Not in our Genes

Richard Lewontin

"Social power runs in families. The probability that a child will grow into an adult in the highest 10 percent of income earners is ten times greater for children whose parents were in the top 10 percent than for children of the lowest 10 percent.

"In France, the school failure rate of working-class children is four times that for children of the professional class. How are we to explain hereditary differences in social power in a society that claims to have abolished hereditary privilege in the eighteenth century? One explanation—that hereditary privilege is integral to bourgeois society, which is not structurally conducive to real equality—is too disquieting and threatening; it breeds disorder and discontent; it leads to urban riots like those in Watts and Brixton. The alternative is to suppose that the successful possess an intrinsic merit, a merit that runs in the blood."

The notion that social power runs in families is cast in Marxist terms. It is the most simple thing in the world – people look out for their kids.

The French statistics are probably true. There is a huge difference between "hereditary privilege" and parents trying to do the best for their kids. What parent doesn't? Certainly the Democrat powers that be in Washington send their kids to the best private schools. That's how it is done.

Hereditary privilege had actually nothing to do with Watts. I speak with some authority – I was there with the California Army National Guard. Blacks had long chafed under the regime of police chief William Parker. The civil rights movement had given them unfulfilled hopes. A habitual criminal named Marquette Frye fought back during a traffic stop. The community supported him against the cops and started a riot. 34 were killed.

Lewontin writes, essentially correctly, about psychometricians:

" This is the explanation offered by the mental testing movement, whose basic argument can be summarized in a set of six propositions that, taken as a whole, form a seemingly logical explanation of social inequality. These are:

- There are differences in status, wealth, and power. (Nobody would disagree, but it takes up Marxist like Lewontin to bring it up)
- These differences are consequences of different intrinsic ability, especially different "intelligence."
- IQ Tests are instruments that measure this intrinsic ability.
- Differences in intelligence are largely the result of genetic differences between individuals.
- Because they are the result of genetic differences, differences in ability are fixed and unchangeable.
- Because most of the differences between individuals in ability are genetic, the differences between races and classes are also genetic and unchangeable."

"While the argument begins with an undoubted truth that demands explanation, the rest is a mixture of factual errors and conceptual misunderstandings of elementary biology." So says Lewontin

I the reviewer say that IQ tests say nothing about social class. The differences between races are not categorical, but rather differences in average intelligence. As Lewontin points out elsewhere, the variation within a population exceeds the differences between population averages. There are smart and dumb people in every group. But the group averages are rather far apart. Some American Blacks will be smarter than the average Ashkenazi Jew, it is true, but only about 3%. The generalization that Lewontin's unenlightened ancestors might have made about the "schwartzers" was pretty much true.

Lewontin writes: "The purposes of Alfred Binet, who in 1905 published the first intelligence test, seem to have been entirely benign. The practical problem to which Binet addressed himself was to devise a brief testing procedure that could be used to help identify children who, as matters then stood, could not profit from instruction in the regular public schools of Paris. The problem with such children, Binet reasoned, was that their "intelligence" had failed to develop properly. The intelligence test was to be used as a diagnostic instrument. When the test had located a child with deficient intelligence, the next step was to increase the intelligence of such a child. That could be done, in Binet's view, with appropriate courses in "mental orthopedics." The important point is that Binet did not for a moment suggest that his test was a measure of some "fixed" or "innate"

characteristic of the child. To those who asserted that the intelligence sits individual is a fixed quantity that one cannot augment, Binet's response was clear: "We must protest and react against this brutal pessimism.""

This reviewer's response is that Binet's opinion on the subject could be no better informed than the science of his time. His belief that intelligence could be improved persisted for the next eight decades, including with the implementation in the United States of the Head Start program.

A major impetus for this book of Lewontin's, and Stephen Jay Gould's "Missmeasure of Man" was Arthur Jensen's 1969 article entitled "How Much Can We Boost IQ and Scholastic Achievement?" Up until that point most researchers had held with what is called the Standard Social Science Model, propounded by Watson and Skinner at Harvard. The SSSM put forth the argument defended by Lewontin that differences among people who caused by environment.

In this argument, therefore, Lewontin is supporting the long-held establishment position against the new science advocated by Jensen, Eysenk, Lynn, Flynn, Hunt and many others. A lot of social policy both in the USSR and the West was founded on the SSSM.

Lewontin writes: "The basic principle of Binet's test was extraordinarily simple. With the assumption that the children to be tested had all shared a similar cultural background, Binet argued that older children should be able to perform mental tasks that younger children could not. To put matters very simply, *we* do not expect the average 3-year-old to be able to recite the names of the months, but we do expect a normal 10-year-old to be able to do so. Thus, a 10-year-old who cannot recite the months is probably not very intelligent, while a 3-year-old who can do so is probably highly intelligent. "

"What Binet did, quite simply, was to put together sets of "intellectual" taslcs appropriate for each age of childhood. There were, for example, some tasks that the average 8-year-old could pass, but which were too difficult for the average 7-I'm year-old and very easy for the average 9-year-old. Those tasks defined the "mental age" of eight years. The intelligence of a child depended upon the relation his or her mental and chronological ages bore to each other. The child whose mental age was higher than his or her chronological age was 'bright" or accelerated, and the child whose mental age was lower than his or her chronological

age was "dull" or retarded. For most children, of course, the mental and chronological ages were the same. To Binet's satisfaction, the mental ages of children in a school class, as measured by his test, tended to correspond with teachers' judgment about which children were more or less "intelligent." That is scarcely surprising, since for the most part Binet's test involved materials and methods of approach similar to those emphasized in the school system. When a child lagged behind its age-mates by as much as two years of mental age, it seemed obvious to Binet that remedial intervention was called for. When two Belgian investigators reported that the children whom they had studied had much higher mental ages than the Paris children studied by Binet, Binet noted that the Belgian children attended a private school and came from the upper social classes. The small class sizes in the private school, plus the level of training given in a "cultured" home, could explain, in Binet's view, the higher intelligence of the Belgian children."

This reviewer writes: Binet was not the leading intelligence researcher of the time. That would probably have been Charles Spearman, who coinvented the field of statistics. Binet's opinions were only speculation. Other speculations differed. Binet did not live to see the speculations verified one way or the other.

"The translators and importers of Binet's test, both in the United States and in England, tended to share a common ideology, one dramatically at variance with Binet's. They asserted that the intelligence test measured an innate and unchangeable quantity, fixed by genetic inheritance. When Binet died prematurely in 1911, the Galtonian eugenicists took clear control of the mental testing movement in the English-speaking countries and carried their determinist principles even further. The differences in measured intelligence not just between individuals but between social classes and races were now asserted to be of genetic origin. " The test was no longer regarded as a diagnostic instrument, helpful to educators, but could identify the genetically (and incurably) defective, those whose uncontrolled breeding posed a "menace ... to the social, economic and moral welfare of the state." 4 When Lewis Terman introduced the Stanford-Binet test to the United States in 1916 he wrote that a low level of intelligence is very common among Spanish-Indian and Mexican families of the Southwest and also among negroes. lheir dullness seems to be racial, or at least inherent in the family stocics from which they come.... The writer predicts that ... there will be discovered enormously significant racial differences in general intelligence, differences which cannot be wiped out by any scheme of mental culture. Children of this group should be segregated in special classes.... They cannot master abstractions, but they can often be made efficient workers.... There is no possibility at present of convincing society that they should not be allowed to reproduce, although from a eugenic point of view they constitute a grave problem because of their unusually prolific breeding. "

This reviewer writes: Lewontin absolutely confounds cause-and-effect, in contradiction to the six points he lays out at the beginning of the article. Spearman, Fisher, Thorndike, Terman and the other early intelligence researchers would have asserted that social class was a result of intelligence rather than the other way around. Intelligent being hereditary, smart parents usually sired children capable of maintaining their parents station in life. This was not always the case. Galton's book "Hereditary Genius" coined the phrase "regression to the mean" to explain the fact that the children would probably not be as smart as the parents.

This reviewer writes: Terman lacked the tools to fully examine his thesis. Statistics was a new science, the test instruments were new and unreliable, and not enough had been given to validate the tests. A half-century later, as Lewontin was writing, this had all been done and Terman was proved to be substantially right.

"Though Terman's Stanford-Binet test was basically a translation of Binet's French items, it contained two significant modifications. First, a set of items said to measure the intelligence of adults was included, as well as items for children of different ages. Second, the ratio between mental and chronological age, the "intelligence quotient," or ftrwas now calculated to replace the simple statement of mental and chronological ages. The clear implication was that the IQ Afficed by the genes, remained constant throughout the individual's life. "The fixed character of mental levels" was cited by another translator of Binet's test, Henry Goddard, in a 1919 lecture at Princeton University, as the reason why some were rich and others poor, some employed and other unemployed. "How can there be such a thing as social equality with this wide range of mental capacity? ... As for an equal distribution of the wealth of the world, that is equally absurd." 6

The reviewer writes: Because intelligence does not change but in adulthood, a different measure was required. Psychometricians established the scale of IQ scores by working backwards. They administered their tests to large populations of subjects and mapped the results into a Gaussian curve (the bell curve).

In other words, by definition rather than by observation, half of the population has an IQ of below 100, roughly 1/6 of the population has an IQ below 85 and another 1/6 above 115. Lewontin neglects to mention that IQ tests are re-centered periodically. The stated IQ of 100 from 1920 does not mean the same thing as a stated IQ of 100 today. According to Dutton

and Woodley of Menie actual IQs have been falling, perhaps as much as 15 IQ points by an invariant measure such as reaction time.

"The major translator of Binet's test in England was Cyril Burt, whose links to Galtonian eugenics were even more pronounced than those of his American contemporaries. Burt's father was a physician who treated Galton, and Galton's strong recommendations hastened Burt's appointment as the first school psychologist in the English-spealdng world. As early as 1909 Burt had administered some crudet ests to two very small groups of schoolchildren in the town of Oxford. The children at one school were the sons of Oxford dons, fellows of the Royal Society, etc., while children at the other school were the sons of ordinary townspeople. Burt claimed that the children from the higher-class school did better on his tests and that this demonstrated that intelligence was inherited. This scientifically stated conclusion, published in the 1909 British journal of Psychology, might have been predicted from Burt's handwritten entry, six years earlier, in his Oxford undergraduate notebook: The problem of the very poor— chronic poverty: Little prospect of the solution of the problem without the forcible detention of the wreckage of society or other preventing them from propagating their species."

The reviewer writes: As IQ testers were later to find out, they needed to include more variables in the regression. Malnourishment, a product of poverty, was certainly one of them. Poor kids suffer from dietary deficits as well as genetic deficits.

"Burt continued his eugenic researches into the inheritance of IQ until he died in 1971, Knighted by his monarch and bemedaled by the American Psychological Association. The masses of data that he published helped to establish the "eleven-plus" examination in England, linked to the postwar system of selective education. "Intelligence," Burt wrote in 1947, "will enter into everything the child says, thinks, does or attempts, both while he is at school and later on.... If intelligence is innate, the child's degree of intelligence is permanently limited." Further, "Capacity must obviously limit content. It is impossible for a pint jug to hold more than a pint of milk; and it is equally impossible for a child's educational attainments to rise higher than his educable capacity permits." 8 There could be no dearer statement of what had happened to Binet's test in the hands of the Galtonians. The test designed to alert educators that they must intervene with special educational treatment was now said to

measure "educable capacity." When a child did poorly in school, or when an adult was unemployed, it was because he or she was genetically inferior and must always remain so. The fault was not in the school or in the society, but in the inferior person."

The reviewer writes: Lewontin is substantially right. This is the conclusion. It is a pessimistic conclusion, but it has been exhaustively tested.

The interventions that do work, such as improving diet, have been done. Others such as improving the early childhood environment have been tried. Although they appear at first to raise intelligence, intelligence regrettably regresses to the level dictated by genetic inheritance by the time a child reaches adulthood.

The interventions to have social benefits, however. Well socialized, polite children will enjoy better success in life whatever their intelligence.

"The IQ Test, in practice, has been used both in the United States and England to shunt vast numbers of worldng-class and minority children onto inferior and dead-end educational tracks.* The reactionary impact of the test, however, has extended far beyond the dassroom. The testing movement was clearly linked, in the United States, to the passage, beginning in 1907, of compulsory sterilization laws aimed at genetically inferior "degenerates."

"The categories detailed included, in different states, criminals, idiots, imbeciles, epileptics, rapists, lunatics, drunkards, drug fiends, syphilitics, moral and sexual perverts, and "diseased and degenerate persons." The sterilization laws, explicitly declared constitutional by the U.S. Supreme Court in 1927, established as a matter of legal fact the core assertion of biological determinism: that all these degenerate characteristics were transmitted through the genes. When the IQ Testing program of the United States Army in World War I indicated that immigrants from Southern and Eastern Europe had low test scores, this was said to demonstrate that "Alpines" and Mediterraneans" were genetically inferior to "Nordics." The army IQjdata figured prominently in the public and congressional debates over the Immigration Act of 1924. That overtly racist act established as a feature of American immigration policy a system of "national origin quotas." The purpose of the quotas was explicitly to debar, as much as possible, the genetically inferior peoples of Southern and Eastern Europe, while encouraging

"Nordic" immigration from northern and western Europe. This tale has been told in full elsewhere. 9"

The reviewer writes: Psychometrics was still in its infancy during the First World War. The test instruments themselves included cultural biases such as those of Lewontin points out subsequently in this article. Psychometricians of the 1920s and 30s worked diligently to eliminate the biases. Raven's progressive matrices, introduced in the 1930s, was entirely symbolic with no language component. It was expressly designed to eliminate cultural bias, and it did.

An aside has been clarified since Lewontin's time is that the progressive matrices especially favored familiarity with standardized testing regimes. And, even the verbal tests gave experienced testtakers a bit of an advantage. The consensus among Psychometricians of today is that the countries of Europe have average IQs ranging from 103 in Finland down to the mid-90s around Greece. There is enough standard error and overlap that any rank ordering is subject to revision over time.

"Today many (if not most) psychologists recognize that differences in IQ between various races and/or ethnic groups cannot be interpreted as having a genetic basis. The obvious fact is that human races and populations differ in their cultural environments and experiences, no less than in their gene pools. There is thus no reason to attribute average score differences between groups to genetic factors, particularly since it is so obviously the case that the ability to answer the kinds of questions asked by IQ Testers depends heavily on one's past experience. Thus, during World War I, the Army Alpha test asked Polish, Italian, and Jewish immigrants to identify the product manufactured by Smith & Wesson and to give the nicluiames of professional baseball teams. For immigrants who could not speak English, the Army Beta test was designed as a "nonverbal" measure of "innate intelligence." That test asked the immigrants to point out what was missing from each of a set of drawings. The set included a drawing of a tennis court, with the net missing. The immigrant who could not answer such a question was thereby shown to be genetically inferior to the tennis-playing psychologists who devised such tests for adults."

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The reviewer writes: Lewontin writes of psychologists. These are the users of IQ tests. Certainly the Psychometricians who developed them would not agree with Lewontin's assertion above. Back to World War I again. Lewontin is beating a dead horse, a straw man. He was writing seven decades later, at which time cultural bias had been absent from the tests for four decades.

In another essay, Lewontin writes:

"How do we know that IQ tests measure "intelligence"? Somehow, when the tests are created, there must exist a prior criterion of intelligence against which the results of the tests can be compared. People who are generally considered "intelligent" must rate high and those who are obviously "stupid" must do badly or the test will be rejected. Binet's original test, and its adaptations into English, were constructed to correspond to teachers' and psychologists' a priori notions of intelligence. Especially in the hands of Terman and Burt, they were tinkered with and standardized so that they became consistent predictors of school performance. Test items that differentiated boys from girls, for example, were removed, since the tests were not meant to make that distinction; differences between social classes, or between ethnic groups or races, however, have not been massaged away, precisely because it is these differences that the tests are meant to measure."

The reviewer writes: Lewontin is being patently unfair. Psychometricians did their utmost to eliminate all biases in the test.

For a test to be useful it must be valid. It must have equal predictive ability for all groups being tested. What gets predicted?

- Educational attainment
- Earnings
- Avoiding legal problems
- Marital stability

All of these things correlate with IQ, and they do so reasonably consistently across different groups. The tests are valid.

Lewontin concerns itself only with the United States. IQ tests are administered all over the world, in countries with very different racial makeups and histories. They retain their predictive powers everywhere.

Lewontin writes:

"IQ Tests at present vary considerably in their form and content, but all of them are validated by how well they agree with older standards. It must be remembered that an IQ Test is published and distributed by a publishing company as a commercial item, selling hundreds of thousands of copies. The chief selling point of such tests, as announced in their advertising, is their excellent agreement with the results of the Stanford-Binet test. Most combine tests of vocabulary, numerical reasoning, analogical reasoning, and pattern recognition. Some are filled with specific and overt cultural referents: Children are asked to identify characters from English literature ("Who was Wilkins Mi-cawber?"); they are asked to make class judgments ("Which of the five persons below is most like a carpenter, plumber, and a bricklayer? i) postman, 2) lawyer, 3) truck driver, 4) doctor, 5) painter"); they are asked to judge socially acceptable behavior ("What should you do when you notice you will be late to school?"); they are asked to judge social stereotypes ("Which is prettier?" when given the choice between a girl with some Negroid features and a doll-like European face); they are asked to define obscure words (sudorific, homunculus, parterre). Of course, the "right" answers to such questions are good predictors of school performance."

The reviewer writes: Lewontin does not cite examples of the culturally biased tests. I have never seen them or heard of them elsewhere. These claims certainly deserved a footnote if they were to be believed.

"Other tests are "nonverbal'· and consist of picture explanations or geometric pattern recognition. All—and most especially the nonverbal tests—depend upon the tested person having learned the ability to spend long periods participating in a contentless, contextless mental exercise under the supervision of authority and under the implied threat of reward or punishment that accompanies all tests of any nature. Again, they necessarily predict school performance, since they mimic the content and circumstances of schoolwork."

The reviewer writes: Lewontin is talking about Raven's progressive matrices here. Schools administer standardized tests quite frequently. Very few of them are IQ tests. Children get used to the standardized testing regime, but it is unlikely that they would see progressive matrices often enough to develop strategies for solving them. Why, by the way, doesn't Lewontin inform his readers what he's talking about? Give examples?

"IQ Tests, then, have not been designed from the principles of some general theory of intelligence and subsequently shown

to be independently a predictor of social success. On the contrary, they have been empirically adjusted and standardized to correlate well with school performance, while the notion that they measure "intelligence" is added on with no independent justification to validate them. Indeed, we do not know what that mysterious quality "intelligence" is. At least one psychologist, E. G. Boring, has defined it as "what intelligence tests measure." 10 The empirical fact is that there exist tests that predict reasonably well how children will perform in school. That these tests advertise themselves as "intelligence" measures should not delude us into investing them with more meaning than they have."

The reviewer says: Lewontin is wrong. The people who developed tests are interested in how well they correlate with success in many realms in life, not just school.

Specifically, the military services in almost all countries use intelligence tests to determine how best to use the human raw material they receive as recruits. The most intelligent ones will typically be taught foreign languages and used as interpreters, or taught programming. The least intelligent soldiers become cooks and stevedores. There is a lower limit on the Armed Forces Vocational Aptitude Battery (AFVAB) below which they will simply not accept an enlistee. The training would cost more than the soldier would produce.

"The possibility of behavioral measurements rests upon certain basic underlying assumptions, which should now be clarified. First, it is assumed that it is possible to define, absolutely or operationally, a particular "quality" to be measured. Some such qualities, like height, are relatively unproblematic. To the question "How tall are you?" the answer in centimeters, feet, or inches is easy to give. To the question "How angry are you?" no such easy answer can be given. Anger has to be defined operationally, as, for instance, how often an individual placed in a given test situation and asked the question by the experimenter responds by hitting him on the nose. This is not a flippant example. "Aggression" in a rat is measured by putting a mouse in a cage with it and obsery ing the behavior and time taken for the rat to kill the mouse. Sometimes this is described under the name "muri-cidal" behavior in the literature, which presumably makes the experimenters happier that they are measuring something really scientific. Research in this area thus becomes forced into Boring's circularity: Intelligence "is" what intelligence tests measure."

The reviewer writes: This deserves more of the discussion. IQ tests measure g, or general intelligence. Psychometricians computed it as the combination of many factors, among them spatial intelligence, mathematical intelligence and verbal

intelligence. Those factors in turn may be made up of subfactors.

The key observation is that all of the factors generally covary – a high level of any one of them is a good predictor of a high level of all of them.

Lewontin seems to be purposefully obscure, avoiding the language of experts. I write this as a nonexpert. I am a computer guy with no PhD in anything.

"The "quality" is then taken to be an underlying object that is merely reflected in varying aspects of an individual's behavior under widely different circumstances. Thus "aggression" is what individuals express when a man beats his wife, pickets boycott scabs during a strike, teenagers fight after a football game, black Africans struggle for independence from their colonial masters, generals press buttons unleashing thermonuclear war, or America and the Soviet Union compete in the Olympic Games or the space race. The underlying quality is identical with that which underlies muricide in rats."

Lewontin is being cute here. Muricide is to mice as homicide is to humans.

"Second, it is assumed that the quality is a fixed property of an individual. Aggression and intelligence are seen not as processes that emerge from a situation and are part of the relationships of that situation, but rather exist like reservoirs each of defined amount, inside each of us, to be turned on or off. Instead of seeing the anger or aggression expressed in inner city riots as emerging from the interaction between individuals and their social and economic circumstances and as expressive of collective action—therefore a social phenomenon—the biological determinist argument defines inner city violence as merely the sum of individual units of aggressiveness. So psychosurgeons like Mark and Ervin call fora program of research to find and cure the physical lesions that cause urban ghetto riots (see Chapter 7)."

"Thus verbs are redefined as nouns; processes of interaction are reified and located inside the individual. Further, reified verbs, like aggression, are assumed to be rigid, fixed things that can be reproduci-bly measured. Like height, they will not vary much from day to day; indeed, if the tests designed to measure them show such variations they are regarded as poor tests. It is assumed not that the "quality" being measured is labile, but that our instruments need greater precision.

"Implicit in reification is the third and crucial premise of the mental testing movement. If processes are really things that are the properties of individuals and that can be measured by invariant objective rules, then there must be scales on which they can be located. The scale must be metric in some manner, and it must be possible to compare individuals across the scale. If one person has an aggression score of 100 and the next of 120, the second is therefore 20 percent more aggressive than the first. The fault in the logic should be clear: The fact that it is possible to devise tests on which individuals score arbitrary points does not mean that the quality being measured by the test is really metric. The illusion is provided by the scale. Height is metric, but consider, for instance, color. We could present individuals with a set of colors ranging from red to blue and ask them to rank them as 1 (reddest) to 10 (bluest). But this would not mean that the color rated 2 was actually twice as blue as the color rated 1. The ordinal scale is an arbitrary one, and most psychometric tests are actually ordinals of this sort. If one rat kills ten mice in five minutes, and a second rat kills twelve in the same time, this does not automatically mean that the second is 20 percent more aggressive than the first. If one student scores 80 in an exam and a second 40, this does not mean the first is twice as intelligent as the second."

The reviewer writes: There are invariant measures, such as reaction time. People's reaction times may vary by 20% to 30%. However, what people can do with their intelligence can simply not be measured linearly. It is a question of things one person can do that the other person can't.

Interesting that Lewontin mentions this. The acuity with which people can distinguish between different shades of color and different tones of sound correlate fairly highly with intelligence.. Nonetheless, the measure of interest – problem-solving ability – is not subject to a scaler measure. As I stated above, IQ scores are mapped to a Gaussian distribution. They have meaning only within the reference population on which the test was standardized.

Surmounting or disguising the scaling problem is integral to the grand illusion of psychometry. Individuals vary in height, and if heights for a hundred or so individuals drawn at random from a population are plotted, they will likely fall into the normal distribution, or bell-shaped curve. If the divisions in one's scale are very fine—say, inches—the bell curve is quite wide. If we had no measures less than feet, and we measured each individual to the nearest foot, the curve would be much narrower at the bottom. The vast majority of individuals in Western society would lie between the five- and six-foot measure. While we know the

relationship of inches to feet and could under appropriate circumstances convert from one scale to another, and we know when to use each, as when we are finding a pair of shoes that fit or deciding the best size to make a door opening, we do not know the comparable relationships between different ways of measuring aggression or intelligence. Which scale is chosen depends on whether one wants to make differences of scale appear large or small, and these decisions are those that psychometry arbitrarily makes. The decision that a "good" scale is one in which two-thirds of the population should lie within 15 percent of the mean score of the entire population—the famous normal distribution—is arbitrary, but its power is such that psychometrists chop and change their scales till they meet this criterion.

The reviewer writes: Lewontin is being silly. They don't chop and change their scales. They simply map the observed scores to the bell curve.

"Yet the power of the "norm," once established, is that it is used to judge individuals who have been located along its linear scale. Deviations from the norm are regarded with alarm. Parents. who are told that their child is two standard deviations from the norm on some behavioral score are led to believe that he or she is "abnormal" and should be adjusted in some way to psychometry's Procrustean bed. Psychometry, above all, is a tool of a conformist society that, for all its professed concern with individuals, is in reality mainly concerned to match them against others and to attempt to adjust them to conformity."

It is Lewontin who was introducing the emotionally charged language. By the very definition of the bell curve, individuals being tested are expected to deviate from the mean of 100. Moreover, by the very way the thing is defined, the numbers of people at each degree of deviation is predictable. Who they are is what the test determine.

The reviewer writes: This is silly Marxist talk. Conformist society? IQ tests are used worldwide.

"Pressure to conform to social norms, and institutions that propagate and reinforce these norms, are, of course, characteristic of all human societies. In advanced capitalist societies and today's state capitalist societies like the Soviet Union or those in Eastern Europe, the norm becomes an ideological weapon in own right, foreshadowed by Huxley's Brave New World and Orwell's 1984 but cloaked in the benign language of those who only wish to help, to advise, but not to control and manipulate. Let us be clear: norms are statistical artifacts; they are not biological realities. Biology is not committed to bell-shaped curves."

The reviewer writes: They are statistical artifacts that represent biological realities. Nobody deceives himself that a single two or three digit number can come anywhere near the findings the complexity of a human being.

It probably can tell you, however, whether that person can raise two to the seventh power in his head. That is a useful thing to know, but it is certainly not all there is to a known about that person.

Nonetheless, I wouldn't want to hire a programmer who could not perform that simple feat. And if he could, I wouldn't care what color he was.

"The claim that IQ Tests are good predictors of eventual social success is, except in a trivial and misleading sense, simply incorrect. It is true that if one measures social success by income or by what sociologists call socioeconomic status (SES)—a combination of income, years of schooling, and occupation—then people with higher incomes or higher SES did better on IQ Tests when they were children than did people with low incomes or low SES. For example, a person whose childhood IQ_was in the top 10 percent of all children is fifty times more likely to wind up in the top 10 percent of income than a childw hose IQ was in the lowest 10 percent. But that is not really quite the question of interest. What we really should ask is: How much more likely is a high-IQj:hild to wind up in the top 10 percent of income, all other things being equal, In other words, there are multiple and complex causes of events which do not act or exist independently of each other. Even where A loolcs at first sight as if it is the cause of B y it sometimes really turns out on deeper examination that A and B are both effects of some prior cause, C For example, on a worldwide basis, there is a strong positive relationship between how much fat and how much protein the population of a particular country consumes. Rich countries consume a lot of each, poor countries little. But fat consumption is neither the cause nor the result of eating protein. Both are the consequence of how mudi money people have to spend on food. Thus, although fat consumption per capita is statistically a predictor of protein consumption per capita, it is not a predictor when all other things are equal. Countries that have the same per capita income show no particular relation behveen average fat and average protein consumption, since the real causal variable, income, is not varying between countries."

”This is precisely the situation for IQ. performance and eventual social success. They go together because both are the consequences of other causes. To see this, we can ask how good a predictor IQjs of eventual economic success when we hold constant the person's family background and the number of years of schooling. With these constant, a child in the top 10 percent of IQhas only twice, not fifty times, the chance of winding up in the top 10 percent of income as a child of the lowest IQAgroup. Conversely, and more important, a child whose family is in the top 10 percent of economic success has a 25 times greater chance of also being at the top than the child of the poorest 10 percent of families, even when both children have average IQJ 1 Family background, rather than IQ^is the overwhelming reason why an individual ends up with a higher than average income. Strong performance on IQ Tests is simply a reflection of a certain ldnd of family environment, and once that latter variable is held constant, IQ becomes only a weak predictor of economic success. If there is indeed an intrinsic ability that leads to success, IQ Tests do not measure it. If IQ Tests do measure intrinsic intelligence as is claimed, then clearly it is better to be born rich than smart."

The reviewer writes: This need some footnotes. Where the studies?

”The next step in the determinist argument is to claim that differences between individuals in their IQ arise from differences in their genes. The notion that intelligence is hereditary is, of course, deeply built into the theory of IQ Testing itself because of its commitment to the measurement of something that is intrinsic and unchangeable. From the very beginning of the American and British mental testing movement, it was assumed that IQ_was biologically heritable.

"There are certain erroneous senses of "heritable" that appear in the psychometricans' writings on IQ^ mixed up with the geneticists' technical meaning of heritability, and which contribute to false conclusions about the consequences of heritability. The first error is that genes themselves determine intelligence. Neither for IQjior for any other trait can genes be said to determine the organism. There is no one-to-one correspondence between the genes inherited from one's parents and one's height, weight, metabolic rate, sickness, health, or any other nontrivial organic characteristic. The critical distinction in biology is between the phenotype of an organism, which may be taken to mean the total of its morphological,

physiological, and behavioral properties. It is the genotype, not the phenotype, that is inherited. The genotype is fixed; the phenotype develops and changes constantly. The organism itself is at every stage the consequence of a developmental process that occurs in some historical sequence of environments. At every instant in development (and development goes on until death) the ne. step is a consequence of the organism's present biological state, which includes both its genes and the physical and social environment in which it finds itself. This comprises the first principle of developmental genetics: that every organism is the unique product of the interaction between genes and environment at every stage of life. While this is a textbook principle of biology, it has been widely ignored in determinist writings. "In the actual race of life, which is not to get ahead, but to get ahead of somebody," wrote E. L. Thorndike, the leading psychologist of the first half of the century, "the chief determining factor is heredity."

"The second error—even if admitting that genes do not determine the actual developmental outcome—is to claim that they determine the effective limit to which it can go. Burt's metaphor of the pint jug that can hold no more than a pint of milk is a precise image of this view of genes as the determinants of capacity. If the genetic capacity is large, the argument runs, then an enriched environment will result in a superior organism, although in a poor environment the same individual will not show much ability. If the genetic capacity is poor, however, then an enriched environment will be wasted. Like the notion of the absolute determination of organisms by genes, this view of genetic "capacity" is simply false There is nothing in our knowledge of the action of genes that suggests differential total capacity. In theory, of course, there must be some maximum height, say, to which an individual could grow; but in fact there is no relationship between that purely theoretical maximum, which is never reached in practice, and the actual variations among individuals. The lack of relationship between actual state and theoretical ma.mum is a consequence of the fact that growth rates and growth maxima are not related. Sometimes it is the slowest growers that reach the greatest size. The proper description of the difference between genetic types is not in some hypothetical "capacity" but in the specific phenotype that will develop for that genotype as a consequence of some specific chain of environmental circumstances.

"Nor, of course does the phenotype develop linearly from the genotype from birth to adulthood. The "intelligence" of an infant is not merely a certain small percentage of that of the adult it will become, as if the "pint jug" were being steadily filled. The

process of growing up is not a linear progression from incompetence to competence: To survive, a newborn baby must be competent at being a newborn baby, not at being a tiny version of the adult it will later become. Development is not just a quantitative process but one in which there are transformations in quality—between sudding and chewing solid food, for instance, or between sensorimotor and cognitive behavior. But such transitions are not permitted in the rank-ordered view of the universe that determinism offers.

"The total variation in phenotype in a population of individuals arises from two interacting sources. First, individuals with the same genes still differ from each other in phenotype because they have experienced different developmental environments. Second, there are different genotypes in the population which differ from each other on the average even in the same array of environments. The phenotype of an individual cannot be broken down into the separate contributions of genotype and of environment, because the two interact to produce the organism; but the total variation of any phenotype in the population can be broken down into the variation between the average of the different genotypes and the variation among individuals with the same genotype. The variation between the average performance of different genotypes is called the genetic variance of the trait (that is, the aspect of the phenotype under study—eye color, height, or whatever) in the population, while the variation among individuals of the same genotype is called the environmental variance of the trait in the population. It is important to notice that the genetic and environmental variances are not universal properties of a trait but depend upon which population of individuals is being characterized and under which set of environments. Some populations may have a lot of genetic variance for a character, some only a little. Some environments are more variable than others.

"The heritability of a trait, in the technical sense in which geneticists understand it, is the proportion of all the variation of a trait in a population that is accounted for by the genetic variance. Symbolically,

genetic variance

Heritability = H = genetic variance - f environmental variance

"If the heritability is 100 percent, then all of the variance in the population is genetic. Each genotype would be phenotypically different, but there would be no developmental variation among individuals of the same genotype. If the heritability is zero, all of the variation is among individuals within a genotype, and there is no average variation from genotype to genotype. Characters like height, weight, shape, metabolic activity, and behavioral traits all have heritabilities below 100 percent. Some, like specific language spoken or religious and political affiliation, have heritabilities of zero. The claim of biological determinists has been that the heritability of IQs about 80 percent. How do they arrive at this figure,

"All genetic studies are studies of the resemblances of relatives. If a trait is heritable, that is, if different genotypes have different average performances, then relatives ought to resemble each other more closely than unrelated persons do, since relatives share genes from common ancestors. Brothers and sisters ought to be more like each other than aunts and nephews, who ought to be more similar than totally unrelated people. The standard measure of similarity between things that vary quantitatively is their correlation, which measures the degree to which larger values for one variable go together with larger values of a second variable, and smaller values with smaller values. The correlation coefficient, r, ranges from +1.0 for perfect positive correlation, through zero for no relationship, to —1.0 for perfect negative correlation. So, for example, there is a positive correlation between father's income and child's years of schooling. Richer fathers have better-educated children while poorer fathers have less-educated children, on the average. The correlation is not perfect, since some poor families produce children who go to graduate school, but it is positive. In contrast, in the United States there is a negative correlation between family income and the number of visits per year to hospital emergency rooms. The lower your income, the more likely you are to use the emergency room as a medical service instead of a private doctor.

"One important point about correlation is that it measures how two things vary together but does not measure how similar their average levels are. So the correlation between the heights of mothers and their sons could be perfect in that textbooks of statistics and quantitative genetics. Indeed, these theories are constantly put into practice by animal breeders who would be

unable to have their research reports published in genetics journals unless they adhered strictly to the standard methodological requirements. The record of psychometric observations on the heritability of IQ is in remarkable contrast. Inadequate sample sizes, biased subjective judgment, selective adoption, failure to separate so-called "separated twins," unrepresentative samples of adoptees, and gratuitous and untested assumptions about similarity of environments are all standard characteristics in the literature of IQ genetics. There has even been, as we shall see, massive and influential fraud. We will review in some detail the state of psychometric genetic observations—not simply because it calls into question the actual heritability of IQ but because it raises the far more important issue of why the canons of scientific demonstration and credibility should be so radically different in human genetics than in the genetics of pigs. Nothing demonstrates more dearly how scientific methodology and conclusions are ——————————shaped to fit ideological ends than the sorry story of the heritability of IQ.

The Cyril Burt Scandal

The cldearest evidence, by far, for the genetic determination of IQ was the massive life's work of the late Sir Cyril Burt. In 1969 Arthur Jensen quite correctly referred to Burt's work as "the most satisfactory attempt" to estimate the heritability of IQ. When Burt died, Jensen referred to him as "a born nobleman," whose "larger, more representative samples than any other investigator in the field has ever assembled" would secure his "place in the history of science." 13 Hans Eysendc wrote that he drew "rather heavily'· on Burt's work, citing "the outstanding quality of the design and the statistical treatment in his studies." 14

The Burt data seemed so impressive for a number of very good reasons. First, one of the simplest ways, at least in theory, of demonstrating the heritable basis of a trait is to study separated identical twins. The separated .n pairs have identical genes, and they are assumed not to have shared any common environment. Thus, if they resemble one another markedly in some respect, the resemblance must be due to the only thing they share in common: their identical genes. The largest

IQjtudy of separated identical twins ever reported, supposedly based on fifty-three twin pairs, was that of Cyril Burt. The IQ_

correlation of separated .n pairs reported by Burt was strilcingly high, more so than that reported in the three other studies of separated riAns. The most important aspect of Bures study, however, was that he alone had been able to measure quantitatively the similarity of the environments in which the separated twin pairs had been reared. The incredible (and convenient) result reported by Burt was that there was no correlation at all between the environment of the separated pairs.

Further, in order to fit a genetic model to IQjiata, it is necessary to know what the IQsorrelations are for a considerable number of types of relatives—some close and some not so close. Burt was the only investigator in history who daimed to have administered the same IQ_ test, ——————————in the same population, to the full gamut of biological relatives of all degrees of doseness. In fact, for some types of relatives (grandparent-grandchild, uncle-nephew, second cousin pairs), the IQ_correla-tions reported by Burt are the only such correlations ever to have been reported. The Burt correlations for all types of relatives corresponded

with remarkable precision to the values expected if IQAwere almost entirely determined by the genes.

The blunt fact is that Burt's data, which have played so important a role, were reported and published in what is clearly a truly scandalous and suspicious fashion. The implausibility of Bures daims should have been noted at once by any reasonably alert and conscientious scientific reader. To begin with, Burt never provided even the most elementary description of how, when, or where his "data" had been collected. The normal canons of scientific reporting were ignored entirely by Burt, and by the editors of the journals that published his papers. He never even identified the "IQjtest" he supposedly administered to untold thousands of pairs of relatives. Within many of his papers, even the sizes of his supposed samples of relatives were not reported. The correlations were given without any supporting details. The 1943 paper that first reported many of the correlations between relatives made only the following reference to procedural details: "Some of the inquiries have been published in LCC reports or

elsewhere;

but the majority remain buried in typed memoranda or degree theses." 15 Conscientious scientists usually do not refer interested readers to their primary sources and documentation in such a cavalier way. The reader should not be surprised by the fact that none of the London County Council reports, typed memoranda, or degree theses glancingly referred to by Burt have ever come to light.

The very few occasions when Burt made specific statements about his procedure should have provoked some doubts in his scientific readers. For example, in a 1955 paper Burt described the procedure by which he obtained IQ Test results for parent-child, grandparent-grandchild, uncle-nephew, etc. The IQjiata for children were supposedly obtained by revising (on the basis of teachers' comments) the results of unspecified IQ Tests given in school. But how did Burt obtain "IQs" for adults? He wrote: "For the assessments of the pare. we relied chiefly on personal intery iews; but in doubtful or borderline cases an open or a camouflaged test was employed." 16 That is, in measuring the "IQs" of adults Burt did not even claim to have administered an objective, standardized IQ Test. The IQjvas said to have been guessed at during an interview, The spectacle of Professor Burt administering "camouflaged" IQ Tests while chatting with London grandpare. is the stuff of farce, not of science. The correlations reported by Burt on

this claimed basis, however, were routinely presented as hard scientific truths in textbooks of psychology, of genetics, and of education. Professor Jensen referred to precisely this work as "the most satisfactory attempt' to estimate the heritability of IQ^When Burt's procedure was publicly criticized, Hans Eysenck was able to write in Burt's defense: "I could only wish that modern workers would follow his example." 17

The collapse of Burt's claims within the scientific community began when attention was drawn to some numerical impossibilities in Burt's published papers. 18 For example, Burt in 1955 daimed to have studied 21 pairs of separated identical twins and reported that, on some unnamed group test of intelligence, their IQcorrelation was .771. By 1958 the number of pairs had been increased to "over 30"; surprisingly, the IQcorrelation remained precisely .771. By 1966, when

the sample size had been increased to 53 pairs, the correlation was still exactly .771, This remarkable tendency for IQjcorrelations to remain identical to the third decimal place was also true of Burt's studies of nonseparated identical .n pairs; as the sample size increased progressively with time, the correlation failed to change. The same identity to the third decimal place was also true of IQcorrelations for other types of relatives published by Burt, as sample sizes increased (or in some cases decreased) over time. These and other characteristics indicated that, at the very least, Burt's data and claimed results could not be taken seriously. As one of us in 1974 concluded after surveying Burt's work: "The numbers left behind by Professor Burt are simply not worthy of our current scientific attention." 19

The scientific exposure of Burt prompted Professor Jensen to execute a brisk about-face. Two years earlier Jensen had described Burt as a born nobleman, whose large and representative samples had secured his place in the history of science. But in 1974 Jensen wrote, after citing the absurdities that critics had already documented, that Burt's correlations were "useless for hypothesis testing"—that is to say, worthless. 20 But Jensen maintained that Burt's work had merely been careless, not fraudulent; and he also maintained that the elimination of Burt's data did not substantially reduce the weight of the evidence demonstrating a high heritability of IQ/That incredible claim was made despite Jensen's earlier assertion that Burt's was "the most satisfactory attempt· to calculate the heritability of IQ^ 1

The argument over Burt's data might have remained a discreet IQAThe Rank Ordering of the World / 103

academic affair and might have tiptoed around the question of Burt's fraudulence were it not for the medical correspondent of the London Sunday Times, Oliver Gillie. Gillie tried to locate two of Burt's research associates, the Misses Conway and Howard, who had supposedly published papers in a psychological journal edited by Burt. According to Burt, they were responsible for the IQAtesting of the separated identical riAns, for the testing of other types of relatives, and tor much of Burt's published data analyses. But Gillie could uncover absolutely no documentary record of the cdstence of these research associates. They had not

been seen by, and were wholly unknown to, Burt's closest co-workers. When asked about them by his housekeeper, Burt had replied that they had emigrated to Australia or New Zealand, this at a time heforc, according to Burt's published papers, they were testing twins in England. Burt's secretary indicated that Burt had sometimes written papers signed by either Conway or Howard. These facts led Gillie to suggest, in a fro.-page article in 1976, that Conway and Howard may never have cdsted. 22 The article flatly accused Burt of perpetrating a major scientific fraud, a charge subsequently supported by two of Burt's former students, now themselves prominent psydiometricians, Alan and Ann Clarke.

The public exposure of Burt's fraudulence seemed to strike a raw hereditarian nerve. Professor Jensen wrote that the attack on Burt was designed "to wholly discredit the large body of research on the genetics of human mental abilities. The desperate scorched-earth style of criticism we have come to lcnow in this debate has finally gone the limit, with charges of 'fraud' and 'fakery' now that Burt is no longer here to ... take warranted legal action against such unfounded defamation.

" Professor Evsenck joined in by pointing out that Burt had been "knighted for

his services" and that the charges against him contained "a whiff of McCarthyism, of notorious smear campaigns, and of what used to be Icnown as character assassination." 24

The attempt to defend Burt by assaulting his critics soon collapsed. The eulogy at Burt's memorial service had been delivered by an ad-mirer, Professor Leslie I learnshaw, and had prompted Burt's sister, in 1971, to commission Hearnshaw to write a biography of her distinguished brother and to make Burt's private papers and diaries freely available to him. When the fraud charges exploded, 1 learnshaw wrote to the Bulletin of the British Psychological Society, indicating that he

would assess all the available evidence and warning that the charges of Burt's critics could not be lightly dismissed. This warning seems to have muted the tone of Burt's more militant hereditarian defenders. Thus, by 1978, Eysenck wrote of Burt: "On at least one occasion he invented, for the purpose of quoting it in one of his articles, a thesis by one of his students never in fact written; at the time I interpreted this as a sign of forgetfulness." 25

The Hearnshaw biography, published in 1979, has put to rest any lingering doubts about Burt's wholesale faking. 26 The painstaking searches and inquiries made by Hearnshaw failed to unearth any substantial traces of Miss Conway, or Miss Howard, or of any separated riAns. There were many instances of dishonesty, of evasion, and of contradiction in Burt's written replies to correspondents who had inquired about his data. The evidence made clear that Burt had collected no data at all during the last thirty years of his life, when, supposedly, most of the separated twins had been studied. With painful reluctance, Hearnshaw found himself forced to condude that the charges made by Burt's critics were "in their essentials valid." The evidence demonstrated that Burt had "fabricated figures" and had "falsified." There is now no doubt whatever that all of Burt's "data" on the heritability of IQmust be discarded. The loss of these incredibly clear-cut "data" has been devastating to the claim that a substantial IQ_ heritability was demonstrated.

But what are we to make of the additional fact that Burt's transparently fraudulent data were accepted for so long, and so uncritically, by the "experts" in the field? Perhaps the clearest moral to be drawn from the Burt affair was spelled out by N. J. Mackintosh in his review of the Hearnshaw biography in the British Journal of Psychology:

Ignoring the question of fraud, the fact of the matter is that the crucial evidence that his data on IQjire scientifically unacceptable does not depend on any examination of Burt's diaries or correspondence. It is to be found in the data themselves. The evidence was there ... in 1961. It was, indeed, dear to anyone with eyes to *see* in 1958. But it was n. seen until 1972, when Kamin first pointed to Burt's totally ——————————inadequate reporting of his data and to the impossible consistencies in his correlation coefficients. Until then the data were cited, with respect bordering on reverence, as the most telling proof of the heritability of IQTt is a sorry comment on the wider scientific community

that "numbers ... simply not worthy of our current scientific attention" ... should have entered nearly every psychological textbook. 27

We do not view the uncritical acceptance of Burt's data as an unusual or inexplicable "sorry comment on the wider scientific community?' The fraud perpetrated by Burt, and unwittingly propagated by the scientific community, served important social purposes. Professor Hearnshaw's biography essentially saves the face of psychometry by probing the individual psychology of Burt to ask why he should have been moved to such fraudulence. Burt, no longer a nobleman but now victim of a debilitating

and psychiatrically distressing disorder, has become the bad apple of psychometry. By 1980, when the British Psydiological Society was prepared to draw up its "Balance Sheet on Burt," 28 there had been a dosing of the ranks; the psychometric doyens reiterated their belief that, despite the eviction of Burt, the residual evidence for the heritability of intelligence was strong. The social function of IQJdeology was still dominant.

Separated Identical Twins

With Burt out of the way, there have in fact been three reported studies of the IQs^of separated identical twins. The largest study, by Shields in England, reported an I (^Acorrelation of .77. 29 The American study by Newman, Freeman, and Holzinger found a correlation of .67, 30 while a small-scale Danish study by Juel-Nielsen reported a correlation of .62. 31 Taken at face value, these studies would suggest a substantial heritability of IQJThere are many reasons, however, why they should not be taken at face value.

To begin with, it is obvious that the sample of "separated" identical riAns studied by psychologists must be highly biased. There pr.umably odst some pairs of identical twins who have been separated at birth and who do not know of one another's existence. These genuinely separated twins cannot, of course, respond to the appeals of scientists for separated twins to volunteer to be studied. The Shields study, for example, located its subjects by use of a television appeal. The "separated" twins located in this way in fact included 27 pairs in

which the two twins had been reared in related branch. of the same biological family. There were only 13 pairs in which the two

twins had been reared in

unrelated families. The most common pattern was for the biological mother to rear one of the twins, with the other twin being reared by the maternal grandmother or by an aunt.

From the raw data it can be calculated that the IQcorrelation of the 27 pairs reared in the same family network was .83, significantly higher than the correlation of .51 in the 13 pairs reared in unrelated families. This significant difference is obviously an environmental effect; recall that each twin pair was genetically identical. The data make dear that genetically identical twins reared in the same family network, and thus sharing similar environmental experiences, are much more alike than genetically identical twins reared in unrelated families. Further, it should not be supposed that the correlation of .51 observed among twins reared in unrelated families is unambiguous evidence for some heritability of IQ/The most common pattern, even among pairs reared in unrelated families, was for the mother to raise one twin while the other twin was raised by close family friends. There is thus no reason to assume that any of the Shields twins were reared in very different social conditions. We have no way of Icnowing what the IQcorrelation would be in a set of identical twins who had been separated at birth and randomly placed in two famili. randomly chosen from the full range of rearing environments provided by English society, but we can deduce that the correlation found in such a science-fiction experiment would be considerably less than .51, and it might in fact be zero.

The reader whose Icnowledge of separated twin studies com. only from the secondary accounts provided by textboolcs can have little idea of what, in the eyes of the original investigators, constitutes a pair of "separated" twins. To be induded in the Shields study, for example, it was only necessary that the two twins, at some time during childhood, had been reared in different homes for at least five years. The following examples, taken from Shields's case histories, are illuminating.

Jessie and Winifred had been separated at three months. "Brought up within a few hundred yards of one another,... told they

were twins after the girls discovered it for themselves, having gravitated to one another at school at the age of five.... They play together quite a lot.... J.sie often goes to tea with Winifred.... They were never apart,

wanted to sit at the same desk...." Ironically, the investigator who has supplied us with more than half the documented cases of "separated" twins here informs us that a separated pair of 8-year-olds "were never apart." The technical use of the word "separated" by the scientists of I(Lobviously differs from the usage of the same word by ordinary people. We might note, also, that Jessie and Winifred had been reared by unrelated'families. Presumably a twin pair reared by related families would be even less separated.

Bertram and Christopher had been separated at birth. "The paternal aunts decided to take one riAn eadi and they brought them up amicably, living next door to one another in the same Midlands colliery village.... They are constantly in and out of each other's houses." Odette and Fanny, on the other hand, had been separated only between the ages of three and eight. During that period they changed places every six months, one going to the mother, the other to the maternal grandmother. Benjamin and Ronald had been "brought up in the same fruit-growing village, Ben by his pare., Ron by the grandmother.... They were at school together.... They have continued to live in the same village." The twins were fifty-two years old when they traveled to London to be IQ Tested by Shields. Finally, consider Joanna and Isabel, aged fifty, who had been "separated from birth to five years" but who then "went to private school together."

The study of separated identical twins would be of theoretical value if it could be assumed that there was little or no systematic similarity between the environments in which pair members had been reared. Professor Burt, without providing any of the details, was indeed able to report that there was no correlation between the environments of his mythical separated pairs. The real-life case studies provided by Shields, however, make dear that in the actual world the environments of so-called

separated riAns have been massively correlated. That fact alone makes such studies virftially worthless for attempts to demonstrate the heritability of IQ^

The fatal flaw of highly correlated environments is obvious in all three of the studies of separated twins. Thus, in the American study of nineteen twin pairs by Newman et al., Kenneth and Jerry had been adopted by two different families.

———————————Kenneth's foster father was "a city fireman with a very limited education." Jerry's foster father, by contrast, was "a city fireman with only fourth-grade education... The two

boys had lived between the ages of five and seven in the same city in which their fathers worked but were said to be "unaware of the fact." Harold and Holden, another pair studied by Newman et al., had each been adopted by a family relative. They lived three miles apart and attended the same school.

The Juel-Nielsen study of twelve Danish pairs included Ingegard and Monika, each cared for by relatives until the age of seven. They then lived together with their mother until they were fourteen. "They were usually dressed alike and very often confused by strangers, at school, and sometimes also by their step-father.... The twins always kept together when children, they played only with each other and were treated as a unit by their environment... Remember that these and similar separated twin pairs are the bedrodc upon which the scientific study of the heritability of IQhas been based. The ludicrous shortcomings of these studies are obvious to the most naive of nonscientific eyes. Perhaps only a scientist caught up with an enthusiasm for an abstract idea and trained to accept the "objectivity" of numbers could take such studies seriously.

There are other severe problems with the separated twin studies, which have been documented in full elsewhere. 32 For example, in each study the usual procedure has been for the same investigator to administer the IQ Test to both members of a riAn pair. This violates the basic methodological requirement that sudi testing should be done "blind." That is, Twin B should be tested by a person who has no knowledge of Twin A's IQjscore; otherwise the administration and/or scoring of the test to Twin B may be biased by the tester's knowledge of Twin A's score. There is, in fact, suggestive evidence that such unconscious tester bias, a very common finding in research involving human subjects, has inflated the correlations reported in twin studies. Finally, we should note that the _____investigators in these studies have depended heavily on the verbal accounts of the volunteer riAns themselves to provide details about the conditions and duration of their separation. There is evidence that the twins sometimes tend romantically to

exaggerate the degree of their separation, and "facts" reported by the twins have sometimes been mutually contradictory. When all these problems are added to the overwhelming flaw of highly correlated environments, and when it is recalled that the apparently most impressive study has been unmasked as a fraud, it seems clear that the study of separated

_____ _____identical twins has failed to demonstrate a heritable basis for IQ Test scores.

Studies of Adopted Children

The fact that in ordinary families parents and children resemble one another ir1 IQdoes not in itself say anything about the

relative importance of heredity and environment. As should be clear by now, the problem is that the parent provides the child both with its genes and with its environment. The high-IQj>arent, who has transmitted his or her genes to a child, is also likely to provide that child with intellectual stimulation in the home and to stress the importance of doing good schoolwork. The practice of adoption makes possible, at least in theory, a separation of genetic from environmental transmission. The adoptive parent provides his or her child with an environment, while the genes, of course, come from the child's biological pare.. Thus, the I (^correlation between adopted child and adoptive parent has been of particular interest to investigators of IQheritability, especially when it is compared to other relevant IQcorrelations. The key question, as we shall see, is: To what other correlations can the correlation between adoptive parent and adoptive child be meaningfully compared,

Two early and influential studies of adoption by Burks 33 and Leahy 34 employed identical experimental designs. This "classical" design is schematically illustrated in Figure 5.1. First, Burks and Leahy calculated the IQcorrelation, in a set of adoptive families, between adoptive parents and adopted children. The correlation, taken to reflect the effects of environment alone, averaged out to a mere .15. That correlation was then compared to the correlation behveen biological parent and biological child observed in a "matched control group" of ordinary families. The latter correlation, presumed to reflect the effects of environment plus genes, averaged out to a full .48. The comparison between the

two correlations was said to demonstrate that, although environment plays some small role, heredity is far more import. as a determiner of IQ^

This comparison makes sense, however, only if we are willing to believe that the biological families used as control groups in these

figure 5.1 / The "classical" adoption design of Burks and Leahy. Note that correlations in two different, but supposedly matched, groups of families are compared. In the biological families, parent transmits environment plus genes to child.

Adoptive Parent

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Adopted Child

Biological Parent

Ex3

_____ _____C/5

a

a

Biological Child

studies were in fact meaningfully "matched" to the adoptive families. There are some obvious ways in which adoptive families must, as a group, differ from ordinary biological families. For one thing, all the adoptive parents, but not necessarily all the biological parents, actively wanted children. For another, adoptive parents, by law, are carefully screened by adoption agencies before they are allowed to adopt and therefore as a group tend to be especially suitable pare., although there are, of course, exceptions. They are selected as being emotionally stable, economically secure, not alcoholics, without criminal records, etc. Thus adoptive families generally provide much better than average environments for their children; as well, adoptive parents often have quite high IQj>cores as a consequence of their own childhood advantages. The key fact for present purposes is that there will be very little variation in the richness of the environments provided by adoptive parents. The necessary statistical consequence of this is that there cannot be a very high correlation between adopted children's IQand any environmental measure, such as the adoptive parents' IQ^Where environment does not vary, or varies very little, it cannot be systematically correlated with the child's IQJThe "matched" control groups of biological families, who have not been rigorously selected by adoption agencies, will doubtless exhibit more variation in the environments they provide for their children. That, of course, allows for a higher parent-child correlation in the biological families.

IQJThe Rank Ordering of the World / in

To be sure, Burks and Leahy each attempted to matdi their adoptive and biological families in at least some ways. The two groups of children had been matched for age and sex. The two types of families had been matched for parental occupation, for parental educational levels, and for "type of neighborhood." The adoptive pare., however, were considerably older than the control parents; they had tried to have their own biological child for some time before adopting. For obvious reasons, there were significantly fewer siblings in the adoptive than in the biological families. The income of the adoptive families turns out to have been 50 percent higher. The homes of the adoptive parents, with smaller families, were larger and 50 percent more expensive than those of the "matched" biological parents. Thus, despite apparently careful matching, these differences doubtless reflect the fact that adoptive parents as a group are relatively "successful" people. They make clear that adoptive and biological families cannot meaningfully be regarded as "matched" merely because they are comparable on a few rough demographic measures. There is clear evidence in the Burks and Leahy studies that the environments of the adoptive families were not only richer but also much less variable than the environments of the biological families. 35 These considerations mean that a comparison of correlations across the adoptive and biological families has no theoretical point.

There is, however, an obvious possible improvement on the "classical" design of Burks and Leahy, illustrated schematically in Figure 5.2, which avoids the impossible requirement of matching adoptive and biological families. There are many adoptive parents who, in addition to adopting a child, also have a biological child of their own. Thus, in a sample of sudi families, it is possible to correlate a parent's IQjvith the IQjrf (a) adopted child and (b) biological child. The two children, in such a comparison, have been reared in the same household by the same parents. To the extent that genes determine IQAthe correlation between parent and biological child should obviously be larger than that between parent and adoptive child. The parents in all such families have been carefully selected by adoption agencies; we therefore expect relatively little environmental variation and relatively small IQcorrelations between parent and child in such a study. The virtue of the new design, however, is that this should be true for both the adoptive and the biological correlations studied in the same group

figure 5.2 / The new adoption design of Scarr and Weinberg (1977) and of Horn et al., (1979). Note that only one set of families is involved, with each family containing both an adopted and a biological child. The parent transmits environment plus genes to the biologica4 child.

Adopted Child Biological Child

of families. There is plenty of room for any genetic effect to display itself in a higher correlation for the biological parent-child pairs.

Two recent studies have employed the new design: one in Minnesota in 1977 by Scarr and Weinberg 36 and one in Texas in 1979 by Horn, Loehlin, and Willerman. 37 The investigators in each case were behavior geneticists who clearly expected to discover evidence supporting a high heritability of IQ^

The results for mother-child pairings in both studies are as follows: The same mother's IQAremember, has been correlated with the IQof her adopted and of her biological child. There is no significant difference between the two correlations: In Texas the mother was a trifle more highly correlated with her adopted child, and in Minnesota with her biological child. The Minnesota study, it might be noted, was based upon transracial adoptions. That is, in almost all cases the mother and her biological child were both white, while her adopted child was black. The child's race, like adoptive status, had no effect on the degree of parent-child resemblance in Mese results appear to inflict fatal damage to the notion that IQjs highly heritable. Children reared by the same mother resemble her in IQj:o the same degree, whether or not they share her genes.

The results for father-child pairings are not so clear-cut. Though not statistically significant, they are more easily compatible with the notion that IQjriay be partly heritable. However, when we turn to the IQ_

table 5.1 / Mother-child IQ:correlations in adoptive families containing biological children.

	Texas Study	Minnesota Study
Mother X Biological Child	0.20 (N = 162)	0.34 (N = 100)
Mother X Adopted Child .	0.22 (N = 151)	0.29 (N = 66)

"N" refers to the number of mother-child pairings on which each tabled correlation is based. Texas study is Horn et al. (37); Minnesota study is Scarr and Weinberg (36).

correlations between the various types of siblings found in these families, they are again entirely inconsistent with the notion that IQJs significantly heritable. In these families there are some pairs of biological related siblings (the biological children of the adoptive parents); there are also genetically unrelated pairs of adoptive siblings (two children adopted by the same parent); finally, there are genetically unrelated pairs made up of a biological and an adoptive child of the same parents. The correlations

for all sibling types show no differences.

MZ Twins, DZ Twins, and Other Kinships

By far the most common type of heritability study involves comparing the two fundamentally different types of twins, monozygotic (MZ) and dizygotic (DZ). Remember that the MZ twins result from the fertilization of a single ovum by a single sperm. There is an extra split of the zygote early in development, resulting in the birth of two genetically identical individuals, always of the same sex and typically, but not always, strikingly similar in appearance. The DZ twins occur when two separate sperm fertilize two separate ova at about the same time. The mother gives birth to two individuals, but the two are no more alike genetically than are ordinary siblings. The DZ twins, like ordinary siblings, share on average about 50 percent of their genes.

They may be either of the same or of different sexes, and their physical resemblance is no greater than that of ordinary siblings.

The fact that MZ .ns are twice as similar genetically than are DZ hAns leads us to expect that, for any genetically determined trait, the correlation between pairs of MZ twins should be greater than that between pairs of same-sexed DZ twins. (We restrict the comparison to same-sexed DZs since all MZs are same-sexed, and sex might affect the trait in question.) The degree of heritability of a trait can in theory be estimated from the magnitude of the difference between the MZ and DZ correlations. With a very highly heritable trait, the MZ correlation should approach i.00, while the DZ correlation approaches .50. Put simply, MZ riAns should resemble one another in heritable traits much more than do DZ riAns. There have been many dozens of studies

comparing the IQcorrelations of MZ and DZ twins. With almost no exceptions, the studies demonstrate that the IQjrorrelation of MZs is considerably higher than that of DZs. Typically, correlations reported for MZs range between .70 and .90, compared to a range of .50 to .70 for same-sexed DZs.

Though hereditarians attribute this difference to the greater genetic similarity of MZs, there are also some obvious environmental reasons to expect higher correlations among MZ than among DZ twins, especially when one realizes the *degree* to which an MZ pair creates or attracts a far more similar environment than that experienced by other people. Because of their striking physical similarity, ——————————parents, teachers, and friends tend to treat them very much alike and often even confuse them for one another. MZ twins tend to spend a great deal of time with one another, doing similar things, mudi more so than is the case with same-sexed DZ twins, as established by many questionnaire studies. The MZ twins are much less likely to have spent a night apart from each other during childhood. The MZ riAns are more likely to dress similarly, to play together, and to have the same friends. When Smith questioned riAns, 40 percent of MZs reported that they usually studied together, compared to only 15 percent of DZs. 38 In an extreme example of this deliberate pattern, one of the most extraordinary social experiences of identical twins is the institution of the twin convention, to which identical hAns of all ages go, or are sent by their parents, dressed

identically, acting identically, to show off their identity, and, in a sense, to compete with other twins to see who can be the most "identical."

There is no great imagination required to *see* how such a difference between MZs and DZs might produce the reported difference in IQ_ correlations. It is entirely dear that the environmental experiences of MZs are much more similar than those of DZs.

Twin studies as a whole, then, cannot be taken as evidence for the heritability of IQAThey have been interpreted, of course, as if their proof were adequate, and hereditarian scholars have routinely ground out quantitative estimates of IQJieritability from the results of riAn studies. Claiming validity for such calculations can only be done by willfully ignoring the obvious fact that MZ and DZ twins differ in environment as well as in genetic similarity.

Heritability and Changeability

The careful examination of the studies of heritability of IQj:an leave us with only one conclusion: we do not know what the heritability of IQjreally is. The data simply do not allow us to calculate a reasonable estimate of genetic variation for IQ_in any population. For all we lcnow, the heritability may be zero or 50 percent. In fact, despite the massive devotion of research effort to studying it, the question of heritability of IQis irrelevant to the matters at issue. The great importance attached by determinists to the demonstration of heritability is a consequence of their erroneous belief that heritability means unchangeability. An American court recently ruled that an advertised cure for baldness was fraudulent on the face of it because baldness is hereditary. But this is simply wrong. The heritability of a trait only gives information about how much genetic and environmental variation odsts in the population in the current set of environments. ft has absolutely no predictive power for the result of changing the set of environments. Wilson's disease, a defect of copper metabolism, is inherited as a single gene disorder and is fatal in early adulthood. It is curable, however, by the administration of the drug penicillamine. IQAyariation could be 100 percent heritable in some population, yet a cultural shift could change everyone's performance on IQ Tests.

In fact, this is what happens in adoption studies: Even when adopted children are not correlated, parent by parent, with their adoptive parents, their IQj>cores as a group

resemble the adoptive parents as a group much more than they resemble their biological pare.. So, in an adoption study by Skodak and Skeels the mean IQof the adopted children was 117 while the mean IQ_ of their biological mothers was only 86. 39 A similar result was reported in a study of children in English residential nursery homes. 40 Children who remained in the homes had an average IQj)f 107, those adopted out of the homes an IQj)f 116, but those returned to their biological mothers, only 101. The most striking and consistent observation in adoption studies is the raising of IQ^irrespective of any correlation with adoptive or biological parents. The point is that adoptive parents are not a random sample of households but tend to be older, richer, and more anxious to have children; and, of course, they have fewer children than the population at large. So the children they adopt receive the benefits of greater wealth, stability, and attention. It shows in the children' test performances, which clearly do not measure something intrinsic and unchangeable.

The confusion of "heritable" with "unchangeable'· is part of a general misconception about genes and development. The phenotype of an organism is changing and developing at all times. Some changes are irreversible and some reversible, but these categories cross those of the heritable and nonheritable. The loss of an *eye,* an arm, or a leg is irreversible but not heritable. The appearance of Wilson's disease is heritable but not irreversible. The morphological defect that causes blue babies is congenital, nonheritable, irreversible under normal developmental conditions, but reversible surgically. The extent to which morphological, physiological, and mental characteristics do or do not change in the course of individual lifetimes and the history of the species is a matter of historical contingency itself. The variation from person to person in the ability to do arithmetic, whatever its source, is trivial compared to the immense increase in calculating power that has been put into the hands of even the poorest student of mathematics by the pocket electronic calculator. The best studies in the world of the heritability of arithmetic skill could not have predicted that historical change.

The final error of the biological determinists' view of mental ability is to suppose that the heritability of IQjvithin populations somehow explains the differences in test scores between races and classes. It is claimed that if black and working-class children

do worse on an aver-

age on IQ Tests than white and middle-class children and if the differences are greater than can be accounted for by environmental factors, the differences must be genetically caused. This is the argument of Arthur Jensen's Educability and Group Differences and Eysenck's The Inequality of Man. What it ignores, of course, is that the causes of the differences between groups on tests are not, in general, the same as the sources of variation within them. There is, in fact, no valid way to reason from one to the other.

A simple hypothetical but realistic example shows how the heritabil-ity of a.trait within a population is unconnected to the causes of differences between populations. Suppose one takes from a sack of open-pollinated corn two handfuls of seed. There will be a good deal of genetic variation between seeds in each handful, but the seeds in one's left hand are on the average no different from those in one's right. One handful of seeds is planted in washed sand with an artificial plant growth solution added to it. The other handful is planted in a similar bed, but with half the necessary nitrogen left out. When the seeds have germinated and grown, the seedlings in each plot are measured, and it is found that there is some variation in height of seedling from plant to plant within each plot. This variation within plots is entirely genetic because the environment was carefully controlled to be identical for all the seeds within each plot. The variation in height is then 100 percent heritable. But if we compare the two plots, we .11 find that all the seedlings in the second are much smaller than those in the first. This difference is not at all genetic but is a consequence of the difference in nitrogen level. So the heritability of a trait within populations can be 100 percent, but the cause of the difference between populations can be entirely environmental.

It is an undoubted fact that in the school population at large the IQ_ performance of blacks and whites differs on the average. Black children in the United States have a mean IQscore of about 85 as compared with 100 for the white population,

on which the test was standardized. Similarly, there is a difference in IQjm the average between social classes. The most extensive report on the relation between occupational dass and IQjs that of Cyril Burt, so it cannot be used, but other studies have found that the children of professional and managerial fathers score about 15 points higher on the average than children of unskilled laborers. Not uncharacteristically, Burt reported rather

larger differences. Is there any evidence that these race and class differences are in part a consequence of genetic differences between groups?

What Is Race?

Before we can sensibly evaluate claims of genetic differences in IQ_ performance between races, we need to look at the very concept of race itselfi What is really lcnown about genetic differences between what are conventionally thought of as human races?

Until the mid-nineteenth century, '·race" was a fuzzy concept that induded a number of lcinds of relationships. Sometimes it meant the whole species, as 'The human race"; sometimes a nation or tribe, as ··the race of Englishmen"; and sometimes merely a family, as "He is the last of his race." About all that held these notions together was that members of a "race" were related by ties of kinship and that their shared characteristics were somehow passed from generation to generation. With the rise to popularity of Darwin's theory of evolution, biologists soon began to use the concept of "race" in a quite different but no more ultimately

consistent way. ft simply came to mean "kind:· an identifi-ably different form of organism within a species. So there were light-bellied and dark-bellied "races" of mice, or banded- or unbanded-shell "races" of snails. But defining "races" simply as observable kinds produced two curious contradictions. First, members of different '·races" often existed side by side within a population. There might be twenty-five different "races" of beetles, all members of the same species, living side by side in the same local population. Second, brothers and sisters might be members of two different races, since the characters that differentiated races were sometimes influenced by alternative forms of a single gene. So a female mouse of

the light-bellied '·race" could produce offspring of both light-bellied and dark-bellied races, depending on her mate. Obviously there was no limit to the number of "races" that could be described within a species, depending on the whim of the observer.

Around 1940, biologists, under the influence of discoveries in population genetics, made a major change in their understanding of race. Experiments on the genetics of organisms taken from natural popula-

tions made it dear that there was a great deal of genetic variation between individuals even in the same family, not to speak of the same population. Many of the "races" of animals previously described and named were simply alternative hereditary forms that could appear within a family. Different local geographic populations did not differ from each other absolutely, but only in the relative frequency of different characters. So, in human blood groups, some individuals were type

A, some type B, some AB, and some O. No population was exclusively of one blood type. The difference between African, Asian, and European populations was only in the proportion of the four lcinds. These findings led to the concept of

"geographical race" as a population of varying individuals, freely mating among each other but different in average proportions of various genes from other populations. Any local random breeding population that was even slightly different in the proportion of different gene forms from other populations was a geographical race.

This new view of race had two powerful effects. First, no individual could be regarded as a "typical" member of a race. Textboolcs of anthropology would often show photographs of "typical" Australian aborigines, tropical Africans, Japanese, etc., listing as many as fifty or a hundred "races," each with its typical example. Once it was recognized that every population was highly variable and differed largely in average proportions of different forms from other populations, the concept of the type specimen" became meaningless. The second consequence of the new view of race was that since every population differs slightly from every

other one on the average, all local interbreeding populations are "races," so race really loses its significance as a concept. The Kikuyu of East Africa differ from the Japanese in gene frequencies, but they also differ from their neighbors, the Masai, and, although the extent of the differences might be less in one case than in the other, it is only a matter of degree. This means that the social and historical definitions of race that put the two East African tribes in the same "race" but put the Japanese in a different "race" were biologically arbitrary. How much difference in the frequencies of A,

B, AB, and 0 blood groups does one require before deciding it is large enough to declare two local populations are in separate ——————————— ———————————"races"?

The change in point of view among biologists had an eventual effect on anthropology in that about 40 years ago textbooks began to play

down the whole issue of defining races, but the changes in academic views have had little effect on everyday consciousness of race. We still speak casually of Africans as one race, Europeans as another, Asians as another, using distinctions that correspond to our everyday impressions. No one would mistake a Masai for a Japanese or either fora Finn. Despite variation from individual to individual within these groups, the differences between groups in skin color, hair form, and some facial features make them clearly different. What racists do is to take these evident differences and claim that they demonstrate major genetic separation between "races." Is there any truth in this assertion? Are the differences in skin color and hair form that we use to distinguish races in our everyday experience typical of the genetic differentiation between groups, or are they for some reason unusual?

We must remember that we are conditioned to observe precisely those features and that our ability to distinguish individuals as opposed to types is an artifact of our upbringing. We have no difficulty at all in telling individuals apart in our own group, but "they" all look alike. The question is, if we could look at a random sample of different genes, not biased by our socialization, how much difference would there be between major geographical groups, say between Africans and

Australian aborigines, as opposed to the differences between individuals within these groups? It is, in fact, possible to answer that question.

During the last forty years, using the techniques of immunology and of protein chemistry, geneticists have identified a large number of human genes that code for specific enzymes and other proteins. Very large numbers of individuals from all over the world have been tested to determine their genetic constitution with respect to such proteins, since only a small sample of blood is needed to make these determinations. About 150 different genetically coded proteins have been examined, and the results are very illuminating for our understanding of human genetic variation.

It turns out that 75 percent of the different kinds of proteins are identical in all individuals tested, regardless of population, with the exception of an occasional rare mutation. These so-called monomorphic proteins are common to all human beings of all races; the species is essentially uniform with respect to the genes that code them. The other 25 percent, however, are polymorphic proteins. That is, there exist two or more alternative forms of the protein, coded by alternative forms

of a gene, that are common but at varying frequencies in our species. We *can* use these polymorphic genes to ask how much difference there is between populations, as compared with the difference between individuals within populations.

An example of a highly polymorphic gene is the one that determines the ABO blood type. There are three alternative forms of the gene, which we will symbolize by A, B, and 0, and every population in the world is characterized by some particular mixture proportions of the three. For example, Belgians have about 26 percent A and 6 percent B; the remaining 68 percent is O. Among Pygmies of the Congo, the proportions are 23 percent A, 22 percent B, and 55 percent O. The frequencies can be depicted as a triangular diagram, as shown in Figure 5.3. Each point represents a population, and the proportion of each gene form can be read as the perpendicular distance from the point to the appropriate side of the

triangle. As the figure shows, all human populations are dustered fairly close together in one part of the frequency space. There are no populations, for example, with very high B and very low A and 0 (lower right-hand corner). The figure also shows that populations that belong to what we call major "races" in our everyday usage do not cluster together. The dashed lines have been put around populations that are similar in ABO frequencies, but these do not mark off racial groups. For example, the cluster made up of populations 2, 8,10,13, and 20 include an African, three Asian, and one European population.

A major finding from the study of such polymorphic genes is that none of these genes perfectly discriminates one "racial" group from another. That is, there is no gene known that is 100 percent of one form in one race and 100 percent of a different form in some other race. Reciprocally, some genes that are very variable from individual to individual show no average difference at all between major races. Table 5.2 shows the three polymorphic genes that are most different between "races" and the three that are most similar among the "races." The first column gives the name of the protein or blood group, and the second column gives the symbols of the alternative forms (alleles) of the gene that is varying. M the table shows, there are big differences in relative frequencies of the alleles of the Duffy, Rhesus, and P blood groups from "race" to "race," and there may be an allele like Fy b that is found only in one group, but no group is "pure" for any genes. In contrast,

figure 5.3 / A triallelic diagram of the ABO blood group allelle frequencies for human populations. Each point represents a population: the perpendicular distances from the point to the sides represent the allelle frequencies as indicated in the small triangle. Populations 1-3 are African, 4-7 are American Indians, 8-13 are Asians, 14-15 are Australian aborigines, and 16-20 are Europeans. Dashed lines enclose arbitrary dasses with similar gene frequencies, which do not correspond to the "racial" dasses. (jacquard, 1970.)

0

13

the Auberger, Xg, and Secretor proteins are very polymorphic within each "race,"

but the diff pi ll. It must be remembered that 75

percent of known genes in humans do not vary at all, but are totally monomorphic throughout the species.

Rather than picicing out the genes that are the most different or the most similar between groups, what do we see if we pick genes at random? Table 5.3 shows the outcome of such a random sample. Seven enz¯ymes known to be polymorphic were tested in a group of Europeans and Africans (actually black Londoners who had come from West Africa and white Londoners). In this random sample of genes there is a remarkable similarity between groups. With the exception

table 5.2 / Examples of extreme differentiation and close similarity in blood-group allele frequencies in three racial groups

Source: From a summary provided in L L Cavalli-Storza and W. F. Bodmer, 71&e Genetics of Human Populations (San Francisco: Freeman, 1971), pp. 724-31. See this source for information on other loci and for data sources.

of phosphoglucomutase-3, for which there is a reversal between groups, the most common form of each gene in Africans is the same form as for the Europeans, and the proportions themselves are very close. Such a result would lead us to conclude that the genetic difference between blacks and whites is negligible as compared with the polymorphism within each group.

The kind of question asked in Table 5.3 can in fact be asked in a very general way for large numbers of populations for about twenty genes that have been widely studied all over the world. Suppose we measure

table 5.3 / Allelic frequencies at seven polymorphic loci in Europeans and black Africans

EUROPEANS: AFRICANS:

deaminase

Source R. C. Lewontin, The Genetic Basis of Evolutionary Change (New York: Columbia Univ. Press, 1974). Adapted from H. Harris, The Principles of Human Biochemical Genetics (Amsterdam and London: North-Holland, 1970).

the variation among humans for some particular gene by the probability that a gene taken from one individual is a different alternative form (allele) than that taken from another individual at random from the human species as a whole. We can then ask how much less variation there would be if we chose the two individuals from the same "race." The difference between the variation over the whole species and the variation within a "race" would measure the proportion of all human variation that is accounted for by racial differences. In like manner we could ask how much of the variation within a "race" is accounted for by differences between tribes or nations that belong to the same "race," as opposed to the variation between individuals within the same tribe or nation. In this way we can divide the totality of human genetic variation into a portion between individuals within populations, between local populations within major "races,"

and between major "races." That calculation has been carried out independently **by three different groups of geneticists using slightly different data and** some-

what different statistical methods but w ith the identical result. Of all human genetic variation known for enzymes and other proteins, where it has been possible to actually count up the frequencies of different forms of the genes and so get an objective estimate of genetic variation. 85 percent turns out to be between individuals within the same

local population, tribe, or nation; a further 8 percent is between tribes or nations within a major "race": and the remaining - percent is between major "races." That means that the genetic variation between one Spaniard and another, or between one Masai and another, is 85 percent of all human genetic variation, while only 15 percent is accounted for by breaking people up into groups. If everyone on earth became extinct except for the Kikuyu of East Africa, about 85 percent of all human variability would still be present in the reconstituted species. A few gene forms would be lost—like the Fy b allele of the Duffy blood group that is known only in European, or the Diego blood factor known only in American Indians—but little else would be changed.

The reader will have noticed that to cam- out the calculation of partitioning variation between "races." some method must have been used for assigning each nation or tribe to a "race?' The problem of what one means by a "race" comes out forcibly when making such assignments. Are the Hungarians European? They certainly look like Europeans, vet they dike the Finns) speak a language that is totally unrelated to European languages and belongs to the Turkic family of languages from Central Asia. And what about the modem-day Turks? .Are they Europeans, or should they be lumped with the Mongoloids? And then there are the Urdu- and Hindi-spealcmg people of India. They are the descendants of a mixture of Aryan invaders from the north, the Persians from the west, and the Vedic tribes of the Indian subcontinent. One solution is to make them a separate race. Even the Australian aborigines, who have often been put to one side as a separate race, mixed with Papuans and with Polynesian immigrants from the Pacific well before Europeans arrived. No group is more hybrid in its origin than the present-day Europeans, who area mixture of Huns, Ostrogoths, and Vandals from the east. Arabs from the south, and Indo-Europeans from the Caucasus. In

practice, "raciar categories are established that correspond to major skin color groups, and all the borderline cases are distributed among these or made into new races according to the whim of the scientist. But it

turns out not to matter much how the groups are assigned, because the differences between major "racial" categories, no matter how defined, turn out to be small. Human "racial· differentiation is, indeed, only sldn deep. Any use of racial categories must take justifications from some other source than biology. The remarkable feature of human evolution and history has been the very small degree of divergence between geographical populations as compared with the genetic variation among individuals.

IQ_Differences Between Groups

The only way to answer the question of genetic differences in IQ_ between groups would be to study adoption across racial and class boundaries. Such studies are not easy to find, but the several that have been done all give the same result. In the study by Tizard 41 of black, white, and mixed-parentage children in English residential nurseries, using three preschool tests of mental performance, the differences were not larger than could be expected from statistical variations due to chance; but, taken at face value, blacks and mixed-parentage children did better than whites. Another relevant case is the comparison of the children of black and of white U.S. soldiers and German mothers who were left behind to be raised in Germany when their fathers returned home after the Occupation. Again, there is a small difference favoring the black children. Two studies comparing the amount of white ancestry of bladc children with their IQjcores found no correlation. On the other hand, a study of black children adopted by white families showed a much higher IQjthan for children in the general population, but within these adoptees, children of two black parents performed less well than when one of the biological pare. was black and one white. 42 In fact, this is the sum total of evidence on genetic differences between blacks and whites that makes any effort at all to separate the genetic from the social.

Like all the studies of the heritability of IQAthese five have more or ***less*** serious methodological problems, and no positive conclusions can be reached using them. The point is not that they prove a genetical identity between races, which they certainly do not, but that there is

-IQAThe Rank Ordering of the World / 127

no ———————————evidence for any genetic "difference in IQAscore. The first four studies, the only ones then available, were reviewed in a report that was meant to be the final judicious word from the American social science establishment, "Race Differences in Intelligence," under the auspices of the Social Sciences Research Council's Committee on Biological Bases of Social Behavior. 43 It is characteristic of the deep ideological commitment of American social science to a hereditarian point of view that the results were characterized as showing that

Observed average differences in the scores a members of different U.S. racial-ethnic groups on intellectual ability tests probably reflect in part inadequacies and biases in the tests themselves, in part differences in environmental conditions among the groups, and in part genetic differences among the groups.... A rather wide range of positions concerning the relative weight to be given to the three factors can reasonably be taken on the basis of the current evidence, and a sensible person's position might well differ for different abilities, for different groups, and different tests.

Precisely how a "sensible person" could reasonably take the position that the observed difference between U.S. racial-ethnic groups is partly genetic, on the basis of the evidence presented, we are not told. Nor is it revealed by this disingenuous summary that, where differences were seen in those observations, they were in favor of blacks.

The evidence on cross-dass adoptions is sparse. In one sense, adoption in general is cross-class because adopting parents as a group are richer, better educated, and older than the biological parents; and, as we have seen, adopted children have significantly raised IQs.

The study conducted in France by Schiff et al., 44 however, was designed especially to test the effect of dass. The investigators located thirty-two children who had been born to lower-worldng-class parents, but who had been adopted before six months of age by upper-middle-dass (or above) parents. They also located twenty biological siblings of the same children. These siblings had been reared by their own worlcing-class mothers. Thus, the two groups of siblings were

genetically equivalent but had experienced quite different sor. of environments. The adopted children, by school age, had an average IQ_ of in, 16 points higher than that of their stay-a-home siblings. Perhaps more important, 56 percent of the stay-at-homes had failed at least one

year in the French school system, compared to only 13 percent of the adopted children.

We should recall that the title of the article by A. R. Jensen that rekindled interest in the heritability and fixity of IQjvas "How Much Can We Boost IQjind Scholastic Achievement?" The answer, from cross-racial and cross-dass adoption studies, seems unambiguous: As much as social organization will allow. It is not biology that stands in our way.

CHAPTtft SIX

THE: DETthMttD PAThlAhCHY

". it a boy or a girl?" is still one of the first questions asked about any newborn infant. This question marks the beginning of one of the most important distinctions our culture makes between people, for whether a child is a boy or a girl is going to make a profound difference to its subsequent life. It will determine its life expectancy. On average, slightly more boys are born than girls; at all ages males have a somewhat greater chance of dying than females; in Britain and the United States at the moment the average male life expectancy is about 70 years, while that of females lbout 76. This means that most elderly people are women —more than three women to every man in the 85 + age group, for instance.

In Western society today, on average, men are taller and heavier than women. They have larger brains, compared to women, though not when considered in proportion to body weight. Men and women

show differential susceptibility to many diseases, quite apart from the obvious, reproductive ones: men suffer more frequently in our culture from a variety of circulatory and heart diseases and some cancers; women are more likely to be diagnosed as psychiatrically disturbed and to be drugged or institutionalized as a result. Men are physically stronger in terms of performance on the sports field or track. Even though a high proportion of women are in paid labor outside the home, the jobs they do tend to be different from those of men. Men are more likely to be cabinet ministers or parliamentarians, business executives or tycoons, Nobel Prize-winning scientists or fellows of academies, doctors or airline pilots. Women are more likely to be secretaries,

laboratory technicians, office cleaners, nurses, airline stewardesses, primary school teachers, or social workers.

And these differences in "chosen" profession are mirrored in school performance and the behavior of children at an early age. Boys play with cars and construction sets and cognitive board games; girls with dolls, shops, nurse's uniforms, and home cooking sets. Girls expect to be primarily homemakers, boys to be breadwinners. Fewer girls at school study technical subjects, science, or metalworlc; fewer boys study home economics. After adolescence, girls perform worse than boys at math.

All these are current "facts," objectively ascertainable statements about our present society at this time in history. Some are seemingly facts about biology, some about society, and some about both. But how are they to be understood? What are their irnplications, if any, for assessing the limits to social plasticity? More than almost any other social "fact" with which this book deals, "facts" about differences between men and women in society— gender differences—are seemingly naturalized as manifestations of essentially biological sex differences, so apparently obvious as to be beyond question. And indeed for many men, such assumptions—which imply that the current division of labor between the sexes in our society (a social division of labor) is merely a reflection of some underlying biological necessity, so that society is a faithful mirror of that biology—are extraordinarily convenient. 1

That we live in a society characterized by differences of status, wealth, and power between men and women is abundantly dear. just as contemporary Western society is capitalist in its form, so it is also

taller mothers had the taller sons and shorter mothers had the shorter sons, yet all the sons could be taller than all the mothers. Covariation is not the same as identity. The significance of this fact for the heritability of ICLand its meaning is considerable. Suppose a group of fathers had IQs^of 96, 97, 98, 99,100, 101, 102, and 103, while their daughters, separated from their fathers at birth and raised by foster parents, had IQsArespectively of 106,107,108, 109,110, in, 112, and 113. There is a perfect correspondence between the IQs^of fathers and daughters, and we might judge the character to be perfectly heritable because, knowing a father's IQ we could tell without error which of the daughters was his. The correlation is, in fact,

r = + 1.0, yet the daughters are ten points above their fathers in IQ^ so the experience of being raised by foster parents hada powerful effect. There is thus no contradiction between the assertion that a trait is perfectly heritable and the assertion that it can be changed radically by environment. As we shall see, this is not a hypothetical example.

Second, a correlation between two variables is not a reliable guide to causation. If A and B are correlated, one may be the cause of the other, they may both be the consequence of a common cause, or they may be entirely accidentally related. The number of cigarettes smoked per day is correlated with the chance of lung cancer because smoking is a cause of lung cancer. The floor area of a person's house and the average age to which he or she lives are positively correlated not because living in a big house is conducive to health but because both characteristics are a consequence of the same cause—high income. For that matter, the distance of the Earth from Halley's comet and the price of fuel are negatively correlated in recent years because one has been decreasing while the other increased, but for totally independent reasons.

In general, heritability is estimated from the correlation of a trait between relatives. Unfortunately, in human populations two important sources of correlation are conflated: Relatives resemble each other not only because they share genes but also because they share environments. This is a problem that can be circumvented in experimental organisms, where genetically

related individuals

can be raised in controlled environments, but human families are not rat cages. Parents and their offspring may be more similar than unrelated persons because they share genes but also because they share family environment, social class, education, language, etc. To solve this problem, human geneticists and psychologists have taken advantage of special circumstances that are meant to break the tie between genetic and environmental similarity in families.

The first circumstance is adoption. Are particular traits in adopted children correlated with their biological families even when they have been separated from them? Are identical (i.e. monozygotic, or one-egg) twins, separated at birth, similar to each other in some trait? If so, genetic influence is implicated. The second circumstance holds environment constant but changes genetic relationship. Are identical twins more alike than fraternal (i.e. &zygotic, or two-egg) twins? Are two

biological brothers or sisters (sibs) in a family more alike than two adopted children in a family? If so, genes are again implicated because, in theory, identical twins and fraternal twins have equal environmental similarity but they are not equally related genetically.

The difficulty with both these kinds of observations is that they only work if the underlying assumptions about environment are true. For the adoption studies to work, it must be true that there is no correlation between the adopting families and the biological families. There must not be selective placement of adoptees. In the case of one-egg and two-egg twins, it must be true that identical twins do not experience a more similar environment than fraternal twins. As we shall *see,* these problems

have been largely ignored in the rush to demonstrate the heritability of IQ^

The theory of estimating heritability 0 very well worked out. It is well known how large samples should be to get reliable estimates. The designs of the observations to avoid selective adoptions, to get objective measures of test performance without bias on the part of the investigator, to avoid statistical artifacts that may arise from unrepresentative samples of adopting families, are all well laid out in