Inverted liberals of our academic community encourage this *we-don’t-pursue, no-one-willing-even-to-think* avoidance of dysgenics by our political leaders. They devise such unsearch dogmatism as this rephrased thought-blocker: “An individual’s I.Q. is controlled by two variables, his environment and his genes. Separate control of these variables is neither practical nor humane. Therefore, to determine the ‘geneticity’ [my word for the genetic fraction of the spread, precisely of the variance or square of standard deviation] of I.Q. for any population is impossible. Environmental improvements in human quality so need resources that none should be wasted on ‘bad heredity’ research.”

To refute the unsearch dogmatism of the above “two-variable-basically-impossible” thought-blocker, I exhibit Figure 1, showing my use of published research

to “predict” 122 “unknown” I.Q.’s, together with the “observed” values.

A Challenge to the Reader

I challenge *Kappan* readers to answer this question: How can these genetically based “predictions” be possible? This is the question that my audiences ask me when I project Figure 1 as a slide. They ask: “Do you use the I.Q.’s of the parents?” I reply: “Parents’ I.Q.’s do not permit such accuracy. The predictions of Figure 1 account for 82% of the I.Q. variance of the ‘observed’ population. There is only one way it can be done.”

Dear reader, does a thought-blocker prevent you from recognizing the familiar because I have presented it in an unfamiliar light? These “100% genetic control predictions” – I phrase this with scrupulous precision – can be made in only one way – a way that you know if you remember a good psychology course. If you can’t dispose of my challenge, is the “Apple of God’s Eye Obsession” the cause of your thought-block? Will any of you suffer the “Speer syndrome” a decade or two from now? I define these concepts in my conclusion (page 305), “The Moral Obligation to Think.”

Associated with my challenge are two questions: 1) On what do I base my “predictions”? 2) How can one sort out

the environmental influences quantitatively after one does know the basis? I ask the reader to be my student while I elucidate a pedagogical methodology that permits the necessary analysis of variance to be understood by one whose mathematical skills are at the pre-college level. While you read, keep my challenge in mind. Perhaps, before my explanation leaves no challenge to meet, you will overcome the thought-block that most of my audiences experience on encountering Figure 1.

Now back to Figure 1. The average of the 122 “observed” I.Q.’s is 96.8 and the standard deviation is 14.2. Furthermore – and this is important in what follows – the distribution is typical of representative Caucasian populations and is accurately normal over the range covered by the 122 cases. The same applies to the “predicted” distribution. For simplicity, we round these off to an average of 100 with a variance of 200 (14.2 squared = 201.64).

The “Las Vegas” method, my Americanized version of the Monte Carlo method of statistics, consists of creating a normal distribution generator in the form of a deck of cards from which randomly drawn cards produce a set of positive and negative integers that may represent genetic or environmental contributions to whatever pushes I.Q. up and down around the population norm of 100. Analysis of variance then consists simply of finding by trial and error what mix of environmental and genetic influences will duplicate the actual fact of Figure 1. The result, which I shall teach you how to duplicate on your own, is shown in Figure 2. In part (a), the genetic weight is four times the environmental weight, i.e., geneticity is 80%; environmental differences contribute only 20% of the variance. Part (a) was produced by drawing four genetic cards and one environmental card, all from the same deck, to get each “observed” I.Q. It is seen to represent Figure 1 very well. In part (b), the ratio is altered to three genetic and two environmental; it is obviously a poor fit; the predictions of Figure 1 could not have worked out so well had geneticity been as small as 60%.

I shall not at this point of my exposition explain exactly how to apply the card drawing ratios to represent the mysterious prediction process of Figure 1; to do so would deprive you of the opportunity to respond to my challenge. After the challenge is disposed of, the procedure for combining the genetic

WILLIAM SHOCKLEY is Alexander M. Poniatoff Professor of Engineering Sciences, Stanford University. In 1956 he was co-winner (with John Bardeen and Walter H. Brattain) of the Nobel Prize in Physics for invention of the transistor. For several years he has pursued an interest in the genetic factors in intelligence. He has urged the National Academy of Sciences to encourage systematic study of the relative influence of heredity and environment on human intelligence and genetic factors in human performance. Although unsuccessful in this effort to date, Shockley continues to call for examination of these and related questions.

In September, 1971, Mr. Shockley presented a paper before Division 9, Society for Psychological Study of Social Issues, American Psychological Association, at its Washington, D.C., meeting. His topic was, “Dysgenics: A Social-Problem Reality Evaded by the Illusion of Infinite Plasticity of Human Intelligence?” This article is an elaboration of ideas presented in that paper.

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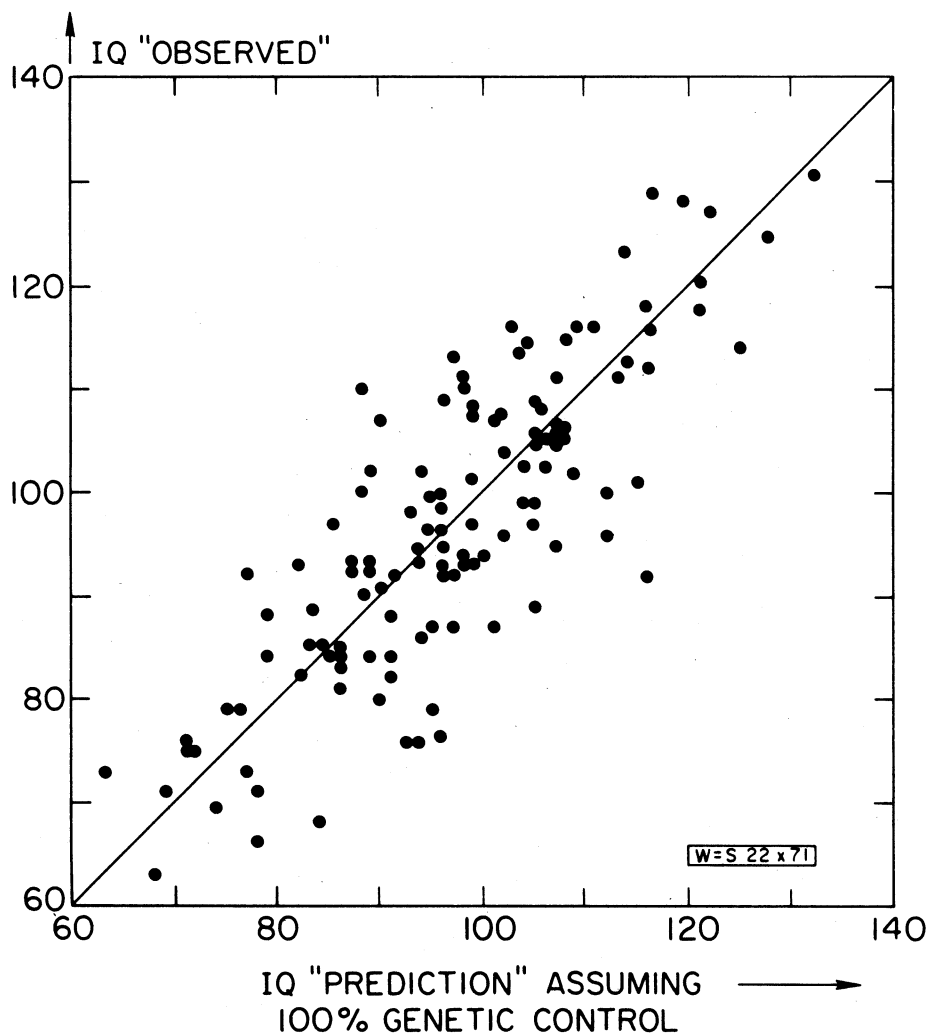


Figure 1 The challenge to *Kappan* readers: How could such accurate predictions of I.Q.'s be made on the basis of the assumption that I.Q. is 100% controlled by the genes?

and environmental cards will be obvious. Next I shall explain how to mark 50 cards from an ordinary deck so that a random choice of five will give scores that on the average add to zero and have a variance of 200 and approximate a normal distribution. This is done by marking 50 cards (some felt-tip marking pens are excellent) as follows: Take 25 black cards and mark them with these numbers: 0,0;1,1;1,2;2,2;2,3;3,3;3,4;4,4;4,5;5,5;5,6;6,6;6,7;7,7;7,8;8,8;8,9;9,9;10,10;10,11;11,11;11,12;12,12;12,13;13,13;13,14;14,14;14,15;15,15. Do the same with 25 red cards. Count the black cards as plus and the red as minus — after all, being “in the red” is minus. The symmetry of plus and minus ensures that the average of many draws is zero. Tests will show you that the variance must be 40, because variances add for independent contributions and you will find that five cards do match the 200 variance of Figure 1.

To convince yourself that the geneticity of Figure 1 is about 80% — certainly more than 60% — you need not understand the theory of the S-N50-V40 deck — i.e., the Shockley Normally dis-

tributed 50-card deck with Variance of approximately 40; precisely, 38.9. The point of the method is that random draws of four genetic cards to one environmental card does indeed match the reality of Figure 1. A ratio of three to two fails badly.

What about my challenge? The quotation marks on “observed” and “predicted” have been a broad hint. The next paragraph — STOP! *If you look before you resolve the challenge you become one more item of evidence for the thought-blockage that afflicts our nation's intellectual community on matters of human genetic quality* — gives the obvious and familiar answer — an answer that typically only 1 or 2% of my college audiences can produce when the projection of a slide emphasizes the shocking evidence for the dominance of genetic differences over environmental ones in pushing I.Q. scores around — especially shocking to the educational fraternity, whose income would burgeon if they could discover how to convert retardates into geniuses.

Genetic Dominance of I.Q.: 'Las Vegas' Analysis, Significance Level

A dispassionate appraisal of the existing data (that of Figure 1 is the best and the easiest to understand, but the same conclusions can be reached without it) leads to the conclusion that intelligence, measured by I.Q., varies more than twice as much from genetic differences than it does from environmental differences for individuals from families like those that raise one of a pair of white identical twins. The only reason that the conclusion of the preceding sentence is not printed in bold-face in a display paragraph is that it would have given away the answer to my challenge too easily. Did you guess it? Identical twins, reared apart, are the naturally occurring experiment that gets around the “two-variable-basically-impossible” thought-blocker discussed above. The 122 “predictions” of I.Q. are obtained by reading from one column of a compilation published by A. R. Jensen.⁴ If you cover the adjacent column, then the I.Q.'s of the other twin will be “unknown” to you. For example, take the highest I.Q. “predicted” in Figure 1: The uncovered column shows 132; the covered column is found, when uncovered and “observed,” to be 131. The largest error of “prediction” is 24 points. This is the famous and often cited case of Gladys, I.Q. 92, and Helen, I.Q. 116, in the twins study of Newman, Freeman, and Holzinger,⁵ one of the four studies in the Jensen compilation mentioned above.

The Las Vegas method of analysis of variance in Figure 2(a) creates a twin pair with six cards: Draw four cards from the S-N50-V40 deck and add their integers with due regard to sign; the sum is disturbance from the population norm of 100 due to genetics that is common to both twins of the pair; draw one more card for the environment of one twin and add this to obtain that twin's I.Q. Draw one more and do the same for the other twin. Genetic cards have four times more influence than environmental cards on each individual's I.Q. An example: The highest “predicted” I.Q. of Figure 2(a) had a sum of 31 for genetics plus 3 for environment for an I.Q. of 134, and the other “observed” twin had 0 for environment for a total of 131. (A perfectionist shuffles after each card draw, although this is not really necessary; just put drawn cards back at random between twins.) For 60% geneticity, use seven cards;

three for common genetics and two two's for environments.

On what basis are the obvious results of Figure 1 rejected? And they are rejected – believe me! Let me quote from a recent letter signed by a past president of the American Psychological Association in response to an inquiry a friend made about my reasoning:

“When Dr. Shockley says that heredity is more than twice as important as environment in determining the I.Q., he doesn't know what he is talking about and doesn't understand the problem. Both variables are *completely* important. Any other statement is nonsense.”

I have failed to detect any impressive capacity for analytic thinking behind such dogmatic assertions. I shall give two examples of the feeble thinking that accompanies the rejection of the “more-than-twice-as much” conclusion drawn from Figure 1.

Here is a typical statement concerning my first example: “Identical twins are not absolutely identical. After all, nature must make occasional errors in perfect duplication of genes. The analysis of Figure 1 does not allow for such differences. Consequently, the deductions may be in error. Until you know how much error, the conclusion that geneticity is 82% may be way off. It might really be less than 50% if the genetic accidents were large enough.”

I have heard this ridiculous argument seriously proposed by presumably competent biologists. I introduced it as a sort of I.Q. test for a group of able science writers at a seminar on the Las Vegas method; none of them got it. On another occasion I tried it on a group of Stanford biology majors; it was shot down by a freshman while an upper-classman remained baffled until after the answer was explained twice. Here is the answer:

If geneticity were really 80% but accidental gene duplication errors caused many of the twins to differ by, say, 10 I.Q. points, then this difference would not be allowed for in plotting Figure 1. Consequently, the error of prediction would be increased due to the unknown genetic differences. We would attribute these additional errors to environment. In other words, the effect would be to make us wrongly overestimate the effects of environment and underestimate geneticity. Thus if the neglected effects are really present, correcting for them could not lead to a lower correct value like 50% but only to a higher value than 80%.

Another standard argument for rejecting genetic dominance of I.Q. asserts that I.Q. is really controlled by environment; I.Q.'s of separated identical twins are nearly equal because adoption agencies succeed in placing the two twins of

a pair in essentially identical environments. This “equivalent-environment” argument does not stand up against the facts. The best data is that of the late Sir Cyril Burt, whose 1966 paper⁶ supplied 53 of the pairs of twins in Figure 1. I had obtained these values from Sir Cyril to construct possibly the first scatter diagram plot like Figure 1, thinking that the raw data would be a more eloquent witness to the realities of human intelligence than the usual tabulations of correlation coefficients. In response to my subsequent inquiries, Sir Cyril reviewed his reasons for refuting the equivalent-environment explanation. I select for my example of his comments the one on the previously mentioned 132-131 pair of Figure 1. About these twins he wrote:

“They were children of an Oxford don [Burt rates this as occupational class ‘1,’ the highest of the six he lists for home environments] who died a few months before their birth. Unable with her slender means to bring up two boys as she would desire, [the widow] secretly arranged for one to be ‘boarded out’: He was sent to a farmer in Wales (occupation class ‘4’) and eventually became a successful farmer himself (Miss Conway gives his I.Q. in 1958 as 137; our final assessment was 132). The one who remained with his mother eventually obtained a first class degree

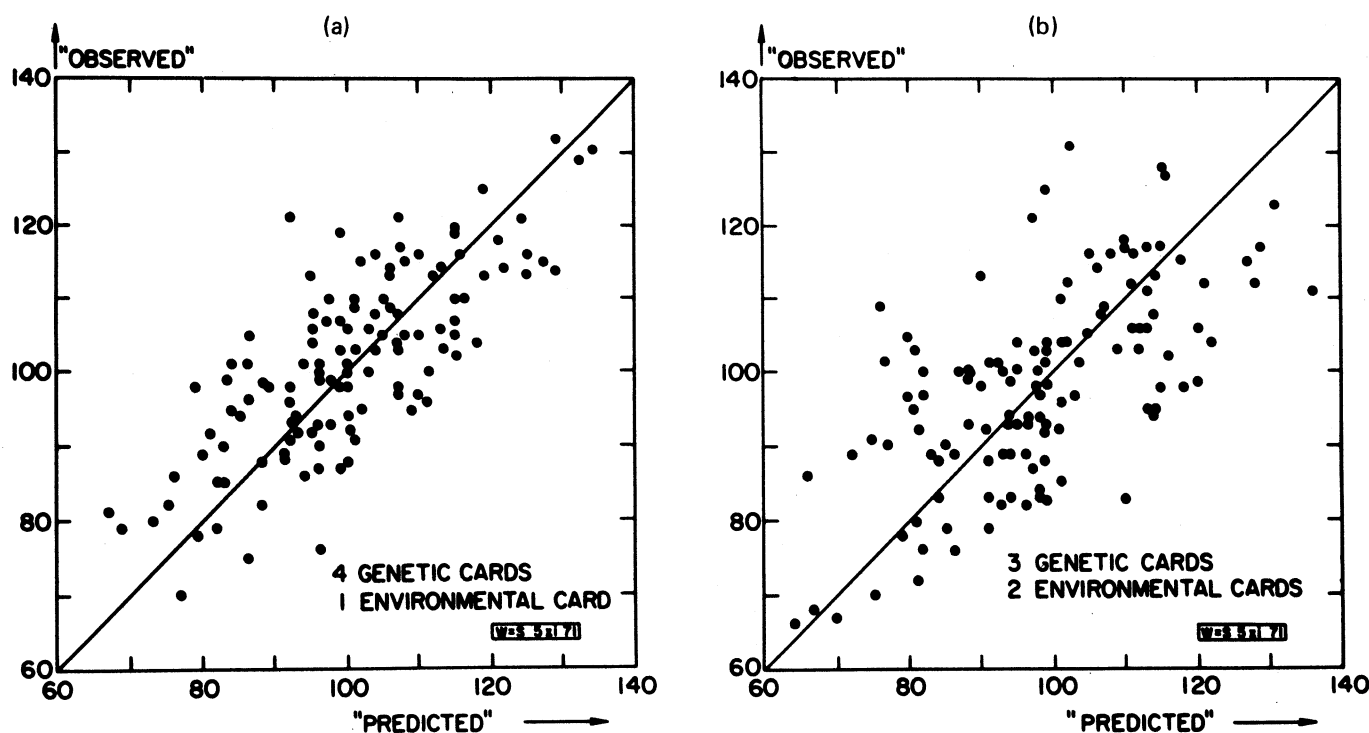


Figure 2 The challenge continued: By “creating” artificial individuals with randomly generated deviations from the population norm of 100 I.Q., scatter diagrams like Figure 1 are made. (a) Four parts genetics and one part environment is seen to match the real data of Figure 1. (b) Three parts genetic to two of environment gives less I.Q. predictability than is actually found.

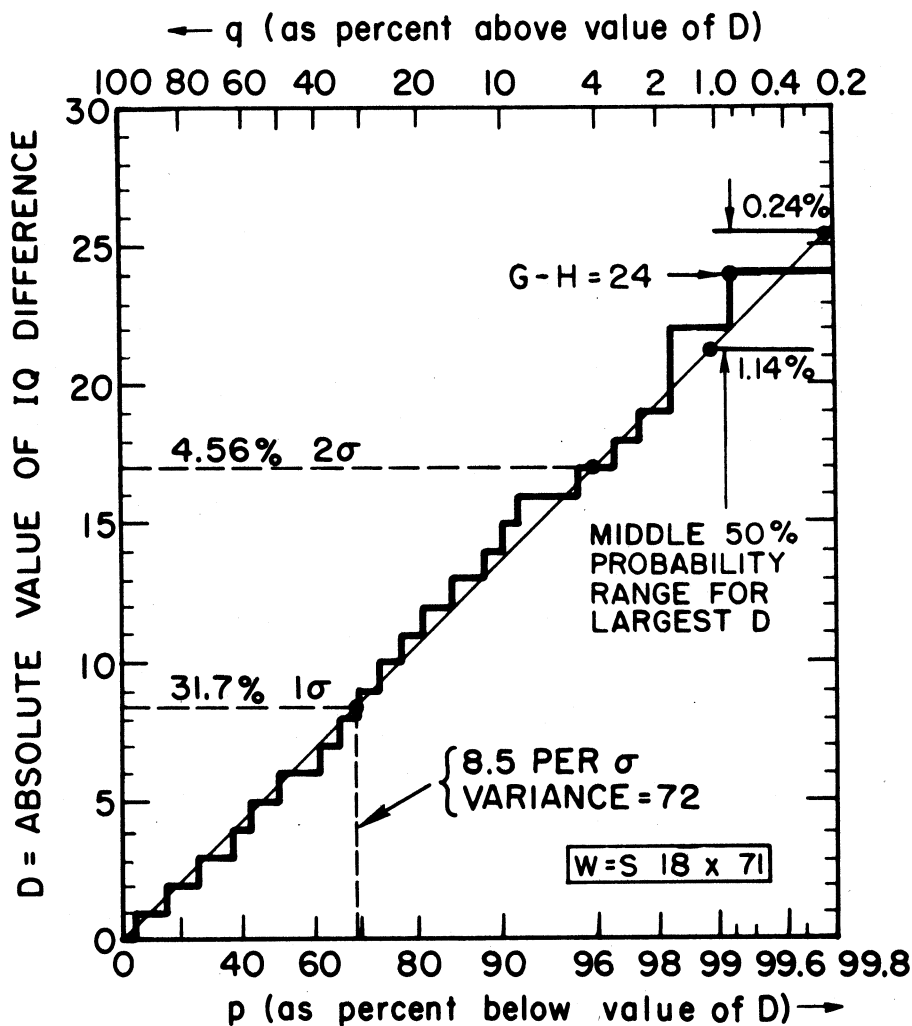


Figure 3 Nongenetic influences are seen to cause I.Q. differences to be accurately normally distributed. [Dear reader: If you are responding to my challenge, don't spoil my detective story by reading the answer in the text that explains this figure now!]

(I.Q. 136 in 1958, 131 in 1956)."⁷

This quotation illustrates two general conclusions of Burt's study: There is no significant correlation – indeed, the correlation coefficient is slightly negative – between the environments of Burt's separated twins. It also illustrates the typical range of test errors that may occur – on the order of five points. In the carefully controlled tests used in the four twin studies compiled by Jensen, test error is estimated to be normally distributed with a standard deviation of about 3.5 points so that it contributes about 5%, or 10 units, to the population variance of 200.

If the differences in environments between pairs of twins are compared with their differences in I.Q. for Burt's compilation, then it turns out – *as makes sense* – that better occupational class of home *does tend* to raise I.Q. – *but this tendency is not a certainty nor are the I.Q. increases very decisive*: Of the 35 cases in which co-twins differed in both I.Q. and occupational

class, 23 were concordant – higher class with higher I.Q. – and 11 were discordant – lower I.Q. in the higher class home. The result is significant at the 0.02 level. Each upward step of one social class raises I.Q. on the average about one I.Q. point.

But what about Gladys and Helen, with their 24-point difference? The difference is often cited to show that environmental effects among Caucasians are so much larger than differences between racial averages that obviously environment can easily account for the generally accepted deficit of about 15 points for our nation's black minority. The Gladys-Helen case warrants close scrutiny.

The Gladys-Helen 24-point difference is the exception needed to prove the 80% geneticity rule: It would be improbable if there were not one such case with a difference of about 24 I.Q. points in a sample of 122 pairs of twins. The reasoning is outlined on Figure 3. In brief, the method of plotting shows

that the differences (D) in I.Q. between twins is as accurate a realization of a normal distribution as one could expect from 122 cases. Therefore, although we may not be able to identify what the exact causes are that push the I.Q. of one twin away from the I.Q. of his co-twin, there are apparently enough independent, additive causes to give a good normal distribution. If it is a normal distribution, then straightforward methods can be used to determine the range of I.Q.'s in which the highest of the 122 differences has a 50% chance of falling – the probability being 25% that the largest falls above and 25% that it falls below this range. Gladys-Helen does fall in the proper range, as shown on Figure 3. There is only one chance in 100 that the largest value would have been smaller than 17 points.

One more logical consequence of Figure 3 is that one standard deviation of the environmental variable that influences I.Q. is worth five I.Q. points. Even though we cannot define what this variable may be – undoubtedly it is some complex combination of many components – it must account for some 25 units of variance for each twin to give the standard deviation of 8.5 in Figure 3 in combination with test error variance. Burt's occupational class variable only accounts for about one-fourth of this unknown environment composite.

Applied to Gladys-Helen, this five-point environmental variable accounts for a large fraction of the 24-point difference: Gladys had a sickly childhood and never finished third grade. Helen graduated from college. This large environmental difference, appraised using Census Bureau tables, corresponds to quite possibly three or four standard deviations of the distribution of educational environments – the 80% geneticity model can thus account for a substantial fraction of the 24 point difference. As Herrnstein's recent widely noted article in the *Atlantic* emphasizes,⁸ if such large environmental differences were eliminated by social progress, then the relative importance of genetic differences would increase.

One final significant point about Figure 3 and the accurate 82% geneticity value that can be deduced from it in conjunction with Figure 1: If the true value for geneticity were as small as 72%, then standard statistical theorems lead to the result that there is less than one chance in 2,000 that a value as small as the 8.5 for the standard deviation of Figure 3 would have occurred by

chance.⁹ This is a typical level of significance statement. It says that the hypothesis that geneticity is 72% or less can be rejected at a significance level of 0.0005 so far as the null hypothesis that 8.5 of Figure 3 resulted by chance is concerned.

The Non-Genetic 20 Percent

My emphasis on the dominance of genes in controlling I.Q. has led to the misunderstanding that I "treat I.Q. as a fixed characteristic, like eye color, susceptible of exact measurement" — to quote from an editor's reaction to one of my manuscripts. A distinguished psychologist, after seeing a diagram showing environmental effects based on the 80% geneticity presented above, wrote to me: "Your figure implies that no matter how bad the environmental restriction becomes it will have no effect whatsoever on the phenotype indicated by the I.Q. test score. This would mean that if William Shockley had been raised in a clothes closet from the time he was old enough to learn language, he would still have been able to win the Nobel Prize."

The fact is that, as for the Gladys-Helen case, small though the 12 to 15% of the variance attributable to environment may be, it can have large effects upon I.Q. and other behavioral traits. In fact, some of my own educational experiments have been aimed at raising I.Q. or motivational or attitudinal factors. Figure 4 illustrates one surprisingly successful result. For a number of years my freshman seminar at Stanford was chosen by almost twice as many students as I could take in two sections. I rated them in groups having closely matched weighted averages of S.A.T. scores and from each matched group rejected about half by using random numbers. The experimental group was found to outperform the controls by about 0.6 of a standard deviation of grade point average for the four academic quarters subsequent to the two spent in the seminar.

A recent widely publicized example of exceptional environmental success in reducing mental retardation may fit into the 80% geneticity pattern. Professor Rick Heber has given an intensive educational enrichment program to slum children whose mothers have I.Q.'s below 75. At three and a half years of age, the undersecretary of Health, Education, and Welfare has recently reported, these experimental children are averaging 33 I.Q. points above comparable con-

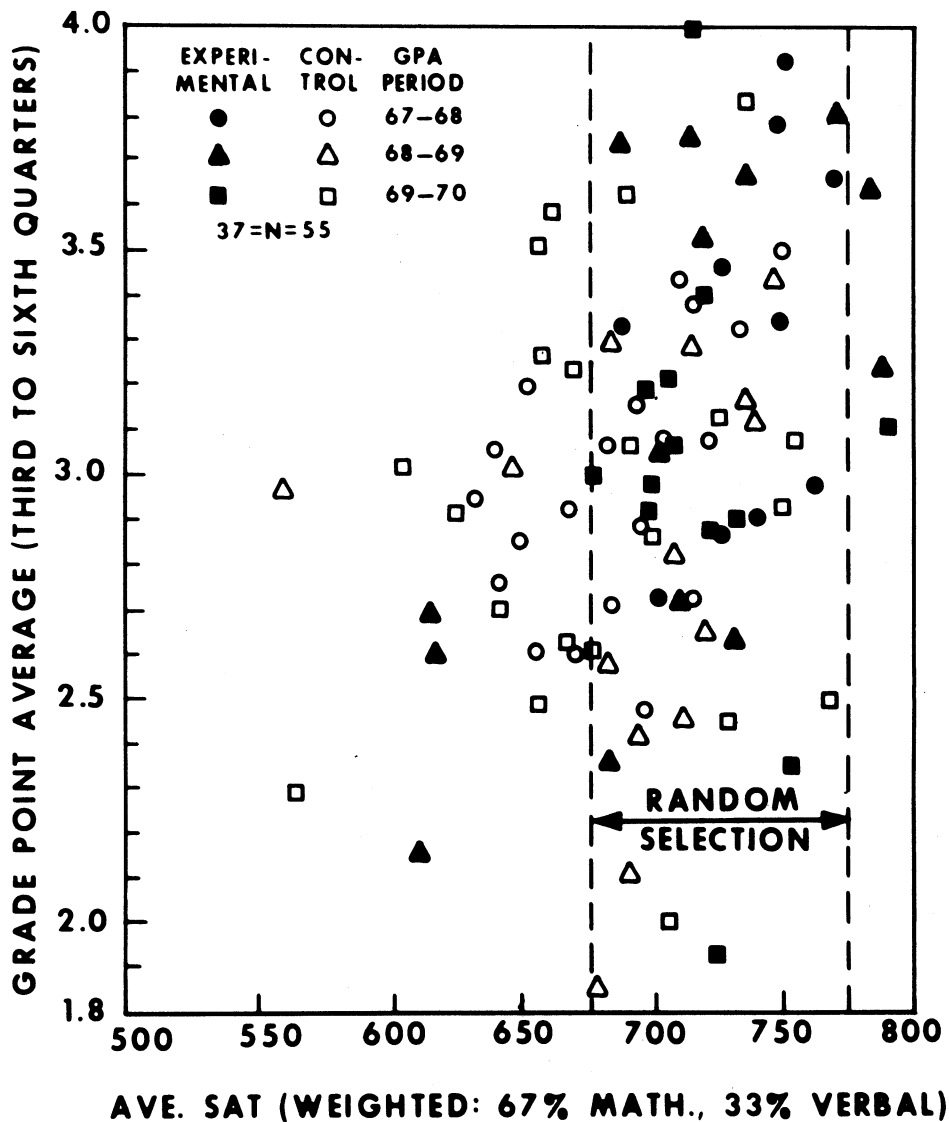


Figure 4 Results of a controlled experiment on randomly selected applicants for a Stanford University freshman seminar on *mental tools for scientific thinking*. In the four quarters subsequent to the two in which the seminar was taken, the "experimental" students outperformed the controls at a significance level of better than 0.05.

trols.¹⁰ These findings are not incompatible with 80% geneticity. In fact, they may be almost predictable. The undisturbed home environments were probably in the lowest 1 or 2% of all home environments for intellectual stimulation. On the other hand, Heber's intensive program is probably in the top fraction of 1% for developing performance on I.Q. tests. This is equivalent to an improvement of perhaps six standard deviations of the distribution of environments, so that 33 points would correspond to about five points per standard deviation — a value quite compatible with 80% geneticity.

The economics of such remedial programs suggest mournful numbers. The initial cost was of the order \$10,000 per child year. Whether the effects will be lasting or in the end adverse because of

untimely experiences — such is the case for laboratory experiments with primates — are important and researchable questions.¹¹ I discuss below the moral obligation to do quantitative thinking on human problems.

Standard I.Q. Cliches

I have gone at length and with dramatized examples into the basis for my own conviction about genetic dominance of I.Q. because I believe that this is the cornerstone for all logical structures about human quality problems. I anticipate that many criticisms will be leveled at my reasoning. Some of these I shall respond to in detail below. Here I shall deal perfunctorily with some that space does not permit me to treat in depth:

"I.Q. has no relevance to successful living." My best answer to this is an analysis of the *Genetic Studies of Genius*, the great work of Lewis M. Terman and his colleagues. The gifted children did outperform the population average across the board on all sorts of generally accepted and valued human quality measures.¹²

"Until you can meaningfully define exactly what you mean by intelligence and relate it to what I.Q. measures, your studies are not scientific." My answer is that I.Q. as used by Terman and others is meaningfully correlated with values that are generally accepted. I also turn the question: Until you can tell me what is gravity, why should I worry about falling?

"I.Q. tests are so culturally influenced that they cannot possibly tell anything about genetic potential and especially about racial differences. For example, monkeys could outperform humans on tests involving tree climbing." One answer that almost always reveals the unsearch dogmatism of the questioner is this: What is the best attempt that you know of to design a culture-fair test and what was wrong with it? I do not recall ever getting an answer. I shall discuss several research proposals on racial differences below.

"You have discussed geneticity; but what does this have to do with dysgenics — after all, dumb parents have bright kids and vice versa?" My answer: See any good psychology text on correlation of adopted childrens' I.Q.'s with natural and with foster parents. In fact, these comparisons are the independent way to arrive at the 80% geneticity figure without using identical-twin data. Let me express the conclusion by quoting again from the Sir Cyril Burt letter mentioned above: "But the strongest case for mental inheritance is provided by a comparison of data for *all* types of relatives."

The list is long. It may have no end. The "Apple of God's Eye Obsession" may drive true believers tirelessly. For other answers I refer my readers to the references, particularly Jensen,¹³ Eysenck,¹⁴ Herrnstein,¹⁵ and my own writings with their reference lists.¹⁶

Forms of Dysgenic Threat

My concerns are based on my evaluation that in the intellectual community of the nation the emphasis on environmental aspects of human quality is so great that it excludes proper consideration of hereditary genetic factors. I

appraise this unbalance as deplorable and dangerous. During the last half decade my studies have increased my conviction that concentration upon the environmental factors cannot solve the important problems of man's future and that adequate solutions to poverty, crime, illiteracy, and national security problems demand facing hereditary problems. I believe that to avoid very real dangers to worldwide human welfare, civilization, including particularly that of the United States, must face in a broader sense than it does now the problems raised in 1966 by James Shannon, then director of the National Institutes of Health, in congressional testimony: "The effect — if I may put it bluntly, Mr. Chairman — is that we are weakening our genetic inheritance."¹⁷ Dr. Shannon emphasized biochemical physiological traits. What my intellectual conscience impels me to demand is that we look objectively also on man's behavioral traits. This, my investigations lead me to conclude, is not being done adequately. I conjecture that this lack of needed effort is caused less by the great difficulties involved than by the unsearch dogmatism that produces thought-blockers.

With the advent of nuclear weapons, man has in effect reached the point of no return in the necessity to continue his intellectual evolution. Unless his collective mental ability can enable him reliably to predict consequences of his actions, it is possible that he may provoke his own extinction, or at least drastically modify the gene pool of humanity — and perhaps for the better.

Let me illustrate by a specific speculation upon the evolutionary aspects of possible gene pool modifications: Sweden and Switzerland both have extensive shelter facilities that would save substantial fractions of their populations from death from worldwide fallout in the event of an unlimited nuclear war involving "dirty weapons" that might destroy the preponderance of the human life on earth. A much less substantial fraction of our population would survive. This preferential survival of the most foresighted components of the human race is a form of "self-renewal" for human evolution that my intellectual conscience does not allow me to face complacently. I feel an obligation to try to increase the probability that man's destiny will be shaped by the application of intelligence to determine realistic goals for human progress rather than by forces man has let get out of control. These specula-

tions about man's future evolution accent my fears that contemporary United States population trends are such that we are disproportionately multiplying the least foresighted elements of our population.

A nuclear holocaust as a consequence of advancing weapons technology combined with a dysgenic decline in national foresight may present the most dramatic dysgenic threat. But increased welfare tax burdens and crime rates and lower productivity may act sooner to draw attention to the basic issues. I estimate that our nobly intended welfare programs may be encouraging the births of 100 babies per day who can be reliably predicted to face lives of frustration because of low genetic I.Q. potential. It is this estimate — I find no one in government who will check it — as much as any one thing, that underlines the urgent need for evaluation. I propose as a program for continued progress: Let's ask the questions, do the necessary research, get the answers, discuss them widely. Then either worries will evaporate or plans for action will develop.

Raceology

A common objection to studies of racial genetics is that the concept of race is meaningless. This objection is refuted by research on blood type frequencies, most recently that of T. E. Reed of Toronto, who has determined with a precision of 1% that the Oakland, California, Negro population is 22% Caucasian in ancestry.¹⁸ I have refined Reed's studies to estimate that the spread of the Caucasian ancestry in Oakland probably varies from a few percent to well over 50%¹⁹ and have combined Reed's findings with Army pre-induction test data in Figure 5 to estimate that, for low I.Q. Negro populations, each 1% of Caucasian ancestry raises average I.Q. by one point.²⁰ I have suggested ways of controlling for the environmental differences to test the reliability of this estimate. An interesting question is the level at which diminishing returns set in; for example, at 40% Caucasian ancestry, would average I.Q. be 110?

The possible relationship of blood type determination of racial mixes of populations and I.Q. may offer a unique opportunity to evaluate the reality of the dysgenic threat. To fail to use a potentially effective means of diagnosis for fear of being called a racist is irresponsible. It may also be a great

injustice to black Americans themselves. If those Negroes with the fewest Caucasian genes are in fact the most prolific and also the least intelligent, then genetic enslavement will be the destiny of their next generation.²¹ The consequences may be extremes of racism and agony for both blacks and whites.

The word "raceology" has been proposed for studies like mine. They are not racist. They are motivated by concern for the feelings of all involved – not by fear and hate. My research focuses principally upon white-Negro comparisons for two reasons: 1) Our national racial problems primarily involve the Negro minority and 2) Negroes are the only racial group for which extensive published statistics are available. Therefore, my personal research on questions related to Negroes has far greater immediate promise of contributing to sound diagnosis of our human quality problems than, for example, would attempts to study hereditary factors for Appalachian whites, for whom I have found that statistical data are practically unobtainable. Although I emphasize the Negro area for these reasons, I continue to urge broad inquiry into hereditary aspects of human behavior for all racial groups.

As an example of raceology, I present in Figure 6 some new research results on Negro superiority that compare Negro and white visual acuity, based on Army tests. The points specify fractions of Negroes and whites having various levels of visual acuity. From 20/20 to less than 20/200, the points fall accurately along a line. The interpretation of this analysis is that whites and Negroes are distributed in their visual acuity according to the same basic underlying normal distribution but that the distribution for Negro visual acuity is offset upwards by approximately 0.6 of a standard deviation – a value that if it applied for mental performance would be equivalent to about nine I.Q. points.

Medical studies support the conclusion that the differences between the Negro and the white distributions of visual acuity are due to differences in gene pools rather than environmental effects. This shoots down the theory of some social scientists that many white children ruin their eyes by excessive reading and that this is why white visual acuity is worse than black. The opinion of ophthalmologists is that myopia, the chief cause of poor visual acuity, does not arise from excessive use of eyes for close work such as reading. Large-scale

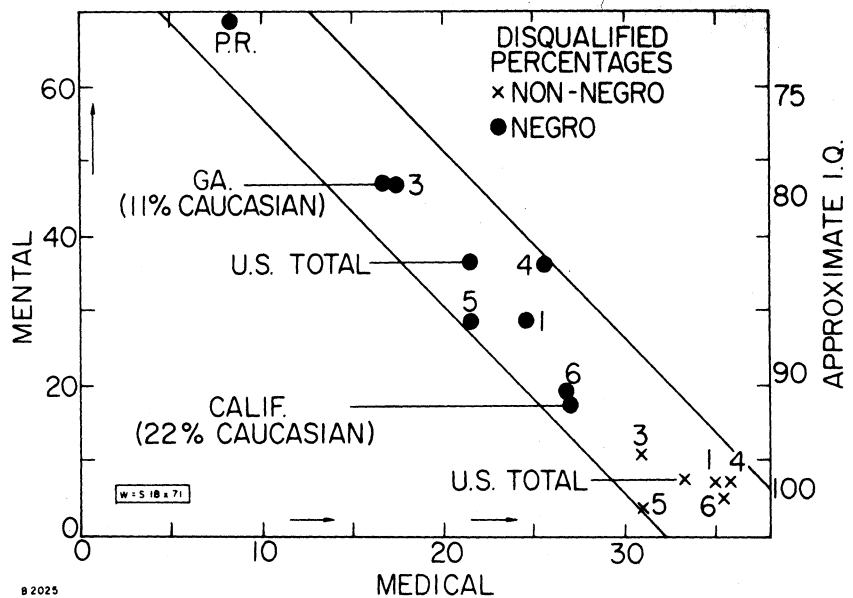


Figure 5 A plot of data from *Supplement to Health of the Army*, June, 1969 (Bernard D. Karpinos, Medical Statistics Agency, Office of the Surgeon General, Department of the Army). The data apply to pre-induction examinations of draftees in 1968. The numbers identify five recruiting districts; P. R. is Puerto Rico. Caucasian percentages are from T. E. Reed's values for Oakland, California, and two counties in Georgia. Mental and medical rejection rate coordinates include those rejected on both grounds. The approximate I.Q. scale is obtained by assuming a normal distribution with a standard deviation of 15 and 100 I.Q. for non-Negro U.S. total. (For citations, see footnotes 18 and 19.)

studies extending over periods of years have prevented children from focusing at short distances by mild doses of atrophine that are known not to affect normal eyes. The subjects were expected to develop myopia in a certain percentage of cases on the genetic basis that their families had high incidence of myopia. No reduction of myopia was found. The fact that gene pool effects are involved is further supported by the dominance of myopia over hypermetropia, or farsightedness, in studies of family patterns of poor vision.²²

Correlation coefficients between behavioral traits were found to be smaller for Negroes than for whites²³ using data from tables in the Coleman Report.²⁴ Figure 7 presents these data so as to facilitate interracial comparisons of the correlation coefficients between "student" variables and "dependent" or achievement variables. As Figure 7 shows, except for the remarkable "control-of-environment" variable, the correlation coefficients between student variables and achievement variables are much lower for Negroes than for whites. The mean values of such student "personality" variables as self-concept and interest in school are seen to be no lower for Negroes than for whites – in fact, they are slightly higher for Negroes. What is surprising, however, is the difference in the pattern of correlations

between the personality variables and the achievement variables. Comparisons between Orientals and whites do not show the striking differences in values of correlation coefficients. Explanations of the lower correlation between I.Q. and earnings for Negroes than for whites usually lean heavily on the fact that blacks in our society are subject to racial discrimination. I have used my findings to offer an explanation of the lower correlation not involving discrimination.²⁵ The differences shown here are consistent with differences in Level I (rote memory) and Level II (conceptual) learning reported by Jensen.²⁶ The chief purpose in introducing Figure 7 here is to illustrate the existence of research possibilities on racial differences that may exist but are unexplored because of the prevailing unsearch dogmatism.

Where data have been available, I have tried to compare other racial groups.²⁷ My findings do not support a theory of white Aryan supremacy: I have found and published the observation that American Orientals are about 10 times more successful than the national average on a per-capita basis in achieving the distinction of election to the National Academy of Sciences. They are also about 10 times more successful in avoiding citations in the annual FBI uniform crime reports.²⁷

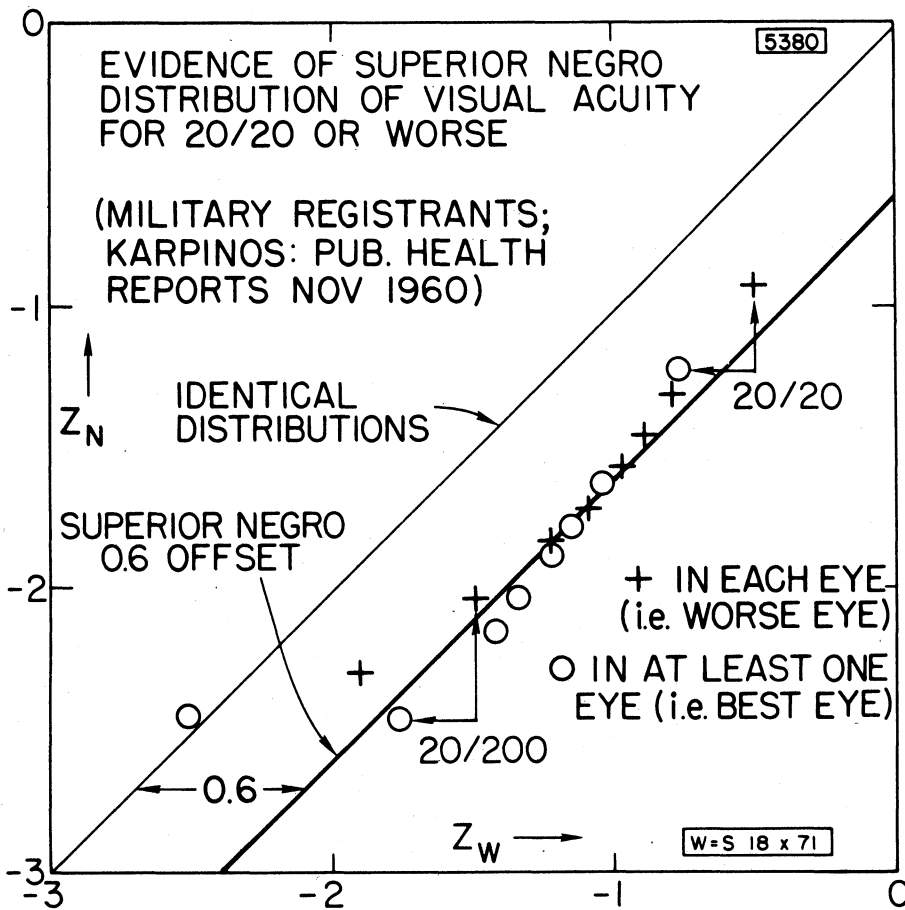


Figure 6 The Z_W values give normal distribution arguments that correspond to the percentage of white military registrants who fail to meet the prescribed visual acuity. Z_N values are plotted in the same way for Negroes. The unmarked visual acuities are in sequence 20/30, 20/40, 20/50, 20/70, 20/100. The extreme points that fall out of the pattern are 20/400. If the points fell perfectly on the line, it would imply identical normal distributions for both races except for an offset of 0.6 standard deviations.

My statistics also show that Jewish Nobel Prize winners in science occur about 10 times more often than expected on the basis of the population as a whole.

Quantifiable Humanism?

One form objections take to my demands that quantitative scientific thinking be applied to human quality problems was eloquently expressed in a listing of and comment on environmental variables in a letter by a black Ph.D. in education as part of his criticism of a paper of mine:

... devastation... has been wreaked... through the evils of slavery, ... intimidation, lynching, virulent job discrimination, segregation, ... How can the debilitating effects of such a legacy be couched in quantifiable terms?

I believe we must answer that we do not, nor shall we soon, know *how to*

quantify such environmental factors. But the future of our nation's black minority does depend upon sound diagnosis. Wishful thinking and good intentions are not enough. *Quantified facts do describe* the agonizing disadvantages of Afro-Americans. Note this recent Associated Press dispatch:

The NAACP's labor director, Herbert Hill, told the annual convention: "The rates of unemployment among black youth have now reached disaster levels. And if they continue... virtually an entire generation of ghetto youth will never enter the labor force. Their only future will be a marginal, alienated existence, separate and unusual within American society..."²⁸

Mr. Hill's concern over black unhappiness is supported by a Gallup poll of 1,517 adults. "Very happy" was the response of 46% of whites but of only 20% nonwhites; "not happy" percentages were 5% and 12%.²⁹

What do these quantitative findings mean? My "offset analysis"³⁰ of these percentages shows that the nonwhite happiness distribution is offset downwards, compared with whites, by about half a standard deviation for adults. What will it be for the next generation of black Americans whose employment disaster Hill reports? Will diagnosis reveal that racial dysgenics is a cause? Diagnosis of questions like those related to Negro unhappiness is what I believe will be the best insurance for our black minority's future and what I urge our nation's citizens, including the professional educators who read this journal, to demand.

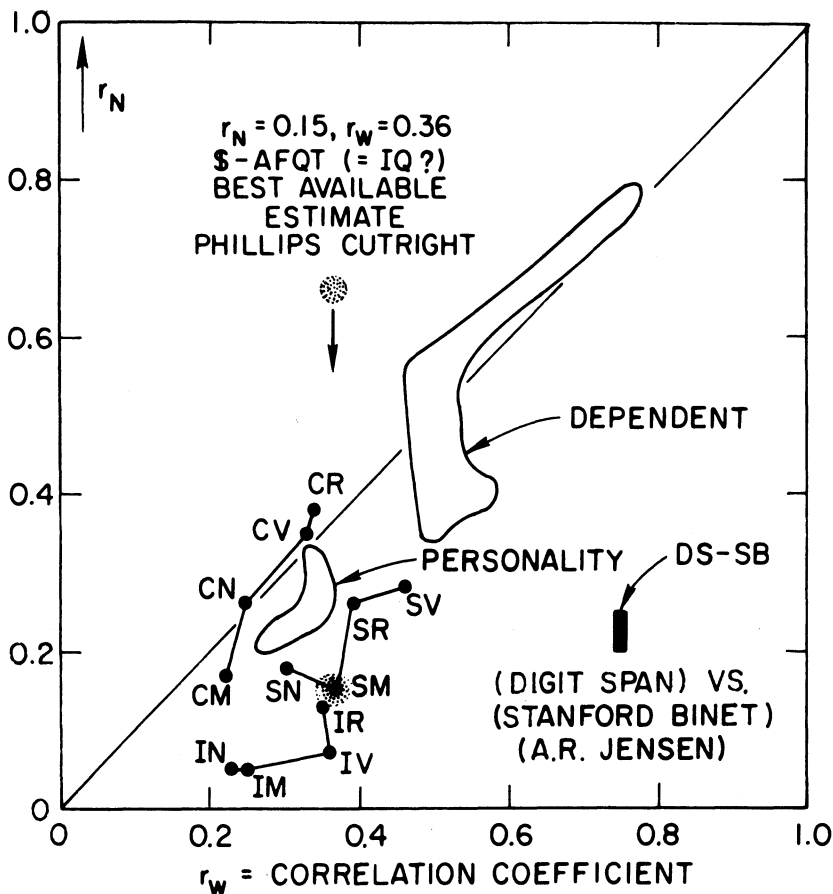
The Moral Obligation To Think

1. *Hitler and Speer*. A familiar basis for rejecting my demands that research on dysgenics be undertaken is the assertion that any resulting knowledge would be worthless because all conceivable remedial actions would involve intolerable eugenic measures.

Eugenics is a shunned word because it was a feature of Hitlerism. But the lesson of Nazi history is not that eugenics is intolerable. Since 1935 Denmark has carried out programs with clearly positive eugenic implications. (Although a cause-and-effect relationship is uncertain, it is noteworthy that Denmark's per-capita homicide rate has dropped since World War II and is less than 2% of the rising rate for Washington, D.C., which was 20% higher in 1971 than in 1970.) The real lesson of Nazi history was anticipated 140 years before Hitler, when the Bill of Rights incorporated into our Constitution the First Amendment guaranteeing freedom of speech and of the press. Only the most anti-Teutonic racist can believe the German people to be such an evil breed that they would have tolerated the concentration camps and gas chambers if a working First Amendment had permitted exposure and discussion of Hitler's final solution — the extermination of the Jews.

I suggest that there is a significant parallel between the attitude of German intellectuals in Hitler's day and our intellectuals' unwillingness to face the dysgenic threat. Albert Speer, Hitler's minister of armaments and war production, wrote in his memoirs:

But in the final analysis I myself determined the degree of my isolation [from Hitler's "final solution" of the Jewish problem],



W=S 18 x 71

CORRELATION COEFFICIENTS
"COLEMAN" REPORT GRADE XII

DEPENDENT=ACHIEVEMENT

V=VERBAL
N=NONVERBAL
R=READING COMPREHENSION
M=MATHEMATICS ACHIEVEMENT

"PERSONALITY"=STUDENT

S=SELF CONCEPT
I=INTEREST IN
SCHOOL
C=CONTROL OF
ENVIRONMENT

	S	I	C	V	NV	R	M
W Av.	0.02	-0.03	0.22	67	37	76	57
W S.D.	0.73	0.59	0.57	14	7	17	17
N Av.	0.05	0.11	-0.13	49	28	58	38
N S.D.	0.71	0.55	0.76	14	9	17	18

Figure 7 Comparison of correlation coefficients r_w for whites and r_N for Negroes for correlations between achievement variables and personality variables. The lower "cooperative correlation" is consistent with the Cutright estimate of lower effect of I.Q. on earnings for Negroes than for whites. (Phillips Cutright, personal communication to W. Shockley, September 22, 1969.)

the extremity of my evasions, and the extent of my ignorance. . . . Whether I knew or did not know, or how much or how little I knew, is totally unimportant when I consider what horrors I ought to have known about and what conclusions would have been the natural ones to draw from the little I did know. Those who ask me are fundamentally expecting me to offer justifications. But I have none. No apologies are possible.³¹ [Emphasis added.]

I call this retrospection the "Speer syndrome." It is what I warned *Kappan* readers who failed my challenge that they might experience in future decades if — to paraphrase Speer — they are failing to draw the natural conclusions from the little — or much — they do know.

2. A voluntary sterilization bonus plan. The First Amendment makes it safe for us in the U.S. to try to find humane eugenic measures. As a step in such search, I propose as a *thinking exercise* a voluntary sterilization bonus.

Bonuses would be offered for sterilization. Payers of income tax would get nothing. Bonuses for all others, regardless of sex, race, or welfare status, would depend on best scientific estimates of hereditary factors in disadvantages such as diabetes, epilepsy, heroin addiction, arthritis, etc. At a bonus rate of \$1,000 for each point below 100 I.Q., \$30,000 put in trust for a 70 I.Q. moron potentially capable of producing 20 children might return \$250,000 to taxpayers in reduced costs of mental retardation care. Ten percent of the bonus in spot cash might put our national talent for entrepreneurship into action.

In Honolulu on September 29, 1971, John G. Veneman, undersecretary of Health, Education, and Welfare, rejected this thinking exercise, saying:

And the more I thought about [the voluntary sterilization bonus plan], the less I liked that idea. All my instincts told me that the way to attack mental retardation is at its roots — not through its

victims. For many years I was a fruit grower in California. And I've learned that you begin with good rich soil — not with the fruit. . . .³²

He did not mention seed quality. This substitution of instinct for scientific analysis and emphasis on environmental soil to the exclusion of genetic seed quality reminded me of Lysenko in Russia. With Stalin's backing, he insisted that his Soviet biologists had discovered how to transform one species into another — wheat into rye, pines into firs, etc. Lysenkoism was a disaster in Russian agriculture.

One obvious area of tabooed research, comparable in emotional hazard to conventional genetics in Lysenko's Russia, concerns racial differences in brain anatomy. The most significant recent publication that I can find reports "unexpected variations in fine structures of the brain in Melanesians, including size and shape of septal nuclei, . . . and the frontal lobes."³³ Where has this research on racial frontal lobe differences, reminiscent of now-

rejected research on Negro brain differences, been published? Only in a conference report and an alumni magazine.

Another shocking speculation about dysgenics is provoked by news stories on the "battered child" syndrome. The battered child is becoming more prevalent. Who does the battering? Often it is grown-up battered children.³⁴ Heritability? Dysgenics?

3. "Apple of God's Eye Obsession." I shall close with a hypothesis about the psychology of the critics of my concerns about dysgenics. I doubt neither the sincerity nor the good intentions of these critics. I diagnose their thought-blockage as caused by a theologico-scientific delusion. I call it the "Apple of God's Eye Obsession" – God meaning, for some, the proper socio-biological order of the universe. True believers hold that God has designed nature's laws so that good intentions suffice to ensure humanity's well-being; the belief satisfies a human need for self-esteem. Any evidence counter to man's claim to be the apple of God's eye strikes a central blow at his self-esteem and thereby provokes retaliation reminiscent of the prompt execution of a Greek messenger bearing tidings of defeat in battle. The parallels become clearer in historical perspective. Galileo and Darwin brought new knowledge that was incompatible with the then-cherished interpretation of humanity's unique place in the universe. Either the new knowledge had to be rejected or else the Apple of God's Eye Obsession had to be painfully revised.

The thought-blockers and unsearch dogmatism that reject the relevance of genetics to social problems arise, I propose, because the theory that intelligence is largely determined by the genes and that races may differ in distribution of mental capacity offends equalitarian-environmentalism – an important feature of the contemporary form of the Apple of God's Eye Obsession. The preponderance of the world's intellectual community resists the fact that nature can be cruel to the newborn baby. Babies too often get an unfair shake from a badly loaded parental genetic dice cup. At the acme of unfairness are features of racial difference that my own research inescapably leads me to conclude exist: Nature has color-coded groups of individuals so that statistically reliable predictions of their adaptability to intellectually rewarding and effective lives can easily be made and profitably be used by the pragmatic man in the street.

If, as many thinking citizens fear, our welfare programs are unwittingly, but with the noblest of intentions, selectively down-breeding the poor of our slums by encouraging their least foresighted to be most prolific, the consequences will be tragic for both blacks and whites – but proportionately so much worse for our black minority that, as I have said, the consequence may be a form of genetic enslavement that will provoke extremes of racism with agony for all citizens.

My position is that humanity has an obligation to use its intelligence to diagnose and to predict in order to prevent agonies that lack of foresight can all too easily create.

1. Willard W. Wirtz, OECD speech, 1964, and personal correspondence with the author.
2. Earl C. Behrens, "Tough Agnew Proposals on Welfare," *San Francisco Chronicle*, January 15, 1971, pp. 1, 24.
3. Frederick S. Jaffe, "Toward the Reduction of Unwanted Pregnancy," *Science*, October 8, 1971, pp. 119-27.
4. Arthur R. Jensen, "I.Q.'s of Identical Twins Reared Apart," *Behavioral Genetics*, No. 2, 1970, pp. 133-46.
5. H. H. Newman, F. N. Freeman, and K. J. Holzinger, *Twins: A Study of Heredity and Environment*. Chicago: University of Chicago Press, 1937.
6. Cyril Burt, "The Genetic Determination of Differences in Intelligence: A Study of Monozygotic Twins Reared Together and Apart," *British Journal of Psychology*, 1966, pp. 137-53.
7. Sir Cyril Burt, personal correspondence with the author.
8. Richard Herrnstein, "I.Q.," *Atlantic Monthly*, September, 1971, pp. 43-64.
9. William Shockley, "On the Significance Level for Genetic Dominance of I.Q. and on the 24-Point Difference Between Twins Gladys and Helen," paper presented at October 27 meeting, 1971, of the National Academy of Sciences, Washington, D.C.
10. John G. Veneman, "Partial Text of Remarks by Undersecretary John G. Veneman, Department of Health, Education, and Welfare, Before the Pacific Forum on Mental Retardation, Honolulu, Hawaii, September 29, 1971." Released by Office of Public Affairs, HEW, Washington, D.C.
11. Arthur R. Jensen, "Reducing the Heredity-Environment Uncertainty," in *Environment, Heredity, and Intelligence*, Reprint Series No. 2, *Harvard Educational Review*, Cambridge, Mass., p. 234. (Jensen's discussion is based on H. F. Harlow, "The Development of Learning in the Rhesus Monkey," *American Scientist*, 1959, pp. 459-79.)
12. Lewis M. Terman and Melita H. Oden, *The Gifted Group at Mid-Life: Thirty-five Years' Follow-up of the Superior Child*, Vol. 5. Stanford, Calif.: Stanford University Press, 1959.
13. Arthur R. Jensen, "How Much Can We Boost I.Q. and Scholastic Achievement?," *Harvard Educational Review*, Winter, 1969, pp. 1-123.
14. H. J. Eysenck, *The I.Q. Argument*. Freeport, N.Y.: The Library Press, 1971.
15. Herrnstein, *op. cit.*
16. William Shockley, "Models, Mathematics, and the Moral Obligation To Diagnose the Origin of Negro I.Q. Deficits," *Review of Educational Research*, October, 1971, pp. 369-77.

Educational Research, October, 1971, pp. 369-77.

17. James A. Shannon, testimony before House Subcommittee on Appropriations, March 2, 1966. See *Washington Star*, March 25, 1966, p. 1.

18. T. E. Reed, "Caucasian Genes in American Negroes," *Science*, August 22, 1969, pp. 762-68.

19. William Shockley, "Hardy-Weinberg Law Generalized To Estimate Hybrid Variance for Negro Populations and Reduce Racial Aspects of the Environment-Heredity Uncertainty," *Proceedings of the National Academy of Sciences*, Vol. 68, 1971, p. 1390A.

20. William Shockley, "New Methodology To Reduce the Environment-Heredity Uncertainty About Dysgenics," *Proceedings of the National Academy of Sciences*, Vol. 67, 1970, pp. 10A-11A (abstract).

21. That dysgenics is more threatening for Negroes follows from D. P. Moynihan, "Employment, Income, and the Ordeal of the Negro Family," in *The Negro American*, T. Parsons and K. B. Clark (eds.), and B. T. Osborne, "Population Pollution," *Journal of Psychology*, 1970, pp. 187-91. Moynihan reports that "in 1960 nonwhite women (married once, husband present) age 35 to 45 had 4.7 children as against 3.8 for white women in the same situation" (p. 148). For women in the same age bracket, married at age 22 or over to professionals or technical workers with one or more years in college, the numbers are 1.9 children for Negroes and 2.4 for whites. Osborne reviewed the standard treatments that reject all evidence for dysgenic trends. He presented new findings and came to the conclusion that prior studies were based on populations too narrowly selected and that dysgenic trends cannot be soundly rejected.

22. John B. deC. M. Saunders, personal communication to the author, based on his review of the problem at the University of California Medical School in San Francisco.

23. William Shockley, "'Cooperative Correlation' Hypothesis for Racial Differences in Earning Power," *Proceedings of the National Academy of Sciences*, Vol. 66, 1970, p. 245 (abstract).

24. James S. Coleman *et al.*, *Equality of Educational Opportunity*. Washington, D.C.: Department of Health, Education, and Welfare, 1966.

25. William Shockley, "Dr. Shockley's Theory," *The New York Times*, November 8, 1969, p. 32C.

26. Jensen, *op. cit.* (fn. 13), p. 122.

27. William Shockley, "A 'Try Simplest Cases' Approach to the Heredity-Poverty-Crime Problem," *Proceedings of the National Academy of Sciences*, Vol. 57, June, 1967, pp. 1767-74.

28. Associated Press, *San Francisco Chronicle*, July 9, 1971, p. 7. Cited by Shockley in *op. cit.* (fn. 16).

29. George H. Gallup, "Gallup's Poll: The Happiest People," *San Francisco Chronicle*, January 14, 1971, pp. 1-2.

30. William Shockley, "Offset Analysis Description of Racial Differences," *Proceedings of the National Academy of Sciences*, Vol. 64, 1969, p. 1432 (abstract).

31. Albert Speer, *Inside the Third Reich: Memoirs of Albert Speer*. New York: Macmillan, 1970, p. 113.

32. Veneman, *op. cit.* (fn. 10).

33. Carleton Gajdusek, "Physiological and Psychological Characteristics of Stone Age Man," *Engineering and Science*, April, 1970, p. 58. (Publication of the California Institute of Technology and the Alumni Association.)

34. "Parents Who Beat Children," *San Francisco Chronicle*, August 30, 1971, p. 16. □