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SAN JOSE STUDIES

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To our Readers

San Jose Studies, a journal sponsored by San Jose State University, publishes critical, creative, and informative writing of interest to the general, educated public. Our goals remain unchanged from the editorial statement appearing in our first issue in February 1975:

> We plan to publish articles which originate in the scholarly pursuit of knowledge but which appeal to every individual who possesses an interest in intellectual activities and ideas. Our projected audience, therefore, is the educated, literate reader who enjoys fairly erudite discussions of topics and ideas in the broad areas of the arts, humanities, sciences, and social sciences. In that respect, we intend *San Jose Studies* as a complement to the formal learning that goes on within the university classroom and as a factor in the "continuing education" of our readers.

SJS is now in its fourth year of publication with issues appearing annually in February, May, and November. Past issues have included articles on topics as diverse as Melville's "errors" in Billy Budd, Permian geologic provinces in the Western USA, archetypal themes in R. Crumb's comics, historical disputes about the Battle of Hastings, and the letters of William James (several published for the first time). Special issues have been devoted to John Steinbeck and to the American Bicentennial. Poetry, fiction, and photographic essays are also featured in most issues.

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ARTICLES

Between Utopia and Hades:

Should Mankind Steer Its Own Evolution?

Francisco J. Ayala

THE discovery of the evolution of man from nonhuman ancestors is perhaps the most important contribution of the natural sciences to the understanding of human nature. Man knows now that he was not always what he is now, that his biological nature has changed dramatically since the first humans came into existence a few million years ago.

Mankind's biological nature has not only evolved; it is still evolving. There is no basis to the claim sometimes made in popular writings that the biological evolution of mankind has stopped. The possibility also exists for mankind to direct its own evolution, to introduce human purposes and goals into the process by which human nature changes. Scientific discoveries in the fields of medicine, molecular biology, and genetics have provided an understanding of ways and means by which the constitution of mankind could be manipulated in an efficient and rapid manner.

I want to discuss in this paper the techniques that have been proposed to control and to direct the biological evolution of mankind. I will first enumerate the biological methods proposed; second, I shall consider whether these methods *can* be used, that is, whether the required biological know-how is indeed presently available; finally, I will raise the question whether the proposed methods *should* be used: numerous and difficult ethical, legal, religious, and socio-political issues are at stake. Before entering these matters, I shall briefly review the evolutionary history of mankind and the evidence showing that modern mankind continues to evolve biologically.

THE ORIGIN OF MANKIND

The species *Homo sapiens* is of very recent origin when placed on the geological time scale. Man is a newcomer to our planet. Life originated on the Earth more than 3,000 million years ago, perhaps as long as 4,000 million years ago. During the longer part of that time, life existed in the waters of the world, mostly in the seas, in the form of relatively very small organisms. The first vertebrates, animals with backbones, came into existence about 500 million years ago; they were aquatic animals. The first organisms to colonize the land were plants, but animals followed them soon thereafter – some 350 million years ago. The evolutionary line of descent giving origin to man separated from that leading to our closest animal relatives, the great apes, some 20 million years ago. The transition from ape to man occurred in tropical Africa between five and six million years ago. The Australopithecines, who appeared around that time, are early members of the family to which man belongs. Around three million years ago, the species *Homo habilis* evolved from *Australopithecus. Homo habilis* ("handy man") was a toolmaker whose fossil remains are often associated with primitive stone tools.

Between one million and five hundred thousand years ago, there lived on Earth members of the species *Homo erectus*. They were not only toolmakers, but the use of fire and cave shelters allowed them to extend their range beyond the tropics. Their fossil remains have been found in Java, China, Hungary, Algeria, and Tanganika. *Homo erectus* is the ancestral species of *Homo sapiens*, the taxonomic category to which modern man belongs.

Thus, the earliest organisms that may be called men, the Australopithecines, appeared on Earth some five million years ago. On the geological time scale, five million years is a very short period – about one thousandth of the time during which life has existed on our planet. Since it is difficult to think in terms of millions of years, it may be useful to transform the scale down to one year. Let us assume that it is now December 31st, midnight of an arbitrary year, and that life originated on January 1st. On this scale, the first vertebrates appear on November 15th, and the colonization of the land begins around November 25th; the lines of descent leading to man and to the apes separate on December 29th; the Australopithecines appear on December 31st at 1:00 pm; *Homo sapiens*, our own species, comes into existence on December 31st at 11:30 p.m.

The transition from early man, *Australopithecus*, to modern man, *Homo sapiens*, was accompanied by notable morphological, physiological, and behavioral changes. Some of the most remarkable changes occurred in the size, complexity, and functional properties of the brain. The Australopithecines of five million years ago walked fully upright but had small cranial capacities of about 500 cubic centimeters. Modern man has a cranial capacity of about 1400 cubic centimeters, nearly three times as large. By most evolutionary standards, that is a very fast rate of change. The genetic variants

responsible for larger brain size must have been strongly favored by natural selection. Yet, it is worth noticing that such a fast rate of change could not have been ascertained by an observer having information about the cranial capacity of men for only a few generations. The average rate of increase in brain size during the last five million years is about one cubic centimeter (or one thirtieth of an ounce) for every three hundred generations. To put it differently, if we assume the IQ of the Australopithecines to be 20 (the IQ of an "idiot") five million years ago, the increase in IQ has occurred at an average rate of about one IQ point every 3,000 generations. Small but sustained evolutionary changes can have dramatic effects over long periods of time.

BIOLOGICAL EVOLUTION IN MODERN MANKIND

The evolution of mankind, at least for the last few millennia, has been marked much more by cultural change than by biological change. Culture is a more rapid and versatile mode of adaptation than the biological mode. Yet, the superorganic has not annulled the organic: biological evolution continues in mankind, and it may be taking place at a faster pace than ever, precisely because it is fueled by cultural evolution. Cultural and biological evolution are mutually interrelated. The existence and development of human culture are possible only so long as the genetic basis of human culture is maintained or improved; there can be no culture without human genotypes. At the same time, cultural evolution is doubtless the most important source of environmental change promoting the biological evolution of man.

There is no basis to the claim sometimes made that the biological evolution of mankind has stopped. Mankind continues to evolve biologically because the necessary and sufficient conditions for biological evolution persist. These conditions are genetic variability and differential reproduction (natural selection). An immense wealth of genetic variation exists in mankind. Recent biochemical studies have shown that, on the average, a person is heterozygous at least at 6.7 percent of its genes. (An organism is heterozygous for a gene when the gene inherited from the father for a given trait is different from the gene inherited from the mother; for example, a person inheriting the gene for blue eye-color from one parent and the gene for brown eye-color from the other parent is heterozygous for the eye-color gene). If we assume that man consists of 100,000 pairs of genes (which may be approximately correct, although we are far from sure), a person would be heterozygous at 6,700 genes. Such a person can potentially produce $2^{6,700} = 10^{2,000}$ different kinds of sex cells ($10^{2,000}$ is one followed by two thousand zeroes). Even if we assume that the number of pairs of genes in man is only 10,000 (certainly an underestimate), the number of different kinds of sex cells that can be potentially produced by a person would be 10^{200}, a number immensely large: the number of atoms in the universe is 10^{70}, a very small number by comparison. It follows that, with the trivial exception of

twins developed from a single fertilized egg, no two people who live now, lived in the past, or will live in the future, are likely to be genetically identical. Such is the biological basis of human individuality.

Does natural selection continue to occur in modern mankind? Natural selection is simply differential reproduction of alternative genetic variants. Therefore, natural selection will occur in mankind if the carriers of some genetic constitutions are likely to leave more descendants than the carriers of other genotypes. Some writers have argued that due to the progress of medicine, hygiene, and nutrition, most people now survive beyond reproductive age, and thus that natural selection is hardly or not at all operating in modern mankind. But this claim is based on a misconception. Natural selection consists of two main components: differential mortality and differential fertility; both persist in modern mankind, although the intensity of selection due to postnatal mortality has been somewhat attenuated.

Death may occur between conception and birth (prenatal) or after birth (postnatal). The proportion of prenatal deaths is not well known (death during the early weeks of embryonic development may go totally undetected), but it is known to be substantial. Such deaths are often due to deleterious genetic constitutions, and thus they have a beneficial selective effect in the population. The intensity of this form of selection has not changed substantially in the recent past, although it has been slightly reduced with respect to a few genes such as those involved in Rh incompatibility.

Postnatal mortality has been considerably reduced in recent times, particularly in technologically advanced countries. For example, in the United States somewhat less than 50 percent of those born in 1840 survived to age 45, while it is estimated that more than 90 percent of those born in 1960 will survive to that age (Table 1). In other regions of the world, postnatal mortality remains quite high although there, also, it has generally decreased in recent decades. Postnatal mortality, particularly where it has been considerably reduced, is largely due to genetic defects, and thus it has a favorable selective effect in human populations. More than 2000 genetic variants are known which cause diseases and malformations in humans; such variants are kept at low frequencies due to natural selection.

It might seem at first that selection due to differential fertility has been considerably reduced as a consequence of the reduction in the average number of children per family taking place in many parts of the world during recent decades. However, this is not necessarily so. The intensity of fertility selection depends not on the *mean* number of children, but on the *variance* in the number of children. It is clear why this should be so. Assume that all people of reproductive age marry and that all have exactly the same number of children; then, there would not be fertility selection independent of whether couples had all very few or all very many children. Assume, on the other hand, that the mean number of children per family is low, but some couples have no children at all while others have many; then, there would be

TABLE 1

Percent of men and women surviving to age 15 and to age 45 among United States caucasians born between 1840 and 1960. The rate of mortality has steadily decreased during that time. The values for 1960 are projections.

	Surviving to Age 15		Surviving to Age 45	
Year of Birth	Men	Women	Men	Women
1840	62.8	66.4	48.2	49.4
1880	71.5	73.1	58.3	61.1
1920	87.6	89.8	79.8	85.8
1960	96.6	97.5	92.9	95.9

TABLE 2

Mean number of children per family and opportunity for fertility selection in various human populations. I_f is the "index of opportunity for selection due to fertility," which is calculated as the variance divided by the square of the mean number of children. The opportunity for selection usually increases as the mean number of children decreases.

Human Population	Mean No. of children	I_f
Rural Quebec, Canada	9.9	0.20
Gold Coast, Africa	6.5	0.23
New South Wales, Australia (1898-1902)	6.2	0.42
United States, women born in 1839	5.5	0.23
United States, women born in 1871-1875	3.5	0.71
United States, women born in 1928	2.8	0.45
United States, women born in 1909	2.1	0.88
United States, Navajo Indians	2.1	1.57

considerable opportunity for selection – the genotypes of parents producing many children would increase in frequency at the expense of those having few or none. Studies of human populations have shown that the opportunity for natural selection often increases as the mean number of children decreases (Table 2). Therefore, there is no evidence that natural selection due to fertility has decreased in modern human populations.

It may be that natural selection will decrease in intensity in the future, but it will not disappear altogether. So long as there is genetic variation and the carriers of some genotypes are more likely to reproduce than others, natural selection will continue operating in human populations. Cultural changes, such as the development of agriculture, migration from the country to the cities, environmental pollution, and many others, create new selective pressures. The pressures of city life are no doubt partly responsible for the high incidence of mental disorders in certain human societies. The point to bear in mind is that human environments are changing faster than ever owing precisely to the accelerating rate of cultural change; and environmental changes create new selective pressures thereby fueling biological evolution.

THE BIOLOGICAL FUTURE OF MANKIND

Where is human evolution going? Biological evolution is directed by natural selection, which is not a benevolent force guiding evolution toward some success. Natural selection is a process bringing about genetic changes that often appear purposeful because they are dictated by the requirements of the environment. The end result may, nevertheless, be extinction – more than 99.9 percent of all species which ever existed have become extinct. Natural selection has no purposes; man alone has purposes and he alone can introduce them into his evolution. No species before mankind could select its evolutionary destiny; mankind possesses techniques to do so, and more powerful techniques for directed genetic change are becoming available. Because we are self-aware, humans cannot refrain from asking what lies ahead, and because we are ethical beings we must choose between alternative courses of action, some of which may appear as good, others as bad.

The argument is frequently advanced, most often in popular writings and lectures, that the biological endowment of mankind is rapidly deteriorating owing precisely to the improving conditions of life and to the increasing power of modern medicine. The detailed arguments that support this contention are complex and involve some mathematical exercises, but their essence can be simply presented. Genetic changes, technically called mutations, arise spontaneously in man as well as in other living species. The great majority of newly arising mutations are harmful to their carriers. In a human population under the so-called "natural" conditions, that is, without the intervention of modern medicine and technology, the newly arising harmful mutations are eliminated from the population more or less rapidly depending

upon how harmful they are. The more harmful the effect of a mutation, the more rapidly it will be eliminated from the population by the process of natural selection. However, owing to medical intervention, the elimination of some harmful mutations from the population is no longer taking place as rapidly and effectively as it did in the past.

Let us consider an example. Retinoblastoma is a cancerous disease caused by the presence of a mutant gene. The unfortunate child carrying this gene develops during infancy a tumorous growth which starts in one eye, and rapidly extends to the other eye and then to the brain causing death before puberty. Surgical treatment makes it now possible to save the life of the child if the condition is detected sufficiently early, although usually one eye at least is lost. The treated person can live a more or less normal life, marry, and procreate. However, one half of his progeny will, on the average, be born with the same genetic condition and will have to be treated. Before modern medicine, every mutation for retinoblastoma arising in the human population was eliminated from the population in the same generation owing to the death of its carrier. With surgical treatment, the mutant gene can be preserved and new mutations arising in each generation are added to those arisen in the past.

There are many deleterious hereditary conditions, the manifestations of which can now be totally or partially cured, and their number is increasing at a fast rate. Another well known example is phenylketonuria (PKU), requiring a very careful diet to prevent its devastating effects on the mental and physical health of its carriers. The carriers of these hereditary diseases now survive and may produce offspring, thus transmitting their infirmities to the following generations. The more hereditary diseases and defects are cured today, the more of them will be cured in the succeeding generations.

To understand better the situation, it must be pointed out that the proportion of individuals affected by any one serious hereditary infirmity is relatively small. For instance, about two out of every 100,000 newborn children will suffer from retinoblastoma; and this is probably a typical figure for mutation rates to hereditary conditions causing death of their carriers before adulthood. There are, however, many such hereditary ailments, which on the aggregate make the problem very serious. More than two thousand serious physical infirmities determined by genes are now known. These include metabolic disorders like phenylketonuria; defects of the skin, the skeleton, the blood and vascular systems; defects of the muscular system (like muscular dystrophy, which affects about one out of every thousand persons in the United States), and so on. When all these hereditary ailments are considered together, the proportion of persons born who will suffer from a serious handicap during their lifetimes owing to their heredity is more than two percent of the total population. Some 70 million children are born in the world each year; about one million and a half of them carry hereditary conditions determining serious handicaps to their physical health.

The problem becomes more serious when mental defects are taken into consideration. About four per cent of the population are affected by schizophrenia or a related condition known as schizoid disease, ailments which may be caused by a single mutant gene. Another three per cent or so of the population suffers from mild mental retardation (IQ below 70) – a condition determined polygenetically, that is, by the interaction of multiple genes. Probably more than 200 million people in the world suffer from mental impairments caused by the genetic endowment they inherited from their parents.

Temperamentally, I am not a prophet of doom, but problems are not solved by ignoring them. The incidence of severe hereditary ailments is not increasing as rapidly as some have claimed. The number of genetically determined conditions that can be cured at present is not very large. But every day we are learning to cure new ones, and each of these cures contributes to the further genetic deterioration of man. Is it possible to stop, or to reverse, this process of decay? Can we improve the hereditary endowment of mankind?

POSITIVE AND NEGATIVE EUGENICS

Although the rate of genetic deterioration of mankind is not as large as some have claimed, there is little doubt that progress in health care entails increases in the frequency of deleterious genes in human populations. How can this process of genetic decay be stopped, or reversed?

Eugenics is the science and practice seeking to improve the genetic endowment of mankind. Two kinds of eugenics may be distinguished: positive and negative; *negative eugenics* is concerned with avoiding the spread of undesirable genes, while *positive eugenics* seeks the multiplication of desirable ones. Eugenics is a matter fraught with socio-political and ethical implications; we shall have to deal with such implications and will thus be moving out of scientific ground.

Methods proposed to improve the genetic endowment of mankind may be classified into four categories; the first two are primarily methods of negative eugenics, the other two of positive eugenics.

1. **Genetic counseling**, which is becoming increasingly practiced in the United States and other countries. Prospective parents are informed about the genetic nature of a given condition, which may be known to exist in one of them or in their families, and about the chances of its transmission to their offspring. So advised, the prospective parents may choose not to have a child or may take their chances on a normal child. Genetic counseling can be supplemented with amniocentesis: a sample of the amniotic fluid surrounding the fetus inside the mother's womb is obtained and examined for chromosomal and other genetic abnormalities. The prospective mother can be informed whether or not the fetus carries a certain genetic defect, and she may choose to have an abortion if such is the case.

The body politic could pursue a genetic program based on genetic counseling, amniocentesis, and abortion. Financial incentives, sterilization, and other coercive measures could be used to restrict carriers of unwanted genetic traits from procreating.

2. **Genetic surgery** (also called "genetic engineering" and "genetic therapy"). This refers to the direct manipulation of the genetic material. Consider, for example, sickle-cell anemia, a condition caused by the substitution of a single component in the gene coding for the beta chain of hemoglobin; the abnormal component could be replaced by the normal one or the whole defective gene (or segment thereof containing the abnormal nucleotide) could be replaced by a normal one. Directed mutation and certain techniques known as "transformation," "transduction," and "recombinant DNA" could be the methods to achieve the desired genetic change.

3. **Germinal selection**, a technique ardently proposed by the eminent geneticist and Nobel laureate H. J. Muller (1890-1967). The technique involves the extensive use of sperm and egg cells from individuals with desirable genetic constitutions through artificial fertilization; the frequency of the genetic variants possessed by such individuals would greatly increase in the population.

Muller's plan begins with the establishing of sperm banks for storing the seminal fluid of men of great achievement; this semen could be made available to any woman who would prefer to have a child fathered by a great man rather than by her husband or lover. Through artificial insemination, millions of women could be fertilized with the seminal fluid of a few eminent men. But Muller suggests going further: women produce some 500 eggs each through their lifetime; they can have only a few children because of the long nine-month pregnancies. Women of great excellence could be selected, their eggs flushed out and preserved under physiological conditions until requested by a prospective mother. A married couple could then select the genetic mother as well as the genetic father of their child: eggs fertilized in a test tube would be implanted in the prospective mother and allowed there to develop in the old-fashioned way.

4. **Cloning** (or "twinning") would ensure that a child be a true genetic copy of another individual. Cloning has been practiced with some success in frogs and toads by removing the nucleus from an unfertilized egg and replacing it with the nucleus of a somatic cell (which contains the same two full complements of genes and chromosomes as a fertilized egg). The egg with the replaced nucleus is then induced to develop; the resulting organism is genetically identical to the donor of the nucleus. Cloning could produce a potentially unlimited number of people genetically as similar to each other and to the donor as identical twins are. Conceivably, a new mankind could be obtained consisting of only a few human types, each one existing in millions, or hundreds of millions of genetically identical copies.

STATE OF THE ART

One or several of these Brave New World proposals have been advanced by some authors as the means to improve the genetic lot of humankind. It may be worthwhile to examine briefly the "state of the art," that is, up to what extent the appropriate technical know-how exists or is likely to exist in the near future. There is little doubt that the first category of techniques could be used at present. People can be encouraged, discouraged, or restrained from reproducing. Sterilization is a rather simple process and is voluntarily performed in thousands of individuals every year. Amniocentesis is a delicate technique which is nevertheless practiced every day without serious risks in many U.S. hospitals.

It has been sometimes stated that the techniques of genetic surgery are now available or will be available in the near future. Such statements are misleading. Techniques like transformation, transduction, and recombinant DNA are practiced, with limited success, in a few microorganisms. While history has repeatedly proved wrong those who claimed that something could never be done because of its technical difficulty, the fact remains that we have not yet been able to apply the techniques of genetic surgery to multicellular organisms even much simpler than man. In my opinion, the technical possibility of their application to mankind remains well in the future.

The preservation of human semen under physiological conditions for long periods of time is feasible. Commercial sperm banks are now in existence: more than a dozen throughout the world. Several thousand cases of successful artificial insemination are estimated to occur per year in the United States alone; several hundred documented normal births have resulted from the use of semen obtained from sperm banks. Artificial insemination is often used by couples when the husband is infertile rather than for eugenic reasons, but eugenic goals are not necessarily precluded. (The British Academy of Sciences recommended to Parliament in 1975 that rock stars be prohibited from selling their semen to sperm banks. They feared that the popularity of rock stars could lead to thousands of offspring being produced from the sperm of a single star, which could result in inbreeding problems if some of the offspring intermarried, perhaps without knowing of their genetic relatedness). There are not yet commercial banks for the storage of women's eggs.

Artificial fertilization of human eggs in the test tube has been repeatedly performed during the last few years in several laboratories, mostly in Italy and England. Nevertheless, no human embryo has been fully developed outside a woman's womb. It is difficult to know whether this is due only to the desire to avoid the concomitant legal and ethical problems or to technical difficulties. In all reported cases of test tube fertilization of human eggs, the embryos either died spontaneously or were intentionally destroyed after only a few weeks of development or were reimplanted in a woman's womb and

allowed to develop. There are apparently well authenticated cases of eggs fertilized in the test tube that were implanted in a woman's uterus and eventually resulted in normal and healthy individuals. It seems that the technology required for the artificial development of a human embryo fully outside a woman's womb could become available in the near future if sufficient economic and scientific effort is dedicated to obtain it.

The techniques of somatic twinning or cloning have been successfully employed with frogs and other lower vertebrates. Several laboratories both in the United States and abroad are at present working on the application of similar techniques to mice, Guinea pigs, rats, and other mammals. We cannot, of course, tell whether they will eventually be successful. (A claim publicly announced in March 1978 by a journalist that a baby boy had been successfully cloned from a rich man is almost certainly a hoax.) But if cloning techniques are developed for other mammals, their application to man will only be one step removed. Mice, rats and Guinea pigs are, like man, mammals whose embryological development is basically similar to that of a human being.

There is an additional technical consideration which deserves emphasis. The advocates of the Brave New World give a paramount importance to the genetic component of the individual. But a human being results from the interaction of the genetic characteristics inherited from the parents with the total environment – that is, the sum total of the conscious and unconscious experiences of the individual from conception until death. The hereditary constitution, the genotype, determines only the "norm of reaction" of the individual. In different environments the same genotype may result in very different individuals. This notion, familiar enough to geneticists, seems to be forgotten by those who propose germinal selection or the clonal multiplication of the genotypes of distinguished men and women. The influence of the environment is perhaps more important in man than in any other organism; in the development of man, not only the physical environment but also family, school, and society have decisive influence. The genotype of a great benefactor of mankind, of a great national leader, of a great scientist, or of a saint, may result in a tyrant, a criminal, or a bum. As the eminent geneticist and Nobel laureate George W. Beadle has cogently noted: "Few of us would have advocated preferential multiplication of Hitler's genes. Yet who can say that in a different cultural context Hitler might not have been one of the truly great leaders of men, or that Einstein might not have been a political villain." In order to obtain another Einstein from Einstein's genotype, we would have to provide the latecomer from the beginning of his life with exactly the same environment and education, the same challenges and experiences, the same parents, friends and teachers as the original Einstein had. This is an impossibility. Thus trying to multiply the Einsteins, the Lincolns, and the Gandhis, we might obtain instead Stalins, Hitlers and Rasputins.

SHOULD MANKIND STEER ITS OWN EVOLUTION?

The ethical and socio-political implications of eugenics are enormous. Not all the methods mentioned in the previous section can presently be used as eugenic measures, but some could and others will become available in the future. We now raise the question whether such methods should or should not be applied to human populations. In so doing we leave the grounds of scientific discourse and enter the fields of ethics, sociology, and politics. The issues at stake are very complex. Among the many distinctions which bias these issues are whether the measures are made voluntary or coercive, and whether specific eugenic measures are to be applied only to individual cases as determined by experts or whether they will become available to the public at large.

I shall now briefly state my opinion about what eugenic measures could, and perhaps should, be applied to man and which ones should be avoided. I fully subscribe to the conviction expressed by John V. Tunney, when he was U.S. Senator from California, that we must begin right now the debate about the eugenic issues raised by progress in the biomedical sciences. As Tunney says it, "The techniques must be discussed and debated among lawyers, doctors, theologians, legislators, scientists, journalists and all other segments of society. The issues raised require interdisciplinary attention." *(Congressional Record,* Vol. 118, No. 83, May 23, 1972). In the formulation of the following observations, psychological, sociological, ethical, and religious considerations are of paramount importance. I shall thus be treading outside my field of professional competence, which is genetics. As a member of mankind, and also as a biologist aware of the social implications of his science, I believe that to express my opinions is not only justified, but indeed required, even though they will unavoidably reflect subjective value judgements.

Negative eugenics may prevent the spread of undesirable genetic traits by using the techniques in the first two categories: genetic counseling (including either advice or coercion against the reproduction of individuals with genetic defects) and genetic surgery. I believe that carriers of seriously harmful dominant genes should be informed of the fact and discouraged from reproducing. In the case of retinoblastoma, half of the children will inherit the dominant gene carried by one of their parents. For such serious conditions, this means not only bringing forth much human misery and suffering to the children themselves, but also a heavy burden on the medical, economic, and other resources of society. Since these resources are limited, they are allocated to some social needs at the expense of leaving other needs unattended.

But it seems likely that some people informed about a substantial risk of having genetically defective children may nevertheless decide to procreate. Moreover, in cases of genetically determined mental defects, information and

advice may not be very effective. Mild mental retardation (IQ of less than 70) is a polygenic condition – resulting from interaction of several genes. About three per cent of all people in the United States (and in the world) suffer from this kind of mental retardation. The responsible genes have not yet been identified, but about one half of all mentally retarded persons have one or both parents also mentally retarded, and an additional 30 per cent have a retarded uncle or aunt. Thus, if people suffering from this kind of mental retardation would not have children, their frequency would be halved in one single generation. If neither the mentally retarded nor their brothers and sisters would reproduce, the incidence of mental retardation would decrease in a single generation to only 20 per cent of its present frequency. Reducing the incidence of mental retardation is a desirable objective; much human suffering and misery would be avoided, and a considerable social burden would be substantially alleviated. Yet, how to accomplish such an objective? Has the body politic the right to keep the mentally retarded and their brothers and sisters from reproducing? For example, could society require the institutionalization of such persons or their sterilization? In the more general case of carriers of drastic hereditary ailments, has society the right to sterilize them or to penalize them economically or in some other way, if they persist in having children?

My personal conviction is that individual rights and freedom in matters of procreation should be preserved as far as possible. But it is the case that the rights and choices of some limit the freedoms and rights of others. We face here the general problem of the interrelationships between the rights of the individual as such and the rights of the body politic. I do not know what are the correct answers to the questions I have raised, but the questions need to be asked and answers sought.

The use of genetic surgery to correct serious genetic defects is, in my opinion, socially and ethically acceptable. If the genetic defect is corrected in the germinal cells of a person, the children would be normal. Genetic therapy is in this case comparable to corrective surgery as presently practiced, except that the progeny as well as the individual are the beneficiaries. However, as previously indicated, techniques for genetic surgery in man are not yet available.

Positive eugenics seeks to improve the genetic endowment of mankind through the multiplication of desirable genetic constitutions. The appropriate techniques belong in the third and fourth categories listed above: selecting the sperm or eggs of gifted individuals and multiplying their genotypes by twinning.

The first and most fundamental difficulties of positive eugenics are: (1) what is the ideal genotype or what are the characteristics that should be multiplied?, and (2) who makes such decisions? Frequently, high intelligence is designed as a desirable characteristic. I agree, but artistic abilities and a host of emotional and moral qualities are at least as important. As Senator Tunney has put it, "How can we compare intelligence (even assuming it can be

defined) with love?" Personally, I believe that an increase in moral excellence is considerably more desirable than an increase in the average IQ of mankind. Few of the serious problems facing the nations of this world would be solved with increased intellectual acuity, but much progress could be made if our individual and social ethics were enhanced.

I do not see how we could make wise choices as to what qualities we want to multiply, nor do I see how such decisions could be reached within the framework of a democratic society. But let us assume for the moment that agreement can be obtained as to what individuals possess desirable genetic characteristics. It would, then, seem to me that women could be allowed to choose (with their husbands' consent, if married) to be fertilized with the semen of distinguished men. I doubt, however, that many women would want to do so; Muller was psychologically naive when thinking otherwise. I believe that most women would prefer to have a child fathered by the man they love, rather than by the semen of a famous man.

As a means for changing the genetic constitution of mankind, cloning the genotypes of chosen individuals would be more effective than any other technique. The possibilities of such a technique are stunning: the genotype of a rock star, a beautiful actress, a scientific genius, or a clever politician could be multiplied thousands or millions of times. It would also be possible to create a few genetic castes, each consisting of millions of identical individuals, dedicated to the service of a dominant elite.

The production of a human being by twinning seems to me ethically repugnant. The possibility to produce millions or billions of genetically identical human beings is literally terrifying. The technique of twinning has possibilities destructive of human values so great that it poses for mankind a threat perhaps more serious than the possibility of atomic war. And it seems likely that the technique will be available a few years hence.

Advances in the biomedical sciences have provided man with the tools to change his genetic constitution. Even more effective techniques are likely to be developed in the near future. Great benefits as well as great dangers lie ahead. Choices need to be made, and we need all the wisdom we can master to make the right choices. The future welfare, and even the survival of mankind are at stake. Biologists, physicians, psychologists, sociologists, lawyers, legislators, philosophers, theologians, political and religious leaders must begin right now to work together towards defining the alternatives and making the right choices. The Kingdom as well as the Darkness lie ahead. We must make sure while trying to follow the road to Utopia that we do not take the road to Hades.

The Misuse of Genetics in the Race-IQ Controversy

Ayesha E. Gill

LIKE all living organisms, human beings are the products of evolutionary forces. Human populations, like other natural populations, vary genetically with natural selection acting upon this genetic variability in the evolutionary process. In our self-conscious appraisal of our own evolution, however, we humans have been strongly influenced by non-biological, sociopolitical, and psychological considerations in determining the possible origins and classifications of human variability. Many popularized misconceptions have arisen through a confusion of biological and sociological concepts. The sometimes spurious analogies used in the attempt to invest

Social Darwinism with the legitimacy of biological evolutionary principles (see, for example, the discussion of H. Spencer's views in Gossett 1965 or Chase 1977) or the eugenics movement of the early twentieth century, typified by such men as Lothrop Stoddard and Madison Grant (Allen 1975), relied on purportedly biological data to support elitist and racist policies. Although nonbiological criteria may be involved in the classification of humans into "races" and sociopolitical and economic factors may largely determine the relative positions and treatment of these groups in society, it is often asserted that characteristics of these supposedly racial groups are determined by their biological make-up. Arguments of biological determinism continue to the present time with new versions often appearing at times of social or political agitation. Thus, during the 1960s, the development of the Civil Rights movement and the demand of Blacks, Chicanos and other minorities for full rights as human beings and citizens was countered by a determined effort to show that differences in IQ between races or socio-economic classes had a biological basis (Ingle 1964, Shockley 1967, Jensen 1969, Eysenck 1971, Herrnstein 1971). The basic argument of the proponents of this thesis is as follows:

1) IQ provides a valid measure of intelligence.
2) Some races by this IQ criterion are deemed less intelligent than others.
3) Intelligence as measured by IQ is largely heritable and, therefore,
4) The differences in IQ between these groups will persist regardless of changes in environmental factors.

The biological reality of the "races" considered in the IQ thesis is crucial to the argument. But this racial classification is not valid from a biological viewpoint as the reasons outlined below will indicate.

Nevertheless, the confusion of biological and sociological concepts has been the basis of powerful attacks on cultural minorities in this country (Gossett 1965, Allen 1975, Chase 1977). Historically, attempts have been made to infer biological inferiority of politically subordinate groups. Such efforts to ascribe a simple biological basis for complex human behaviors develop because politically or socially defined attributes are given more weight if a biological basis for them can be postulated. Biological traits are often thought to be fixed or unchangeable—"your genes determine your fate." This misconception arises when the cruicial interaction of genes and environment in the expression of traits is not given adequate attention. A belief in the biological determination of human behaviors and in the "fixity" both of their inheritance and expression provides a strong rationalization for ignoring other possible bases for these behaviors. It cannot be overemphasized that the existence of a genetic component to a trait does not imply biological determination of the trait.

An understanding of biological variation among human beings will go far to dispel the confusion that exists concerning the basis of human variability. In

this paper I will discuss the basis of genetic variation in populations and the role played by time in determining the genetic make-up of populations. This analysis is based on evolutionary principles from the field of population genetics. I will deal especially with the concept of race, distinguishing between the biological definition of this concept and other classifications employing nonbiological criteria. Before presenting a biological definition of race, however, a few basic terms from genetics must be defined.

SOME SIMPLE BASIC GENETICS

Gregor Mendel demonstrated the existence of particulate factors that are inherited and that determine the genetic contribution to an organism's characteristics. These inherited factors are called *genes* and they occur in a linear sequence in the chromosomes. *Chromosomes* are "organelles" found in the nucleus of each cell; they are composed of DNA and proteins. Although it was not known in Mendel's time, we know now that it is the chemical composition of the chromosomal DNA that determines the information content of the genes. A particular linear sequence of the chromosomal DNA constitutes a given gene. The gene's location in the chromosome is called its *locus*. When cells divide, the chromosomes are duplicated and passed along to the new cells, so that each cell gets copies of the genetic information.

Humans are *diploid* organisms, which means that they have two sets of chromosomes and that genes occur in pairs. More precisely, humans have 46 chromosomes, consisting of 22 pairs of autosomes and two sex chromosomes. The sex chromosomes in females are designated X chromosomes, whereas males have one X and one Y chromosome. Only the genes on the males' sex chromosomes are unpaired; all other genes occur in pairs in humans. The individual representations of these gene pairs are called *alleles*. The two alleles of a gene pair may be alike, in which case the organism carrying these genes is said to be *homozygous* for that gene pair, or they may be different and the organism is said to be *heterozygous* at that gene locus.

In sexually reproducing organisms, such as humans, each sex contributes a sex cell, an egg or sperm, which contains only one representative of each chromosome (a complement of 23 for humans) to the formation of the offspring. An individual thus receives half his genetic material from each parent. This genetic material, *i.e.* the genes that an individual inherits from his or her parents, is called the *genotype* of the individual. The traits that an individual expresses are produced by an interaction of his genotype with the environment, both internal and external. The environment thus includes, for example, cellular environments within one's body, the food one eats, as well as the physical and cultural environments to which one is exposed during life. An individual's *phenotype*, which results from the interaction of his genotype and the environment, includes all his characteristics–chemical, physical, behavioral, and so forth. It is important to note that one inherits genes, not traits or even the whole genotype, from a single parent. Since each parent

contributes one chromosome complement to its offspring, the genes in the offspring may have different pairing partners than they had in the parents, so each individual represents a new and unique combination of genes.

Not all the genes in an individual's genotype are expressed in his phenotype. If an individual is heterozygous at a particular gene locus and only one of the allelles is expressed in the phenotype, that allele is said to be *dominant*. The other allele at that locus, which is not expressed in the phenotype, is said to be *recessive*. In some cases, both alleles at heterozygous loci are expressed and the alleles are said to be *codominant*. An example of codominant alleles are the two controlling the AB blood group. They are both dominant to a third allele at that locus, which codes for the O blood group but is only expressed when both alleles are the same and code for O. When the recessive allele for O is paired with the dominant allele for A, for example, the individual's blood type is A.

Some traits are controlled largely by some single major genes, as in the case of the ABO blood groups, whereas the expression of other traits may depend on the contribution of many genes. Environmental and genotypic interactions are involved to a greater or lesser degree in all traits. *Polygenic* traits, which involve many genes, cannot be classified into distinct, separate phenotypes, as, for instance, we can classify ABO blood types, which are controlled by a single locus. The genes involved in polygenic traits each contribute a small amount to the expression of the trait, and the interaction between those genes and the environment leads to the production of many phenotypic classes that cannot be separately distinguished, but instead merge into a continuum. Often traits that can be measured, such as height and weight, or counted, such as number of offspring in a litter or eggs in a clutch, are polygenically controlled. The individual genes involved usually cannot be determined, and the statistical genetic analysis of these quantitative traits depends upon our ability to define and measure them accurately. No doubt, many complex traits of interest in humans, such as intelligence, are polygenically controlled. The question of its definition and measurement is germane to any genetic analysis of the inheritance of intelligence.

To consider the phenomena of sexual reproduction, biological inheritance, or race, we must go beyond the individual level of organization to the population level. Any group of individuals that interbreed is called a *population*. These individuals are all members of the same species, and they share a common gene pool. All the genes carried by members of an interbreeding group constitute the *gene pool* of that population, and each generation of individuals represents a sample of the genes in the common gene pool. Just as individuals may be heterozygous, there may be heterozygosity in the gene pool, if some of the genes are represented by more than one allele. There may be many different forms of a gene in the gene pool, although any one individual would carry only two alleles. The proportions of the different alleles of a gene in the population are called the *gene frequencies* of these alleles. A great deal of analysis in population genetics is devoted to

the mechanisms which may affect gene frequencies, for these changes may be of evolutionary significance, signaling the evolution of a new subspecies and perhaps continuing change to a new species.

The genetic terms which have been defined in this section are the minimum necessary to understand the biological definition of race. The reader should carefully distinguish between concepts applicable at the individual level, such as genotype and phenotype, and concepts that have meaning only at the population level, such as gene pool and gene frequency. Race, which will be defined directly below, is an attribute of a population, not an individual.

BIOLOGICAL DEFINITION OF RACE

The biological definition of race is statistical. *Races are simply populations of the same species which differ in the frequencies of some genes.* Thus, racial differences are due to differences in the frequencies of alleles, not necessarily nor generally in the kinds of alleles. The same kinds of alleles are found in the gene pools of populations of the same species, but the proportions of these alleles may vary among populations.

In humans there are a limited number of genes which we have been able to identify and for which we can measure the frequencies. The genes for different blood types are an example of those whose frequencies have been determined in a number of populations. The sample of genes whose frequencies we can measure and compare in different populations is necessarily limited. Scientists may select different samples of the measurable genes on which to base their racial classification and may refine the classifications to different degrees (see discussions in Dobzhansky 1962, Lerner and Libby 1976). Goldsby (1977) gives the distribution of 26 human races listed in Dobzhansky (1962), with some illustrations of members of these different races.

Some characteristics of the statistical genetic classification of races are:

1) Boundaries of races are arbitrary.
2) The number of races defined is arbitrary.
3) There is no average genotype or average phenotype involved in the classification.

The main virtues of the genetic definition of race are:

1) It is objective.
2) It is quantitative.
3) Changes in gene frequencies are predictable.

There are problems involved in the genetic definition. The classifications are necessarily compromises, because they break up a continuum, the species, into discrete packages. This is a problem in taxonomy, the science of the

classification of organisms, in general. As with other taxonomic problems, there will be differing opinions on how many discrete classes the continuum should be divided into and just where the boundaries should be set. Another problem with the classification of races is that they are based on a small sample of the totality of genes which might be sampled. We do not know if the sample is the most judicious choice or whether differences in the frequencies of certain genes are more useful as criteria for distinguishing races than others would be.

The virtues of the biological definition of race are substantive. One of its main virtues is that it does not invoke an average genotype or average phenotype, *i.e.*, it is not a typological classification. It is statistical. Further, the biological definition of race is objective and quantitative: the classification is based on a measurable population trait—the gene frequencies. Gene frequencies are calculated by taking a sample of individuals from a population and determining the alleles they carry for those genes used in the analysis, e.g. the genes for blood type. By statistical methods, the proportions of these alleles in the population can be estimated from the sample. Then the gene frequencies can be compared among populations, and racial classifications made on the basis of differences in gene frequencies. The measurement of gene frequencies can be repeated and verified, an important characteristic of scientific methodology. The ability to make predictions is another important aspect of scientific methodology. By studying the forces which change gene frequencies in populations, we become better able to predict how their gene pools will change with time.

FORCES THAT CHANGE GENE FREQUENCIES

Since races differ in gene frequencies, the important question is: what causes the differences? Among the forces that alter the frequencies of genes in populations are mutation, migration, selection, and genetic drift.

Mutation is an actual physical change in a gene, an alteration of the composition of the DNA, that produces a different allelic form of the gene. On a larger scale, there may be physical changes in the chromosomal structure as a whole that are also mutational. Mutations are random changes, without any preadaptive significance, and, since they are physical alterations in the genetic material which will be passed on, they are heritable. Mutation at a gene locus occurs spontaneously at rates of approximately 1 in 100,000 or 1 in a million sex cells, and the rate can be increased by agents such as radiation or chemical mutagens. The particular significance of mutations is that they are the primary source of variability in the gene pool. They provide the different forms of the gene, alleles, that natural selection can choose among.

Migration, the movement of individuals from one population to another, is becoming an increasingly important force changing gene frequencies in human populations. If migrants go from one population to another with different gene frequencies and intermarry, their contribution to the gene pool

of the recipient population will tend to alter its gene frequencies. Thus, if a number of migrants from population 1, with, say, 70% of a gene "A" and 30% of an alternate allele, "a," were to move to population 2, which had 20% of "A" and 80% of "a," and intermarry, the frequency of allele "A" would increase in population 2 and the frequency of "a" would decrease. Migrants who went from population 2 to population 1 and contributed to its gene pool through interbreeding would help decrease the frequency of the "A" allele in that population. Migration tends to increase the variability within populations and to make different populations more alike through the sharing of genes.

Selection is a force that alters gene frequencies in the direction of better adaptation of a population to its environment. A population may contain several different allelic forms of any given gene, alleles which arise originally through mutation and provide the variability upon which selection may operate. The interaction of certain genotypes with the environment may result in phenotypes that give the individuals possessing them superior fertility and viability compared to others in the population. These individuals will produce a disproportionately higher number of offspring than individuals with different genotypes, and thus their genes will be "selected" in that environment and will increase. A classic example of selection is the case of industrial melanism in England, where populations of peppered moths having both predominantly black and white forms occurred. Before industrialization, the black form was very rare. After industrialization, the black form increased rapidly in the industrial areas. The reason for the change in selection pressure favoring the black form was the change in the pattern of bird predation on the two color forms. Initially the barks of the trees had been lichen covered and light in color, and white moths could not be easily seen against them. Thus, black moths were the main prey of the birds and were reduced in number. As industrialization continued, the tree trunks became blackened with soot. Now the black moths were protectively colored and the white moths stood out as easy prey for the birds. Whenever there are differences in the phenotypes, *i.e.*, the expressed traits of individuals, due to their having different genotypes, selection may operate on the population to increase the genes which provide the best adaptation to the environment.

Genetic drift is a random or chance process. The individuals of each generation in a population contain only a sample of all the genes in the population's gene pool, and, by chance, the proportions of the different alleles that are passed on will vary from generation to generation. The smaller the population, the greater will be the sampling error and the random deviations in gene frequencies. In small populations there is also likely to be an increase in the amount of inbreeding, *i.e.*, mating between related individuals, and a loss of genetic variability, both because individuals may be similar due to common descent and because the population's gene pool may lose some alleles by chance in the sampling process. Thus, relatively small populations of the same species may begin to differ by chance as well as by selection in different environments.

When we study the effects of forces that alter gene frequencies, such as mutation, migration, selection, and genetic drift, the unit of study is the population. Thus, if we want to compare different groups of people, we can measure the frequencies of a sample of genes in different populations and compare these frequencies. If some populations have quite similar gene frequencies, they may be grouped together and called a race. These groupings may not be easy to make, however, for populations may have highly similar frequencies for the alleles of some genes and very different frequencies at other loci (Lerner and Libby 1976). If the genes studied are not a random sample of the genotype, the particular selection will affect the seeming similarity or dissimilarity of the populations examined. The actual grouping of populations into races according to their degree of similarity is arbitrary, and some investigators may split people into many subdivisions while others tend to lump them together into a smaller number of categories. There are no absolute criteria. An analysis of the process of racial differentiation in the human species must deal with all of these practical difficulties.

RACIAL DIFFERENTIATION IN HUMANS

One of the major processes leading to differentiation between human populations occurs when isolated populations respond to selection in their respective environments. As isolated populations improve in adaptation to their differing local environments, they are likely to diverge from one another. Some highly visible morphological changes have occurred in human populations living in different climates, for example, such as apparently adaptive variations in skin color or body dimensions (see discussions in Williams 1973, Goldsby 1977). Disease is a very strong selective force in human populations, and significant differences between populations in different geographical areas have been found in the frequencies of genes associated with certain inherited diseases, such as sickle cell anemia (Allison 1956). If populations are fairly small, genetic drift may be an important factor in changing gene frequencies and leading to differentiation of isolated populations. The operation of drift in a religious isolate, the Dunkers of eastern Pennsylvania, was studied by Glass (1953), who pointed out that some changes occurring in human populations may be due to chance rather than adaptation. The operation of these various forces in different populations may cause changes in the frequencies of genes, and the populations may begin to differ. If this process of differentiation continues, it may lead to the formation of races consisting of groups of populations that are fairly isolated and living in different environments from other such groups. If, however, there is some gene exchange through migration and intermarriage between individuals of differing populations, this racial differentiation breaks down.

Because of countless migrations between human populations throughout history (often in the form of invading armies) and resultant inter-breeding, the flow of genes between human groups has constantly acted to break down

racial distinctions. If human populations had remained partially isolated over long periods of time during which they adapted to different environments, we would expect them to have gradually diverged into ever more distinct races. Instead the history of the human species has been such that races have arisen and disappeared, giving rise to a network of human races, rather than to an evolutionary tree (Dobzhansky 1962).

Modern technological civilization with its increasing emphasis on travel leads to more gene exchange. Dobzhansky stated in ***Mankind Evolving*** (1962): "Civilization causes race convergence, due to gene exchange, to outrun race divergence. In this sense, human races are relics of the precultural stage of evolution (p. 269)." Differential adaptations of races of mankind are mostly to remote environments, now superseded by modern civilization, which has left few parts of the world untouched. We now have new selection pressures operating on us, such as stress, pollution, noise, crowding.

The biological definition of race derives from the relatively young science of genetics, a development of the twentieth century. In earlier times, other racial classifications were based on entirely different criteria.

EARLIER RACIAL CLASSIFICATIONS

In the eighteenth century, Carolus Linnaeus, a Swedish botanist, devised a system for classification of living organisms. The Linnaen classifications were Aristotelian, based on the notion that species were real, fixed entities, each created separately, and that variations within species were deviations from the ideal archetype of that species. Among the organisms Linnaeus classified was the human species, *Homo sapiens*, for which he described five subspecies or races, as follows (excerpted from Williams 1973):

Four-footed, mute, hairy. *Wild Man.*

Copper-coloured, choleric, erect. *American.*
Hair black, straight, thick; nostrils wide, face harsh; beard scanty; obstinate, content free. Paints himself with fine red lines. Regulated by customs.

Fair, sanguine, brawny. *European.*
Hair yellow, brown, flowing; eyes blue; gentle, acute, inventive. Covered with close vestments. Governed by laws.

Sooty, melancholy, rigid. *Asiatic.*
Hair black; eyes dark; severe, haughty, covetous. Covered with loose garments. Governed by opinions.

Black, phlegmatic, relaxed. *African.*
Hair black, frizzled; skin silky; nose flat; lips tumid; crafty, indolent, negligent. Anoints himself with grease. Governed by caprice.

Suffice it to say that nonbiological criteria and a certain bias characterize the descriptions.

The notion of pure races was prevalent in the eighteenth century (Dobzhanksy 1962, Loehlin et al. 1975) when races were believed to differ in kind, not degree. Even in 1871, Quetelet, the founder of anthropometry, assumed homogeneous or pure races (Spuhler and Lindzey 1967). With our present knowledge of genetics, it is clear that the concept of a pure race is nonsensical and has been discarded by the scientific community.

Although Linnaeus classified humans as one species, there was debate in the 18th century as to whether humans belonged to one species or represented several different species:

> To the eighteenth-century mind the basic issue concerning human races was whether they were to be regarded as separate species or as varieties of a single species. The issue was a vital one. Theologically it bore upon the Christian doctrine of the spiritual unity of men in their common descent from Adam. Politically it influenced the white man's conception of his rights and duties with respect to colonial peoples. Scientifically it involved the distinction, enormous in the eyes of eighteenth-century naturalists, between species and varieties (Greene 1959, p. 221).

Those who believed that the various types of human beings belonged to different species were referred to as polygenists. The monogenists asserted that all humans were of the same species, but comprised different varieties within that species. Since the monogenists believed in a common origin of the human species, they had to explain the development of differences between the varieties. The leading naturalists of that time were all monogenists. Buffon and Blumenbach believed that white people were the original variety of humans and that the various colored peoples represented degenerations of the primitive white stock (original references cited in Count 1950, Greene 1959). They thought that the effects of environmental factors such as climate and diet led to differentiation of human varieties. Prichard, on the other hand, thought that black races were the original human stock and that man evolved toward the more perfect European white races (Count 1950, Greene 1959). He held that the progress of civilization was the cause leading to the superior white varieties. These naturalists had one obvious point of agreement. They all took it for granted that whites, the group to which they belonged, were superior people, even though they chose to invoke opposite processes to explain this superiority. It was bad enough that scientists of the eighteenth century embraced the *a priori* belief in the superiority of people of their own skin color. It is a devastating commentary that in this century, some individuals still cling to such an assumption.

More recent typological classifications have employed several characteristics as the criteria for determining race. Earlier in this century, anthropologists employed classificatory schemes in which races were distinguished according to morphological types. Some of these types were defined by skull

indices: cephalic index, length-height index of the skull, nasal index. Others involved non-skeletal characteristics: color, hair-textures, lip thickness. In each case a morphological type was set up as the prototype for a given race.

There are many criticisms to be leveled at typological classifications. No matter what organism is studied, typological classification – based on a Platonic ideal – is unworkable when dealing with groups. Variation within groups is virtually ignored in a typological approach, and variation between groups is exaggerated. As far as human groups are concerned, a danger in typological thinking is that people may assume that all members of a given race are alike or at least very similar. In reality it is rare that one would find an idealized prototype. Individuals may possess some of the prototypic traits and not others. The human species is not a collection of disjunct types, but a continuum of people, varying in some aspects from one another.

POPULAR DEFINITIONS OF RACE

Most comparisons of racial differences which are currently being discussed in this country are comparisons of "Negro" and "white" races. These are the classifications which Jensen (1969) uses in his discussion of differences between races in IQ. But, these are not scientifically defined races. They are merely categories established by popular definition. At a symposium on "Science and the Concept of Race" organized by the American Association for the Advancement of Science, the anthropologist, Gloria Marshall, challenged the notion that such classifications were scientifically defined races (Marshall 1968). She showed that scientific discussions of race often reflect and reinforce popular notions about human variation and that both scientific and popular conceptions about race are usually influenced by sociopolitical considerations. For example, it is generally held that descent is the basis upon which individuals are assigned to racial groups. However, in interracial marriages a rule of *hypodescent* is followed (a term used by Marvin Harris 1964). According to the rule hypodescent, the offspring of interracial marriages are assigned to the politically subordinate group. *A propos* of this last point, I would like to quote a little story that Ernst Mayr told during the AAAS Symposium (Mead et al. 1968, p. 104):

> I am reminded of an apocryphal story about the American newspaperman who went to Haiti and had an interview with the President. They started to talk about Haiti and its population, and most indiscreetly the American newspaperman asked the President what percentage of the people were white. And the President of Haiti said, 'Oh, about 95 per cent.' The American newspaperman looked a little puzzled and said, 'Well, how do you define white?' And the President of Haiti said, 'How do you define colored?' And the American newspaperman said, 'Well, of course, anybody with Negro blood is colored.' Said the President: 'Well, that's exactly our definition, too: anybody with white blood is white.' "

Language plays a part in popular racial classification. Some individuals of mixed African and European ancestry who do not speak English, but Spanish for example, are not classified as Negroes, but as Puerto Ricans. If the same persons spoke only English, they would be defined as Negroes in the United States. Language was an essential element in the theory of Aryan superiority and in the identification of the "Aryan race" (Gossett 1965, Lerner and Libby 1976).

The criteria on which popular racial divisions are based often have nothing to do with heritable traits. In some cases socio-economic position is used to define race. Thus, in Brazil, as Harris (cited in Marshall 1968) has pointed out, there are many racial categories, and an individual frequently passes from one to another in conformity with the achievement of socioeconomic success. The Eta of Japan are often described as a race, even by scientists. Actually their common attribute is sociological, not biological: they are descendants of what was once the lowest social class in Japan (Marshall 1968).

Religion is also sometimes used to define races. Jews, for example, are considered a race by the popular definition, although they come from diverse populations and these populations are more similar in gene frequencies to non–Jews in their respective regions than to Jews from other parts of the world (Lerner and Libby 1976, Goldsby 1977).

Scientists still use these popularly defined racial classifications in their studies. "It is not surprising, therefore, that scientific discourses on race serve to buttress the popular belief that discrete racial groups exist among mankind, or that scientific typologies serve to legitimize popular racial classifications" (Marshall 1968, p. 156). The popular racial classifications change over time and place because they reflect the prevailing sociopolitical conditions. Now, in this country, peoples from very different areas are lumped together as the "white" race. In previous times careful distinctions were made between them. thus the Irish were considered a separate race from the English (and thoroughly discriminated against). This racial distinction was supported by many scholars: In 1881, E. A. Freeman, an Oxford historian, said ". . . the best remedy for whatever is amiss in America would be if every Irishman should kill a Negro and be hanged for it" (Gossett 1965, p. 109). Not only the Irish, but also Southern and Eastern Europeans were once considered as separate races and there was a strong anti-immigration movement in this country against this "inferior racial stock" (Gossett 1965, Ludmerer 1972).

Currently, the American subgroup classified as "black" draws its ancestry from many other groups, such as Native Americans, Africans, and Europeans. To be a member of this popularly defined race means to be subjected to the modern racism which arose with the colonialist expansion of western Europe in the last three centuries. A strong rationalization was needed to justify the inhuman and degrading treatment of enslaved and colonized people, and the myth of racial inferiority was seized upon (Gossett 1965).

The point to be emphasized is that these popular races are based to a great

extent on sociopolitical criteria, not on biological criteria. They are typological categorizations and stress the similarities of individuals within a race and their distinction from other races. Popular racial classification stereotypes people and disregards their individual differences, but modern genetic research reveals a great deal of variability within the popularly defined races and shows this typing to be incorrect.

GENETIC VARIABILITY WITHIN CONVENTIONALLY DEFINED RACES

How much difference has been found between conventionally defined human races as compared to the variation within these races? Great diversity exists in all populations which have been studied. Within conventionally designated races, a study of diversity by Lewontin (1972) showed much more variability within groups than between. He analyzed the data for gene frequencies of 17 genes in Caucasians, black Africans, Mongoloids, South Asian Aboriginies, Amerinds, Oceanians, and Australian Aborigines. The 17 genes were genes for blood groups, serum proteins, and red blood cell enzymes. Lewontin found that 85.4% of the diversity in gene frequencies was accounted for within populations of the same race, while differences between these populations accounted for only 8.3% of the diversity, and even less – 6.3% – was accounted for by racial classification. Thus most of the genetic variation was found in individuals of the same race living in the same population.

A method that has been widely used since 1966 to study genetic variation in natural populations is electrophoresis (Hubby and Lewontin 1966, Lewontin and Hubby 1966, Harris 1966). This method detects variation in proteins, which are the products of the genes. The information carried by a gene directs the synthesis of a particular protein (or polypeptide which combines with other polypeptides to form a protein), and the different alleles of the gene are responsible for variations in the proteins synthesized. In electrophoresis, samples of blood or tissues from a number of individuals are inserted into a supporting medium through which an electric current is run. These tissue samples contain soluble proteins, and if the proteins have different net charges, they will move different distances in the field. After the proteins have migrated in the electric field, the medium is stained for specific proteins, so that the proteins appear as bands in the contrasting medium, and variations in the distance moved can be observed. If variation in a specific protein is found among samples from different individuals, we can safely infer that these individuals have different alleles at the locus coding for the protein, so that the method can detect different alleles of the gene and determine their frequencies in a population sample. Not all genetic variation is uncovered in this way, but gene variants that lead to a change in the net charge of the soluble proteins they code for can be determined. The technique of electrophoresis has proven invaluable, for it has greatly expanded the kinds and number of gene loci that can be detected. Through its

use, population biologists have discovered that there is a vast amount of individual variation in natural populations of plants and animals, including humans (Lewontin 1974). There is a rich store of variant alleles maintained in most populations studied.

Nei and Rouchoudhury (1972) looked at the number of gene differences per locus for 44 protein loci between American Caucasian, American Negro, and Japanese populations. They found that the differences in genotypes between these three groups were small compared to the difference between two randomly chosen genotypes from the same population. They concluded that "the genes in the three major ethnic groups of man are remarkably similar, although the phenotypic differences in such characteristics as pigmentation and facial structure are conspicuous." A larger study (Nei and Roychoudhury 1974) utilizing both electrophoretic data on protein loci and data on blood group loci in Caucasoids, Negroids, and Mongoloids similarly indicated that gene variation between the three groups is small compared to that within any of the groups.

The studies cited clearly indicate the heterogeneous nature of popularly defined races. Since there is much more variation within groups than between them, such evidence should dispel any typological notions about race. Variation exists at an individual level, and all groups have a wealth of individual genetic variation, with considerable overlap existing among groups. Obviously, the bulk of genetic variation that exists within *Homo sapiens* is between individuals, not populations or races, however defined. People seem especially aware of variations in skin color and facial characteristics, and they can observe differences between some so-called "races" in these physical traits. But these observable phenotypic differences are not typical of the genotype as a whole. Populations may look different from each other, but they have very similar genes.

THE MISUSE OF BIOLOGICAL CONCEPTS

Arguments that cite a biological basis for differences in IQ between races nevertheless still prevail. A great deal has been written on the subject of race and intelligence since Arthur Jensen's article appeared in the ***Harvard Educational Review*** in 1969 (see, for example, Jensen 1973, Loehlin et al. 1975, Block and Dworkin 1976). Still it seems necessary to illuminate some basic fallacies in Jensen's approach. Of primary importance is his misuse of the concept of race. Jensen's thesis is concerned with the biological basis of intelligence and the inheritance of that trait. He compares two "races," Negroes and whites in regard to their IQ scores, which he uses as a measure of intelligence. Despite the fact that his hypothesis rests upon purportedly biological differences between these groups, he does not deal with a biological definition of races. Negroes and whites are not races according to the biological definition of race. These groupings are made on the basis of color and sociopolitical considerations. Both groups have drawn from the gene pools of

innumerable, widespread populations, often the same Western European populations. In fact, the biological inheritance of an individual is derived half from the mother and half from the father. Yet, in the popular assignment of an individual to the "Negro" or "white" race, one Negro parent causes an individual to be automatically classified as Negro. It does not matter what the other parent is because sociopolitical factors supersede biological ones in this popular classification. It is erroneous and misleading to classify Negroes and whites as biological races and totally without scientific foundation to propose that differences in IQ are largely due to biological causes.

Another fallacy is found in Jensen's misuse of the genetic concept of heritability. In order to understand the meaning of heritability, we must review the genetic concepts involved. An individual's genotype consists of all the genes which he inherits from his parents. These genes, which are the bearers of hereditary information, provide the messages to produce the ultimate gene products, which are proteins. The gene products interact with their environment through a series of very complicated biochemical pathways to produce the observable or expressed traits of the individual, his phenotype. It cannot be stressed too strongly that the genes alone do not determine the trait which is expressed. It is the interaction of the genes with each other and with the environment that determines the phenotypes. This may be expressed in the following shorthand form:

$$G + E = P \qquad (1)$$

(G = genotype, E = environment, P = phenotype)

The two kinds of inheritance which should be distinguished include major gene inheritance, in which a single gene carries most of the genetic information involved in the expression of a trait and therefore plays a major role in its expression, and polygenic inheritance, in which many genes are involved, each contributing a small effect to the expression of a trait. In order to analyze a polygenic trait in a population, the trait is measured in a sample of individuals from the population. The mean, or average value of the measurements, and the variation around the mean are computed. The variance of a phenotypic trait has two components: 1) variation between different genotypes and 2) variation around a genotypic mean caused by the environment, *i.e.*, for any polygenic trait the total variance in a population has both a genetic and an environmental component. In the terminology used above, this may be written:

$$\text{var } G + \text{var } E = \text{var } P \qquad (2)$$

(var = variance)

In words, this equation states that the total variance in phenotypes for a given trait in a population is made up of the genotypic variance, due to the presence of different genotypes in the population, and the environmental

variance, due to the influence of different environments on the expression of the trait. If we divide this last equation through by the variance of P, we get

$$\frac{\text{var G}}{\text{var P}} + \frac{\text{var E}}{\text{var P}} = 1 \qquad (3)$$

The first term in equation (3) is called the heritability, h^2.

$$h^2 = \frac{\text{var G}}{\text{var P}} \qquad (4)$$

The heritability is the genotypic variance divided by the total phenotypic variance, *i.e.* h^2 is the proportion of the total variance which has a genetic basis. Consequently, if all the variation in the population is due to differences between genotypes and there is no environmental variation, h^2 equals 1. If all the genotypes are identical so that there is no variation between genotypes and all the variation is due to the environment, h^2 equals 0.

The equations given here are simplified, omitting genotype-environment interactions and analysis of the components of genetic variance (additive, dominance, interaction terms), which would be important if one were doing research in this area. Such a detailed analysis is not necessary here and cannot be covered in this paper, but further discussion of heritability can be found in books by Lush (1945), Falconer (1960), and Loehlin *et al.* (1975).

A measurement of heritability applies to a particular population in a particular environmental range at a particular time. It is based on the measurement of given phenotypes in a certain range of environments. The variances determined depend on the particular genotypes in the population and their environments. One cannot apply a measurement of heritability made in a white European population to a sampling of Negro individuals, as did Jensen in his 1969 monograph, nor can the differences between two groups be explained on the basis of a heritability measure within one of these groups. Since heritability, by definition, applies to one population in a given environment, it affords no information about differences between groups. The concept of heritability is totally irrelevant to Jensen's thesis of the heritability of differences between Negroes and whites in intelligence. He has wasted time discussing a concept that is not applicable to the situation he presumably is investigating.

R. C. Lewontin (1970) has given some excellent examples to illustrate how meaningless it is to apply heritability measures to differences between populations. They are as follows. Let us take two lines of corn, which have been completely inbred by self-fertilization. In self-fertilization, the same plant provides both the egg and the pollen, containing sperm. Continued self-fertilization reduces genetic variability until all the offspring have the same genotype. With each line, the genotypes are identical. The two lines differ genetically however. Plant the seeds of line 1 in one pot, and the seeds of line 2 in an exactly similar pot. The heritability of any trait which is

measured for the plants growing in these pots will be zero, because there is no genetic variance within each line. The plants have identical genotypes. All the variability expressed by the plants in a given pot will be due to environmental causes, but all the differences between the two pots will be genetically determined because the pots provide equal environments. Thus, we have a case in which h^2 equals zero within each of two groups, but all the differences between the two groups is genetically caused. Now let us consider the opposite case. Take an open-pollinated plant, *i.e.*, one which receives pollen form other plants and thus has genetic variability. Plant one seed lot in a complete Knop's solution, a special nutrient used for controlled growth experiments. Plant the other seed lot in Knop's solution lacking half of the nitrates and without a trace element of zinc. Use of the special environment of Knop's solution reduces the environmental variance to zero. All the differences in the first pot are due to differences in genotype and h^2 equals 1. The environmental variance is zero in the second pot also and the heritability is one, but plants in the second pot are stunted. This the differences between the two lots is environmentally controlled although h^2 equals 1 within each lot. If nitrates were added to the second pot to make up the environmental differences, some improvement might be noted in the growth of these plants. They might not, however, do as well as the plants in the first pot, because the trace element of zinc may be crucial. We cannot decide this *a priori*. Neither can Jensen make *a priori* decisions about what is essential in the environments of human beings to provide equal developmental opportunities.

Before leaving the subject of heritability, it is worth mentioning that a number of studies have appeared on the relative contribution of the genetic component to the trait measured by intelligence test scores in Caucasian populations (e.g. Burt 1966, 1972; Jarvik and Erlenmeyer-Kimling 1967; Jencks 1972; Schwartz and Schwartz 1974). The largest heritability estimates, .80 and above, were reported by Burt (1955, 1966, for example) and heavily relied on by Herrnstein (1971) and Jensen (1969) to support their arguments on the heritable basis of differences between classes or races, respectively, in IQ. There is now strong evidence that Burt's estimates were wrong and, in fact, that some studies producing them were fraudulent (Kamin 1974, *Science* 1976).

There is another fallacy in Jensen's work. He assumes that the measurement of phenotypes, in this case intelligence, is adequate. I will not discuss here the lack of a clear definition of intelligence or the inadequacy of the IQ test as a measure of intelligence. Rather, I will address myself to the variability of human populations and the effect of this variability on the measurements of phenotypes. Jensen chooses to stress genetics where it suits his purpose, but he has missed two of the main findings of geneticists. These are the uniqueness of the individual and the great variability within populations. In the typological approach, which underlies the grouping of persons into the Negro and white classifications, there is no appreciation of individual

differences, of the variability of individuals within the group. The classification of people in our society into Negro and white puts them under environmental constraints that limit the phenotypes they may express. Until new environments are provided which remove these constraints, we cannot begin to think that we have measured a substantial fraction of the possible phenotypes.

Recent developments in techniques of measurement such as electrophoresis have enabled geneticists to discover much more genetic variability in populations in general than was previously suspected. Genetic systems may, however, be buffered to a considerable extent, so that they exhibit limited phenotypes. Measurement of these phenotypes will not indicate the great number of different genotypes that exist in the population. All of an individual's genes are not expressed in his phenotype, since the expression of a gene depends on its genetic background, *i.e.*, the other genes which are carried in the genotype, and on environmental interactions. Only by assessing the development of a given genotype in many different environments can we gauge the range of phenotypes which it is capable of expressing. In a behavior as complex as intelligence, environmental interactions over the whole range of an individual's development are extremely important. Environmental factors affecting the phenotype of intelligence range from diet at the biochemical level to social and cultural practices at the population level. There is absolutely no reason to believe that individuals in our society have experienced environmental opportunities which will allow them to display the full phenotypic range of which they are capable. The assertion that "intelligence" can be or has been adequately measured among Negroes and whites (or any other group) in our society is a malicious fallacy. This view totally ignores the great genetic variability present not only in these groups, but in all human populations. As Ginsburg and Laughlin pointed out at the AAAS symposium (1968, p. 34):

> Under most systems of equal opportunity and equivalent selection, any numerically significant segment of the human species could, by virtue of its genetic variability, probably replace any other with respect to behavioral capacities.

Not only is there the genetic potential in different human groups for expressing the range of intellectual and other behaviors observed throughout the human species, there is also the possibility for increasing behavioral capacities by providing more favorable environments.

SUMMARY

There are two fundamentally important findings of genetic research particularly relevant to our discussion of human variation: (1) individuals are genetically unique and (2) populations have great amounts of genetic

variability. For these reasons, human populations are genetically heterogenous. There is far more genetic variability within populations than there is between them. Although the evidence from genetic studies is clear, both in popular usage and scientific work, old racial categories which ignore this variation are often used. Conventional, popularly defined races are essentially typological constructs in which variation within a group is ignored and differences between groups are exaggerated.

Throughout history, there have been attempts by those supporting the societal *status quo* to show that people at the lower socioeconomic levels are there by virtue of their biological inferiority. Such arguments invariably depend on ascribing a biological basis to a phenomenon that is actually based on nonbiological criteria. The example addressed in this paper is the confusion of racial categories based on sociological, economic, or political criteria with categories defined according to biological criteria. In the arguments advanced by Jensen and others to show heritable differences in intelligence between Negroes and whites, both the concepts of biological race and heritability are misused. The categories Negro and white do not represent biological races. As was indicated in the discussion of genetics and of the mechanisms by which biological races evolve, migrations and intermarriage between human populations have led to similarity in their genetic structure and kept them from diverging into dissimilar races. The major part of the genetic variability that exists within our species is not between races or populations, but between individuals. The basis for IQ differences between popularly defined races is not biological, just as the races themselves are not biologically determined. The basis for differing traits between popularly defined races must be sought in socioeconomic and political causes, just as the criteria defining these groups is principally socioeconomic and political.

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FICTION

Snake Eyes

Robert Greenwood

WE'D gone over it a hundred times. And, like the Sheriff and the County Attorney, got nowhere. Why were we interested? Because my wife and I published the local paper, a country weekly. Just the two of us. We'd started it on a shoestring and it was still on one. We worked out of our house, a small place in the country five miles out of Georgetown. The print shop was in the garage. That was my job, the printing. Another reason we were interested was because the thing had happened right under our noses. Well, not literally. About a mile away. That's where Beetle Goose lived, our closest neighbor to the north. Between his house and ours there was nothing but pine trees, manzanita, madrone, and a small pond. He owned most of the land, or rather his wife had. It was a big place, over five hundred acres, and had been in her family for three generations. From our front porch you could see their house through the trees, an old ranch house with a porch on three sides, perched on the side of a hill.

His real name was Orval Croswell. His wife's name was Doris. She was a Taylor, and the Taylors went way back in this part of the county, to about 1860. Before his wife's disappearance we'd never called him Beetle Goose. Betty had come up with that after she heard that crazy story he told of what happened over there that night. We never printed that name in the paper. It was always Mr. Croswell.

"You've got to be kidding," Betty had said into the telephone. She winked at me. "Did you get this from Frank?"

I had been eating breakfast that morning. I figured it was Mabel on the phone.

"I suppose he says he talked with them?" She winked at me again. Then she reached for the writing pad she kept beside the phone and began taking notes. She turned around and looked at me, lifting her eyebrows. She thanked Mabel for the call, put the phone up, and sat down.

"You're not going to believe this," she said.

"Probably not. Try me, anyway."

"Orval Croswell phoned the Sheriff down in Placerville early this morning and said his wife was gone."

"You mean Doris?"

"Frank is over there now. He phoned Mabel about ten minutes ago."

"I don't get it," I said, buttering a slice of toast.

"I'm saving the punch line." She poured herself a cup of coffee.

"It must be a dilly."

"I said you wouldn't believe it. Orval said a flying saucer landed out back of their barn last night, about eleven."

"Probably a frisbee," I said.

"The visitors let down a metal ladder and invited Orval and Doris to come inside."

"Probably a floating crap game."

"Okay, you're very funny this morning. You know there's a story in this." She set her cup down as though waiting for my attention. She knew she had it. "There's more. Orval says they had a long visit, very friendly."

Sure, there was a story in it. But the wire services would send their own people. If the television people covered it, they'd do the same. Maybe if we were lucky we could sell a feature to one of the Sacramento papers. The big media people would take one look at Betty and me and figure us for a couple of local yokels. Unless we could find something they couldn't. We'd use it for our weekly, of course. There hadn't been so much excitement in town since Mrs. Holloway got in that wrestling match in front of the postoffice with Mrs. Finck, whose pet goat had wandered into the Holloway yard and eaten all the prize roses.

"The visitors told Orval and Doris they'd come from Betelgeuse. Doris expressed such interest in their description of life on Betelgeuse that they invited her to return with them. And she accepted." She took off her glasses and set them on the table. "It really does sound crazy, doesn't it?"

"The media will eat it up. I can see the headlines."

"You don't think they'll take it seriously, do you?"

I shrugged my shoulders. "You might be surprised. We're living in strange times."

We got our gear, remembered to take an extra roll of film for the camera, and drove over there.

Frank's patrol car was parked in the shade under a big live oak. He'd left the windows open and the radio tuned to the Sheriff's band. We saw them

down by the barn. When we got out of the car, Orval looked up, shading his eyes with one hand, recognized us, and waved us to come on down. Frank was walking around in a circle, staring at the ground, careful where he stepped.

In all the years I'd known Orval I'd never heard him return a greeting. He didn't reply when we wished him good morning. Just a slight nod of the head. Ordinarily I could read Frank's face but this morning it was official deadpan. He guessed where we'd heard the news. From Mabel, his wife.

He pointed to the ground. "Don't walk over this area. The Sheriff will want it roped off for the lab man. We'd better go up to the house and not disturb anything here."

"What is it?" Betty asked.

I saw a circular depression in the dry grass, about thirty feet across, where a heavy object appeared to have rested on the earth. So what? Orval could have done that by driving his tractor around in circles.

"It's where the saucer landed," Orval said. The way he said it sounded like a simple statement of fact, like a tour guide pointing out an object of interest. "Maybe you heard it land last night?"

"I was running the press until almost midnight," I said, "I couldn't have heard it, too much noise."

He looked at Betty. "Maybe you did?"

She looked at Frank. His face was a blank. For a second I thought she might giggle but she didn't. She knew Frank had a report to write, and because we were Croswell's neighbor, whatever we said, one way or the other, might go into it. "No, I didn't see or hear anything."

"Then how come you came over?" Orval glanced from Betty to me.

"We saw Frank's car and thought maybe something was wrong."

"I warned Doris," he said. "They talked her into it. I told her it'd cause no end of trouble. She wouldn't listen to me." He looked us right in the eye, all three of us, in turn. You couldn't read anything in his face. He underplayed the whole thing, very matter-of-fact, the way a rancher might talk about grain prices. His manner could fool you.

"Who talked her into it?" Betty asked, playing along.

"Those visitors from Betelgeuse. Doris went off with them last night."

"Okay," Frank said, "I'll ask the questions, if you don't mind." He stepped forward and motioned us toward the house.

"Let me take one picture, Frank," Betty asked. She motioned for me to hand her the camera. She knew Frank would refuse me, had I asked. She smiled at him. "Just one, of the landing site. I can shoot it from right here, where I'm standing." She shot the picture before he could stop her.

"Now wait a minute," he said, "you don't have any special privileges here. You can't bust in here and start taking pictures and asking questions. You're taking advantage."

Orval put out his hand. "It's my property. I ain't got nothing to hide. Let her have the picture."

"It's not for you to decide, Orval," Frank said, pushing us along.

"Come off it, Frank," I said. "You know damned well the whole place will be swarming with reporters in another two hours."

"That's for the Sheriff to say. He's on his way. Now you keep quiet and let me ask the questions. Otherwise I'm going to ask you to leave. I mean what I say."

When we reached the porch Orval took a chair, stretched out his legs, and looked off into the distance. Betty sat on the porch stoop, opened her purse, took out her compact and pretended to powder her nose. She was studying Orval's face in the mirror, but it didn't reveal anything. That wasn't unusual. He always presented the same countenance, a kind of reserve and determination. He was the kind of man who could match the stubbornness of a mule. He seldom showed any emotion. Not outwardly. Maybe in the set of his jaw or the line of his mouth, nothing more. I'd once heard a story from the highway patrol that he'd challenged a logging truck for the right-of-way at the intersection in Placerville. Now that's something you don't do in a family sedan, which is what he'd been driving that day. A logging truck, when loaded, weighs about fifteen ton or more, and with that much weight, they can't stop on a dime. Orval had lost a fender, but he wouldn't yield.

He was tall and wiry, about sixty. His face, like many men who spend much of their lives working outdoors, was weathered like the exterior wood of an old barn. It had texture. The deep blue of his eyes hadn't bleached out. He had a full head of hair, fine and straight, parted on the left side, and completely gray. When he dressed up in a suit, shirt and tie, he made a good appearance. When he wore his overalls, as he had that morning, he looked like a typical rancher or farmer.

Frank asked questions. Orval replied, not wasting words. He had that economy of speech you often find in rural people. Betty took notes, in shorthand. I knew she'd get it all down. Every once in a while Frank would glance over at her notebook, like she was getting something he'd missed. From where I stood I could see through the screen door into the front room. On the mantle over the fireplace was a framed photograph of Orval and Doris, taken last year on their fortieth wedding anniversary. We'd run that same picture in the paper. Betty had written the copy for the story. Orval had given me a copy of the print. If we hadn't thrown out the paste-up for that issue we'd have it over at the house, in the storeroom. I was sure it was there.

"I thought you said the Sheriff was coming?" Orval asked.

"He must have got held up," Frank said.

"Is that for publication?" Betty asked.

"You should have gone into comedy," Frank answered.

"Or into politics," she said. "I keep getting the two confused in my mind. Why is that?"

"I haven't the slightest idea," Frank said, keeping a sober face. Had the same words been spoken over Mabel's bridge table, Frank would have come back with a wisecrack of his own. He had wit. He'd proved it more than once.

Orval hadn't thought it funny. His expression was unchanged.

"Well," she said brightly, "I think we have enough for a story. Don't you, Don?" She looked at me.

"Oh, sure," I said. "May I make a suggestion, Orval?"

He looked at me sharply, then nodded.

"That picture in there, of you and Doris. The reporters will want a picture of Doris. If you let them have it, you might never get it back."

Frank looked at me, taking it in. I knew he'd take charge of the picture as soon as we left. You can't very well search for a missing person without a picture.

"I appreciate that," Orval said.

"That picture you took of the landing site," Frank said. "If the Sheriff says you can't run it, you'll have to turn it over."

"What landing site?" Betty asked. "I took a picture of Orval's pasture."

"You heard me," Frank said.

"It *is* a picture of his pasture. That's the image on the film. If the photograph is captioned 'Orval Croswell's Pasture' it's a simple statement of fact any number of people can bear witness to."

"Oh, for Christ's sake," Frank said.

When we drove out on the highway, Betty said, "I don't believe one word of it, do you?"

I looked at her and grinned. "There are two possibilities. Our neighbor is plumb crazy . . ."

"Or," she interrupted, "he is a very clever old turkey." She flipped her finger against the plastic cover of the notebook in her lap. "What do you think he did with her?"

I turned into our driveway. "Maybe nothing. Maybe Doris went to visit her Aunt Minnie in Cucamonga. Maybe Orval dreamed this thing up just to bug the Sheriff."

"Orval hasn't got a sense of humor," she said.

"That's what scares me," I said.

As matters developed, I'd been wrong about two things. I'd mentioned the picture of Orval and Doris hoping the reporters wouldn't get hold of it. At least not for a few days. I'd hoped the Sheriff would sit on it long enough to give us an exclusive on the print we had. Had that happened, we could have printed the picture and then sold it to a wire service, maybe television. I don't mean to suggest the Sheriff would do that intentionally, as a favor to us. He could care less. I'd been counting on bureaucratic procrastination. I'd found the picture in the storeroom when we got home, for all the good it did. Then I'd been wrong when I'd said reporters would be swarming all over the place. The Sheriff posted deputies to keep them out. They came but they didn't get in. Word had somehow leaked out about the story. You know how small towns are. By that time the Sheriff had taken Orval down to Placerville. Instead of the place swarming with reporters, it was swarming with deputies and investigators from the County Attorney's office. We never did hear from

the Sheriff about the picture Betty had taken. We thought at the time that was a real break. We didn't get a single call from the press, though some of them must have heard we'd been over there that morning. Well, Betty had said to me, to hell with them. A plague upon them.

Late in the afternoon we still held out hope of selling the picture Betty had taken in back of the barn. The landing site, Orval had called it. We'd printed it up and it looked real good. You could even see the circular depression in the grass. We felt pretty smug about it. We put out the word, Betty had said, let them come to us, then we set the price.

About five we heard a helicopter fly over the house, low, just clearing the pine tops. We went out on the porch and watched it fly over Orval's barn, hover there a moment, and then take off down the canyon like a bat out of hell. Around the barn a group of deputies waved angrily at it, while the wash from its spinning blade blew up a great cloud of dust around them.

We looked at each other. Betty had said, "You don't suppose?"

They had the story on the television news at six, but no pictures. It was on five different channels. You knew it was going to be a big story. What made it special, not just another flying saucer story, was that for the very first time a person was reported to have flown off in one. And that person was definitely missing. The TV man reading the story looked perfectly serious about the whole thing. Like he had the title to the Brooklyn Bridge in his pocket, all notarized and recorded, and could let you have it real cheap.

Then he hit us with it. Stay tuned in for the late news, at ten, he said, for pictures of Orval and Doris Croswell, and of the site where the saucer was said to have landed on the Croswell ranch.

Things were definitely not breaking our way.

Betty groaned. "Gawd, I get so tired of eating pancakes for dinner. A little country sausage on the side *would* have been nice. Was that asking for too much?"

"We still have the notes you took," I said. "We have a story."

"If we print it, they'll copy it. We live in an age where everybody copies everyone else. Has it ever occurred to you that the copying machine is the perfect symbol of our time? That, and the post-dated check."

"Don't be bitter. We copyright it."

"Better make five copies," she said.

The Sheriff had wanted Orval arraigned for the murder of his wife. The problem was, no body. No evidence of foul play. Even so, they kept Orval down in Placerville for a week. He wasn't booked, so they couldn't put him in the county jail. Betty found out he'd stayed at the Empire Motel, a guest of the county. While they had him down there they went over his ranch with everything from bloodhounds to metal detectors to probing rods, and found nothing. Orval had given a detailed statement but they weren't talking about it. I asked Frank why, and he said parts of it were so fantastic they couldn't release it, they'd be laughed out of town. It was locked up in the County Attorney's safe.

"How about a sanity hearing?" I asked.

"They talked about it. They don't want that, either. But they'll keep on it, in their own way."

"You can't go to trial without a body?" Betty asked.

"Yes, it's been done. But the prosecutor rarely gets a conviction. They looked it up."

"How many have there been?" I asked.

"Four. And one of those was reversed on appeal. The County Attorney won't touch it. He told the Sheriff to find the body. Then he'd prosecute."

"Ring around the rosy," Betty said.

"You didn't notice anything funny over there that night?" Frank asked. Sylvester, our Siamese cat, jumped into his lap. He rubbed its ears.

"No," Betty said. Then she looked at me. "Shall we tell him, Don?"

"Why not?"

"This hasn't anything to do with the night Doris disappeared. But a year ago, on a hot night, Don and I were sitting outside on the patio. We heard hammering over there. At first we didn't pay any attention. Then we heard voices. On a summer night when there's no wind voices carry a long way, especially up on this hill. We couldn't hear all the words but we knew it was Orval and Doris, quarreling."

"That hammering was the funny thing," I said. "We couldn't figure it out. It sounded muffled, like it was inside the house. It would start up, then stop. Orval would shout something at Doris then we'd hear the hammering again."

"We finally figured it out," Betty said. "We pieced together enough of the conversation. Orval was outside the house. She'd locked him out. She was inside, nailing shut all the windows and doors. It went on until past midnight."

"That's a weird one. Did it happen again?"

"Twice, that we know of," I told him.

"How did Orval get in?" Frank asked.

"Well," Betty said, "I suppose Doris finally took pity on him sitting out there. She probably let down a metal ladder and invited him inside for a friendly visit. Now you sit over there, behave yourself, and I'll tell you how wonderful life is on Betelgeuse. Something like that."

Frank grinned. He'd put on weight in the last two years and it looked good on him. He was a head taller than me, a year younger, and people still remembered him from his high school days, ten years ago, when he'd been the boy wonder of the track team. "How's the newspaper going?" he asked. Sylvester jumped from his lap as he stood up.

"Well, for a change, we're having waffles for dinner tonight," Betty said. "We'd ask you and Mabel over but I'm running low on blackstrap molasses."

"As bad as that?" he asked.

I didn't say anything. I wasn't in my best mood, but I put on a good face and walked him to his car.

The County Attorney was a man with a literal mind. He couldn't grasp the

abstract. It had to be translated into the concrete, by way of illustration or example. That's why he wouldn't act in the case until the body was found. Given that, he'd put together a case based on as much evidence as he could find. But the conceptual aspect, if any, wouldn't occur to him until the very end, if then, and then it would be elementary, lacking in insight. This worked both ways: as a limitation, but also as an asset. You put a hard fact before him and he wouldn't argue with you about it. Some people are so committed to a belief, or beliefs, they won't hear of an opposing fact. To them it isn't real, which says something about their grasp of reality. For all his emphasis upon proof, he wasn't taken in by circumstantial evidence. Once he had the facts before him he could infer cause and effect, whether it was phony or real. You had to give the man his due. Once he built a case it was put together as solidly as a tank, maybe not supercharged for speed, but I'd seen more than one cocky attorney crushed trying to oppose him.

Maybe you can understand now why he'd locked Orval's statement in his safe. He knew Orval would give it out to the press, in his own words, when they released him. That was all right with him, as long as it didn't come from his office. The media continued to play up the story. With Doris still missing, and no body discovered, some of the more sensational commentators obliquely inferred that she had indeed departed the earth that night in a flying saucer. An exhaustive search by the authorities had failed to find any trace of her, they said, and there was no evidence of foul play.

We'd got our own story out and printed the picture Betty had taken. She'd based it on Frank's interview with Orval, with facts, no opinions or suggestions. It did well locally. Otherwise, nothing. A big zero.

At the end of a week Orval returned to his ranch. He'd not been charged or arraigned. All that day a steady stream of cars drove up the private road to his house. The media people had a field day. Betty and I took turns watching through the binoculars. He held a press conference on the porch that lasted two hours. Reporters crowded around. The television people had so much equipment over there you'd think they were filming an epic. Later they all went down to the barn, Orval in the lead. They formed a circle around him while he gestured this way and that. Like theater in the round.

That night it was the lead story on the Sacramento television news. It was the first time the public had heard from Orval himself and they gave it a terrific play, almost ten minutes. Betty switched over to a San Francisco channel and there was Orval, sitting on his front porch, looking straight into the camera, talking in that offhand tone about his conversation with the visitors from Betelgeuse. She switched to a Stockton channel. Same thing.

She glanced at me. "You don't suppose they've got him on PBS, do you?"

"Why not?" I said.

Half an hour later he was on the network news, one of those feature bits they do.

I said, "This will do for the UFO phenomenon what Barnum did for the circus."

"And here we are," she said, "right next door to the damned thing. Don't you have *any* ideas?"

"I'm working on one," I said. I wondered what it was.

Five days later it hit the front page of one of the national tabloids. Everywhere we went that week we saw the damned thing. They blew up that picture of Doris, actually touched it up, to make her look much younger. Orval had been cropped out of it. But they saved him for the inside. A full page was given to an interview concerning his impressions of the saucer and visitors from outer space. I noticed they'd copyrighted it. My guess was that Orval had got a nice piece of change for it, probably around a thousand. Following the interview there was an article by a Dr. Philip Austin, professor of philosophy at some eastern university. You had no way of knowing whether he'd talked to Orval or examined any of the "evidence." To my knowledge, he hadn't set foot on the ranch. He treated the incident as one of paranormal phenomenon, not to be explained away by what he called "conventional reliance upon reality." He remarked that the very inconsistency of UFO sightings should be regarded as metalogical, each one suggesting a unique context of alternate realities.

One day I saw Frank in Georgetown and asked him if he'd read the article. He smiled, said yes, but he hadn't thought much about it. He'd been too busy looking for Doris. I wondered if the County Attorney had read it. I could picture the expression on his face, if he had, like he'd bitten into a sour apple.

Eventually the story dropped out of the news. Without developments, they couldn't get a new twist on it. Betty and I had the same problem. We'd run a little piece now and then saying the Sheriff's office was continuing to search for Doris, that a party of deputies had explored an abandoned mine shaft on the ranch, things like that. One day we saw them dragging the pond between our property and Orval's. He was down there with them, walking around the bank, actually helping with the grappling hooks.

One night Betty and I tuned in a television panel discussion on UFO's. There were these four experts, a moderator, and a set that looked like it had been borrowed out of a model home from some housing tract. The incident at Orval's ranch came up. Mention was made that Doris was still missing. They always came back to that, as though everything proceeded from it, like it was First Cause. That consideration, it seemed, was guarantee that Doris had been nominated for immortality. Betty made some wisecrack about how Doris was a sure bet to become the first saint in the new religion of propositional phenomenology. That's what it boiled down to, one of the experts said, propositional phenomenology. He argued that reality as phenomena is contingent upon sentient experience. A vacuum cannot be said to exist unless it is sentiently perceived.If it is not, he said, it isn't real, it doesn't exist. If enough people, a majority, come to believe in the validity of the UFO phenomenon, then it becomes propositional phenomenology, and more real than reality itself.

I got up and turned the damned thing off. We sat there in silence for a few

minutes, in the dark. I got to thinking about that word proposition, in a metaphorical way. In gambling there's a bet known as a proposition bet. It's a bet not covered by the rules. It appears to give you a break, but it doesn't. There's always a gimmick somewhere. The proposition hustler is a guy who offers propositions of his own choosing, but if you look at them carefully, you find he's rigged the odds against you. He considers everyone a potential mark. He gaffs you with his propositions. These guys are persuasive, pretend to be pleasant, knowledgeable good fellows who would never cheat anyone. But if you ever turn your head they switch dice on you.

"Don't tell me crime doesn't pay," Betty said. "Did you see that new car Beetle Goose got today?"

"I saw it," I answered. "The tabloids pay well."

"At first I didn't think he'd get away with it," she said. "Now I'm beginning to wonder."

"He won't," I said. "You overestimate him."

"What makes you think so?"

"Because he's running a scam. And every con man makes the same mistake."

"What's that?"

"Trading in ignorance."

It was October, the month of our wedding anniversary. This year, for a change, we wouldn't have to switch things around to accommodate the day we put the paper out. I'd finished the press run, put the papers in the car, dropped them off where we had retail outlets, and taken the rest to the postoffice. We were free for two whole days. For the past six years we'd celebrated our anniversary in the same way: an overnight trip to Reno, a little gambling, dinner and a show, maybe some shopping in the morning.

"You know what tomorrow is?" I asked.

"Hadn't you noticed I circled it on the calendar? In red ink, in the shape of a heart, like a valentine."

"Why don't we pack a few things and go over tonight? I can be ready in an hour."

"But can we afford it?"

"No, but let's do it anyway."

"We *could* stay here. I could get some work done on my book and you could overhaul the press. You said it needed it."

That was her pet project, the book. She'd been working on it for two years, whenever she could find time. It was about the history of the area, what you'd call local history, and she'd collected a lot of material for it, old photographs, diaries, reminiscences, newspaper clippings, and several notebooks of information.

"Yes, but it wouldn't be fun. All work and no play makes Don a dull boy."

"I hadn't noticed. You sure we can manage it?"

"I made some collections today. Why don't you wear your blue pant suit? You look great in it."

"You talked me into it."

I put the overnight bag in the car, gave Sylvester his dinner, plus a large plate of dry food he could munch on while we were away, and went back into the bedroom to get my wallet when she turned around, facing me. I whistled. The pant suit was powder blue, off the rack at J. C. Penney, but it fit like it was tailored for her. She wore her coppery color shoes and they were a complement to her hair. A pale blue scarf around her throat, fastened with a turquoise brooch, gave her a chic touch. She never wore much make-up. She didn't need it.

I locked the house and we left. We took our time driving over the mountains, admiring the scenery, and when we reached the summit there was a glorious sunset. Coming down the long grade, Donner Lake was almost lost in the darkness, but you could see the lights in houses twinkling around the shore, and the great black sheet of water where there were no lights at all. Seven miles out of Reno we saw the glow of neon in the sky, then we were on the interchange, taking the off ramp to Virginia Street. We inched our way through traffic to a motel on the edge of the central district, one of those places that caters to middle-class tourists, clean, comfortable, and less expensive than the downtown hotels. You couldn't get a waterbed there. But they did have those massage mattresses, where you put a quarter in a meter and they vibrate for half an hour. That's to relax your back from driving all day, or in case you get wiped out at the gaming tables and can't sleep.

We checked in at the motel, freshened up, then walked downtown. Our favorite casino was the Washoe Club. We'd never been there but what it wasn't crowded, noisy and exciting. Everything moved fast, or seemed to. In half an hour you could walk out busted or with a roll in your pocket. Betty liked to play the slots and I liked to shoot craps. We had an understanding: if we got separated we'd meet at the bottom of the escalator at ten, then go on for a dinner show. I worked my way through the crowd looking for a crap table. Every table was in play with a big crowd of people, often two deep, standing around.

I hadn't really been looking at faces and I almost walked on by. But there he was, at the crap table to my left. Maybe I hadn't recognized him sooner because of the way he was dressed. A checkered sport coat, slacks, and a print shirt open at the collar. Definitely an improvement over bib overalls. He hadn't seen me. I hung back in the crowd far enough where he wouldn't spot me if he looked around. Yet close enough to watch the play. He had a stack of five dollar chips in his hand. A little on the expensive side, if the action is fast. Most players bet with Ike dollars, minimum bet one dollar. The shooter sevened out and Orval lost five dollars. He put down ten dollars on the come line, not even looking up at the new shooter. It was a loud blond with too much eye shadow, who thought she could throw a natural simply by screaming. I don't think she knew the first thing about dice. Her boyfriend placed her bet. She threw craps and lost, which just goes to show ignorance of the game isn't any help. So much for beginner's luck. Orval put down fifteen

dollars and waited for the next roll. More craps. In less than fifteen minutes he was down over a hundred dollars. When his turn came to roll he put down fifty dollars and threw a ten, a hard point to make. Then he started playing the hard-way numbers, the hard eight, hard ten, good odds but all sucker bets. He dropped another fifty on those and still hadn't made his point. He threw a lot of numbers but no ten, tossing the dice the way he spoke, offhand, like it was an afterthought. Had he played the come bets he'd had every number on the layout covered and been money ahead. That's the way a good shooter bets when he throws a lot of numbers.

You can learn a lot about a person by the way he shoots craps. I'm not talking about the game itself. I'm not superstitious about it. The odds are against you, in favor of the house, and the longer you play the more the odds stack up against you. In the long run we're all of us dead, as Lord Keynes had put it. But there are ways to play and ways not to play. If you're losing, like Orval, you don't raise your bets, you cut them. You raise your bets when you're "hot," when you're winning. You play with the house money. You play the come line to win, taking the odds. Orval wasn't taking the odds. Orval was playing like a loser. I actually think if he'd made that ten, even the hard way, he'd have been surprised. You see, he expected to lose. He didn't know that. Few shooters do. But it was in his *attitude,* if you could read it.

He sevened out. He reached in his coat pocket and brought out another roll of five dollar chips. By the way he kept feeling in his pocket I knew they were his last. The stick man pushed the dice to the next shooter. Orval put twenty dollars on the line.

I'd been so absorbed in watching him I'd forgotten about Betty. I looked over toward a row of slots and saw her playing a dollar machine. She winked at me, nodded toward Orval, and I knew she'd been watching him too. Then she held up a roll of dollars in a paper wrapper, pointed to the quarter machines, and gave a big smile. I knew she'd won. That's how she played. If she won on the quarter slots she'd move up to the fifty cent slots. Progression, they call it. I couldn't guess why she'd decided to jump to the dollar slot unless she wanted a good vantage point where she could watch Orval.

He was down to his last five chips when a new shooter made two passes. Orval won about fifty dollars. Then he started playing the field again, losing two for one. A loud bell started ringing. Several people looked in the direction of the slot machines. It meant someone had hit a jackpot. The bell keeps ringing until the attendant comes over and shuts it off. They don't hurry, they like people to hear it. It's good psychology. I looked over and saw it was Betty. A red light was flashing on her dollar machine. She had turned to one side, hiding her face with her hand, so if Orval looked over he wouldn't spot her. Even at that angle I could tell she had a big grin on her face. Then she leaned over, hugging herself. The coins were still dropping into the payout box. I glanced at Orval but he hadn't even looked up. His eyes were fixed on the dice bouncing over the green felt. The attendant came up and shut off the bell. Then he took out a roll of bills and counted five of

them into Betty's hand. These dollar slots, when you hit a jackpot, don't pay you the full amount in coin. The attendant pays you the difference in paper money. She scooped the coins into her purse, put a dollar in to play off the winner, and walked over to the bar. I figured the house had bought her a drink. That's good psychology, too. She sat there sipping a scotch, watching Orval.

He had three chips left. He leaned over the table and put them all on eleven. It's a one roll bet. If eleven comes up, you win 15 to 1. What came up was craps. Orval was busted. He turned around and worked his way through the crowd, walking over to the credit window. I went over and joined Betty. She'd ordered a drink for me.

"How's it feel?" I asked.

"I wasn't even watching the thing when it hit," she said. "I was watching him. When that bell started ringing I nearly jumped out of my skin."

"Maybe that's the way to play them, ignore them, be indifferent, play hard-to-get."

There was a flush on her cheeks. It made her look sexy. "I never knew he gambled, did you?"

"He got wiped out," I said. "He dropped three hundred while I watched. He's probably in a lot deeper than that." I sipped my drink. He was talking to the girl at the credit window. "Since you're the big winner, I'll let you buy my dinner."

She laughed. "I can't remember when I've had as much money in my purse. Makes me feel awkward, like the foolish girl who walked into the little boy's room by mistake."

"I've heard that one," I said, "definitely not your style."

The girl at the credit window was shaking her head. That meant Orval had already cashed his limit of checks. They'll let you cash two at the Washoe Club, then you've had it. He turned and started for the street door.

"Let's follow him," Betty said. "I'm curious, aren't you?"

"Maybe he's going back home," I said.

"I don't think he is. Come on, finish your drink."

When we got outside he was already down at the end of the block, headed toward First Street. We kept a good distance behind. When he turned right on First we walked across the intersection and down the opposite side of the street. He went into a pawn shop in the middle of the block. We walked down to the next intersection where we waited at the corner, ready to duck out of sight when he came out. He wasn't in there more than five minutes. When he came out he walked back the way he had come, and away from us. He didn't even glance in our direction.

"I'm going to find out what he hocked," Betty said. "Maybe it's an artifact from Betelgeuse."

The pawnbroker looked up when we entered. He stood behind a wire screen tying a tag to an object he held in his hand. Betty walked up to him. I followed.

"Do you have any old comic books for sale?" she asked in a perfectly serious voice.

"I got the first number of *Superman*," he said.

"You've got to be kidding," she answered.

"Wait until you hear the price, you might not think so." He pulled open a drawer and brought it out, wrapped in a vinyl protector. "Two hundred dollars."

"Would you believe it? You never know what you'll find in a pawn shop," she said. "But it's more than I can afford. Maybe you have something cheaper?"

He gave her a sidelong glance and you knew from the expression on his face he figured she was putting him on. "I'd let you have this one cheap, but you don't qualify for the senior citizen discount. Sorry."

She gave him a fixed smile. "Is that brooch for sale?" She pointed to the object he'd tied the tag to.

"Not for two weeks, it isn't. I just took it in. The law says I have to keep it two weeks. The man has that long to redeem it."

"Oh, it was a man?" she said.

He didn't answer.

"Is that a real diamond?" she asked, looking at the brooch.

"It's real. Two of them. Any other questions?"

"If I decide about the comic book, I'll let you know."

"Sure lady, you do that."

When we were outside, she said, "You saw it? Did you get the number on the tag?"

"Yes, to both questions. It belongs to Doris?"

"You know that anniversary picture? The one they had on TV? The same one we have a print of? She's wearing it in the picture."

"I think our luck is changing."

"Gawd, it's about time. When we get back, we'll tell Frank about this. Then we run it in next week's paper. Maybe now we can do some business with the wire services."

"Don't count on it," I said.

"He really fooled me on that comic book thing. Who would have guessed he'd have the first number of *Superman*? I just said the first thing that came into my head."

I could have made a crack but instead I said, "You promised to buy my dinner. I'm so hungry I could eat a fried turkey."

We walked into the Washoe Club and took the escalator up to the dining room.

"Who ever heard of fried turkey? We're having prime rib tonight."

Before we left the next morning Betty went shopping and blew part of her winnings on some new clothes. Then we checked out of the motel and headed out toward the freeway. It wasn't until we were over the summit, going past

Dutch Flat, when she said, "You know, I have this feeling I'd forgotten something."

"Great," I said, slowing down the car.

"Oh, I don't mean that," she said. "I checked everything before we left. It's something else. The same thing occurred to me last night when we were in the pawn shop, when I saw the brooch. Like it's something I've seen before, but can't remember."

"In connection with Orval and Doris?" I put my foot back on the accelerator.

"Yes, I *think* so. It's in the back of my mind but I can't get at it. I almost thought of it when we went through Truckee. It was there, like a flash, then gone."

"It'll probably come to you. When you're not trying. Like a name does."

"I hope so."

We stopped in Georgetown, picked up the mail and bought a few groceries. As we passed Orval's driveway I noticed he was back. His car was parked up there, the new one. Fire engine red. You never know about these older guys. When we got home I phoned Frank, described the brooch, gave him the name of the pawn shop, and the number of the pawn ticket. He got all excited. He said he thought the Sheriff could get a court order to have it impounded as evidence. I asked him to call back when he had some news and he said he would.

We got back into our old routine. Betty typed some copy for about an hour. Then she took the car and drove down to Placerville to attend a meeting of the planning commission, something about a hearing she wanted to cover for the paper. I printed up a few pictures and did some work in the shop. There were a few phone calls, news items people wanted in the paper, nothing important. Betty got home at five. While she cooked dinner I turned on the radio for the local news. There was nothing about Orval or Doris. I looked into the kitchen once and saw Betty gazing out the window, thoughtfully, tapping her finger on the window sill.

"Still can't remember what it is?" I asked.

"No, but it almost came to me this afternoon. I'll get it eventually."

"Don't let the waffle burn."

"That's my line," she said.

She got up once during the night, around three, and smoked a cigarette in the living room. She rarely did that. She didn't come back to bed until four. I knew she hadn't remembered what it was. She'd have told me, then and there. Ten minutes later she was asleep.

Frank came by while we were eating breakfast. Betty poured him a cup of coffee.

"The deputy from Tahoe brought it down early this morning," he said. "It has her name engraved on the back. The pawnbroker loaned Orval a hundred on it. But it's worth more than that."

"What if Orval goes over and tries to redeem it? What happens then?"

Betty looked at him, her chin cupped in her hand.

"The pawnbroker will tell him we have it. But we're not telling him, yet."

"A good defense attorney would say it's circumstantial, even though it is suggestive," I said.

"True. It's not a lot in itself, but it's the first real break we've had. We found out Orval's made several trips to Reno. He's cashed over nineteen hundred in checks at the Washoe Club. He's also gone into his safe deposit box at the bank three times in the last month. The box is in both names. His and hers. We can't look in the box but the bank did show us the card with his signature and the dates."

"I'd never have figured Beetle Goose for a high roller," I said.

"What's a high roller?" Betty asked.

"Someone who shoots dice for big money," Frank answered. "We're still checking some other angles."

"You think that's the motive, gambling?" Betty asked.

"It's happened before," he answered.

"But it's too obvious," she said.

He looked into his cup. "You may be right. Maybe we can go only so far with this, then we run into a blank wall. Maybe not. One thing I do know, you can't build much of a case on just motive."

"We're back to the missing body again," she said.

He got up and put on his cap. "You folks have a nice time in Reno?"

We grinned at him.

"You two," he said, wagging a finger at us, "I ask a stupid question and I get a stupid grin." He waved and left.

Betty cleared the table and washed the dishes. I drove into town to pick up the mail. When I got back I found her sitting on the floor in the living room, going through a box of old glass-plate negatives. I thought she'd decided to do some work on her local history book.

"I think it's in here," she said.

"You mean what you've been trying to remember?"

"I remembered it while you were gone." She held one up and squinted at it. "You remember these old glass negatives Mr. Williams gave me? They were taken by his father, around 1890. He took pictures all through this area. There's one in here of the Taylor ranch."

"I don't get it," I said.

"You will, when I find it. It shows the ranch as it looked in 1890. If I remember correctly . . ." Then she paused, holding a plate up to the light, and said, "Well, I'll be damned, here it is." She handed it to me.

I took it out to the shop and put it in the enlarger. She flipped off the wall switch and for a moment, while our eyes adjusted to the dark, we couldn't see anything except the red bulb over the sink. I switched on the enlarger and adjusted the focus. The picture was bright and clear, projected on a square of white illustration board. I recognized only a part of the house. A wing had been added on sometime after 1890, and other remodeling done, which

didn't show in the picture. You had to take your mind back into time. But it was the old Taylor place, no doubt of it. You could drive over there with the picture and probably figure out the spot where old Mr. Williams had stood when he clicked the shutter.

Then I saw it.

I turned and kissed her on the cheek. "My Gawd, I think you've found it."

"But what is it, exactly?" She leaned closer, studying the image.

It was a tunnel in the hillside to the right of the house. You couldn't see inside it, though the door was open. It looked like an iron door. When the wing had been built on the house, sometime after 1890, it had covered the entrance to the tunnel.

"It could be a mine tunnel," I said.

"Or maybe like a fruit or potato cellar?"

"The iron door makes me think it was a mine."

"The Taylor's did own a mine. I've got something in one of my notebooks about it."

"That's got to be it. There must be an entrance into it from inside the house." I flipped on the wall switch and opened the door.

"What are you going to do?"

"I want a look at that house. Maybe I can figure out the location of the tunnel." I picked up the binoculars and went outside on the porch. You couldn't tell by the roof line where the wing had been attached. But when you knew the proportions of the original house it was easy. I could pinpoint the exact spot. The hillside behind the house was much the same as in the glass negative.

"Maybe it's gone," Betty said. "It could have caved in."

"Speculative," I answered.

The door opened and Orval came out. He was dressed in his gambling clothes. I watched him lock the front door and walk to his car. "I think Orval's going to try his luck again."

She took the binoculars and watched him.

"I think I'll follow him a way," I said. "If he goes to Auburn and gets on the freeway, he's probably going to Reno. But to make sure, I'll follow him as far as Colfax. If he does, I'll phone you from there. Then you call Frank, get him over here, show him that picture, and tell him Orval's gone to Reno. Okay?" Orval had reached the highway.

"I've got a better idea. I'll follow him. You wait for my call. Then you call Frank. You can go over there with him. I'd rather you go over there. One of us should. Think of the story."

"Weak stomach?"

"Frankly, yes. That old tunnel gives me the creeps."

"Okay, but don't let him see you. He knows our car."

She ran into the house for her purse and keys. Then she was off, waving her left arm out the window. I watched her turn at the highway and pick up speed. I went inside, poured myself a cup of coffee, took it out and sat on the

porch. I wanted to keep my eye on his place in case she lost him and he came back. She wouldn't call for at least half an hour.

It was forty minutes, to be exact. She said, "He's going to Reno. He just left here, headed east. He stopped for gas. You can call Frank."

"He didn't see you?"

"No way. I was way behind him." Then she hung up.

I dialed the Sheriff's office and asked for Frank. They told me he was out and couldn't be reached. That was a hell of a note. I left a message for him to call me when he got back. I never seriously considered calling the Sheriff and telling him. Why should I hand it to him, personally, on a silver platter, all tied up with a blue ribbon? The County Attorney wouldn't believe it if I phoned him, not until he saw the picture, and damned if I was going to drive down to Placerville with it and show it to him. What the hell? Why not? The worst they could say was I'd trespassed.

I got my flashlight. Betty had the car, so I walked over there, down the canyon, around the pond, and up the hill to the house. It was quiet except for a squirrel chattering in a pine tree. I circled around in back of the house. When the wing had been built on they'd left a big clearance between the house and the bank of the hill, at least twenty feet. I'd been wrong when I'd told Betty there must be an entrance into the tunnel from inside the house. Then I saw the storage shed, built flush against the hillside. That had to be it. The door wasn't locked. I pulled it open and looked inside. There was a workbench on the left side, an assortment of tools, and old paint cans. On the right side, a power mower and garden tools. Leaning against the back wall were several sheets of old plywood and wallboard. I moved them until I could see the two by four studs of the wall. It looked solid enough. I was sure the deputies had searched the shed, but then they hadn't known about the tunnel on the other side of the wall.

I couldn't see any hinges. I tried sliding the studs but nothing happened. Then I pushed and a portion gave way, opening on hinges fastened on the opposite side. I looked into a black hole. I shot the flashlight beam into the darkness. The walls and ceiling of the tunnel were of solid slate. That's why it hadn't caved in. There'd never been any need for timbers. I crawled inside. I couldn't see the end of the tunnel with the flashlight. There didn't appear to be any drifts or stopes going off at angles. That would save time. I'd walked about fifty feet when I saw it, something that looked like an oversize packing crate. It couldn't have been moved in there, intact. It was too big and heavy.

The lumber was fairly new and the nail heads weren't rusted. My guess was it had been built by carrying the materials in from the outside, and not very long ago. I walked around it. There was a ventilation pipe sticking out the top. In back was a door, solid and heavy, a hasp and a big padlock. I looked around and saw a crowbar leaning against the wall. I pushed it into the padlock and pulled. It bent but didn't break. I got better leverage, put my weight into it, and it broke. I opened the door.

There was this voice, talking to me.

"I couldn't imagine who it was," she said. It was Doris, holding up a candle, squinting at me. "I knew it wasn't Orval. He wouldn't have broken the lock."

I was speechless.

"Is that you, Don?"

"Yes," I said, recovering myself. "What the hell is this? Everyone thought you were dead."

"Dead?" She stepped out into the tunnel. "Missing, yes. I hoped someone would find me."

I glanced inside and saw a small bed, a table, canned food, a pitcher of water, and a chemical toilet in the corner, the kind you can get for camping trips. "Did Orval put you in there?"

"Yes, he did and I've completely lost track of time. What day is it?"

I told her. She seemed surprised. Her clothes were badly soiled and her hair was a mess. Otherwise she appeared in good health.

"I must look a fright," she said. "You can't imagine how much I want a hot bath."

"What the hell did he do it for?"

"We had a quarrel. I locked him out of the house. I always do that when he gets in one of his tempers. He broke in, through a window, tied me up and brought me back here."

"You mean he'd already built this thing?"

"Yes, I knew he was working on something in here, but I didn't know what. He told me he was putting up some storage shelves." She pointed to the canned food. "He left about an hour ago. He brought me something to eat while he was gone."

"Wasn't that nice of him?" Like feeding the cat, I thought.

"When I have my bath, the thing I want most is some scrambled eggs, bacon, toast, and hot coffee. Maybe some strawberry preserves."

"Did he tell you about the flying saucer?"

She looked at me curiously. "What flying saucer?" If I didn't know it before, I knew it then. For sure. Orval needed help.

I took her arm and led her out of the tunnel. When we were outside she covered her eyes with her hand and said something about how bright the light was.

"I think he locked the house," I said.

"I keep a spare key on a nail underneath the back steps." She stooped down, felt with her hand, and found it.

"Don't you think you should come over to our house? Betty will be home shortly." Then I remembered I didn't have the car.

"That's very sweet of you, Don. You've already done more than enough. I'll be perfectly all right as soon as I have a hot bath and something to eat." She unlocked the door.

I couldn't get over the casual way she acted. After being cooped up in that box for a month. Some women would have come busting out, full of

vengeance and indignation, breathing fire. "Frank will want to talk to you," I said. "You've been in the news. They'll want a statement from you."

"You tell Frank to come on over." She made it sound like nothing more than having a neighbor over for coffee and cookies. She turned and smiled at me. "Thank you again, Don. Tell Betty I said hello." Then she closed the door.

I thought about it all the way back to the house. As I reached the top of the hill I saw our car parked in the driveway. Betty must have really highballed it back. I slid open the patio screen and stepped inside the house.

"My Gawd, you scared me," she said, starting from her chair. "I didn't hear you drive up. Where's Frank?"

"I walked," I said. "I couldn't get in touch with Frank." I didn't quite know how to tell her, so I said, "Doris said to tell you hello."

She stared at me. Then, "You mean?"

I said yes, and told her what had happened, while she kept interrupting with questions and shaking her head in disbelief.

"A live Doris is better than a dead Doris any day," she said, "Some people are going to have egg on their face."

"But we're going to have country sausage in the skillet."

She smiled. "You remember that article in the tabloid and that jazz about propositional phenomenology? Talk about eating crow, I hope they choke on it."

A car drove up outside. It was Frank. I let him in.

"You tell him," Betty said to me, "he'd think I made it all up."

When I got to the part about Doris taking a hot bath, he interrupted, "May I use your telephone?" He called the Sheriff and repeated what I'd told him. We couldn't hear the other end of the conversation. Just an angry buzz, like bees swarming. Judging from the expression on Frank's face it wasn't all sweetness and light.

When he finished he came over and stood in the middle of the living room. "Where is Orval?"

I looked at my watch. "Right now, at this moment, I'd say he's standing at the crap table in the Washoe Club. Something tells me he made a line bet and threw snake eyes."

"Snake eyes?" Betty asked.

"It means he threw craps. He lost," I said.

"But isn't there an alternate reality to snake eyes?" She smiled.

"One and one make two," I said. "It's as simple as that."

Frank had caught on and was grinning.

"Really? You mean it's an absolute?" Her smile was brighter.

"You'd better believe it," I said.

POETRY

B.S. Field Jr.

FOR GERTRUDE STEIN

If, after groceries, the dirty to the laundromat,
dry-cleaning out, to work five times,
ten one-way tickets on Detroit's
mysterious, exotic freeway system,
twenty meals or so, and the subsequential
spasms of digestion,
seven morning dumps, a piss
sometimes more than once a day,
garbage cans out to the curb,
and next night in again,
laundry and dry-cleaning back,
if, after a few thousand weeks of that,
if anybody makes the old suggestion,
that there is more living to be done
after death, the answer takes
the breath away, but
what's the question?

Janet McCann

HOW THEY GOT HERE

they came to the end of the line
and she handed the suitcase down to him
and they got off, and there was nothing
there, and he said, wonder how much per acre,
and she said, I want the master bedroom here,
a western exposure, but she wasn't sure
which way was west, everything looking the same,
the sun not in any particular place in the sky.
they stood there with the suitcase
between them, watching the train
become a point, there being no curves or hills,
wondering how the track could just end like that,
sawed off clean, right in mid-segment.

so they built the house
with the bedroom facing the track,
and she often thought she heard the train at night,
but he said no, that's only the wind.

THE GIFT OF THE THIRTEENTH FAIRY

I am no seamstress, this is an alien art.
I stab myself in the thumb, bleed
a single drop into the cloth. Swear.
Think of Plath and dying. Fold
the bloodspot under the hem, stitch on,
uneven, ungainly, fast.
No metaphors
of mending will blot my poems.

I'm awkward with needles, true,
held together with scotch tape, staples, and glue,
yet how nice it would be for once
to be all of a piece,
dressed in a seamless gown, like the gathering dusk.

William Joyce

NAIL DRIVING

As a boy I learned nails
Could make a mother sing
And myself swing on the limp tail
Of her apron string.

Revenge was our motive – pocks
On the thing we could not make
Or own ourselves. Taking stock
Of the raised rent, the small lake

Where the commode ended and our fate
Began, we purposefully pissed and shat
And jiggled the flusher. We undammed hate.
When visitors came we passed the hat.

It was not exactly living, totalling
Each night our assets in corroded pipes,
Broken locks on peeling doors revolting
Constables and fastidious termites,

But it taught us to sing at night.
This was a melody in two chords,
Hammered spikes we drove upright
In the landlord's floors.

I held while my mother nailed.
Her eyes leaped for the shimmering heads.
The joists over every crossbeam wailed
"Justice." The bleached hardwoods bled

Sawdust on the emptied living room below.
Evicted, we embraced in transients' ways,
A cautious nod at the steel flowers by our toes.
We measured our love by how a house sways.

William Stafford

WHAT I'LL SEE THAT AFTERNOON

The young man who has to look
sideways through his glasses to see.
The lady with the little dog. (I'll put
down my pack.) A car jerking and
popping with its engine cold. Four bicycles
in line unreeling their shadows. (I'll
slowly stand up.) Down by the corner
someone beginning to scream. A brick
wall that breaks halfway across. (With a
whirl of my head I'll see it all tilt.)
The girl with the face. A piece of paper
caught in that corner tree.
(Everything stops,
and I am reaching out for everything.)

LOCKED ON OUR WAY

We left a light on in that cave. Some
days now that's the main thing there
is: our path goes on through nights,
past speeches we give, over moss on stones
for our feet at some place
where we might have lived.

That light stored underground that
we turned on years ago and then sealed
shut – some day it glimmers again,
the only window left open behind us
for those times to come in.

TOTEM PEOPLE, STREET PEOPLE

They need a bird, some thing to say
in the air what they think. They can't
believe unless a bird says it. So this
totem gets to talking, and for hundreds of
years Raven echoes on.

They listen and approve: "How true!"
But they don't want others to hear
Raven. He says not to worry –
the great cold will come back; those others,
they'll freeze. Raven's cold black eye
stares at the snow, and at them.

They think Raven is somebody else, not
their own voice, and they shake and say,
"Good, good."

They believe it.

ON THE ROAD LAST NIGHT

On the road last night I heard the tires
accepting their rendezvous the way I would meet
the rest of the world, wherever it is,
wherever I am, one place then the next
always expected – "Hello, glad to meet you,"
"Goodby, so long." And then just the road.

Loy Banks

REJECTION LETTER

no no man no rhyme its
out this season over thirty past its
prime superannuated like punctuation shakespeare
virginity self-abasement and marriage
engagements please then no corresponding terminal
sounds man this is the third world of pyrotechnic
sensitivity and psychopathology enjambment
man that is what we want and experimental
sex radical politics and liberated public toilets thats
our line the great issues of our age now
my advice as a poetry editor is to get back into
the mainstream before you muck it up

ARTICLES

The Use of IQ Tests in Blaming the Victims: Predicting Incompetence Rather Than Generating Intelligence

Milton L. Andersen

I. Blaming the Poor and Claiming Their Inferiority

The poor have always been blamed for being poor. Low-income groups, the working class, and the ethnic minorities have been labelled inferior and blamed for not having wealth and power by those who do. One particularly important inferiority of poor people, it has been said, is their innately inferior level of intelligence, an assumed low level of intellectual capacity that has been used as a justification for offering working-class and minority people an inferior education or no education at all.

This doctrine of inferiority began as a proper scientific product with Thomas Malthus in 1798. Malthus was England's first professor of political economy, a professorial Chair that he held in the East India Company College from 1805 until his death in 1834. Malthus claimed the "discovery" that the human population would always exceed the food supply. He believed that the poor innately were irresponsible and had a "low nature," that their poverty was decreed by the laws of Nature and the laws of God, and that poor people had neither the right to be born nor the right to live. From this doctrine Malthus advocated that the wages of working people always be kept low and that diseases and other death-producing causes be encouraged among the poor to increase their death rate. Malthus wrote: "Instead of recommending cleanliness to the poor, we should encourage contrary habits. . . . We should . . . crowd more people into houses and court the return of the plague."[1]

Herbert Spencer, the early 19th century English sociologist and social philosopher, was greatly influenced by the writing of Malthus. With views about the poor that were similar to those of Malthus, Spencer opposed any aid to the poor. He regarded them as unfit and said they should be eliminated: "The whole effort of nature is to get rid of such, to clear the world of them, and make room for better. . . . If they are sufficiently complete to live as they *do* live, and it is well they should live. If they are not sufficiently complete to live, they die, and it is best they should die."[2] These views of Herbert Spencer should not be confused with the Darwinian theory of evolution. Spencer, not Darwin, coined the phrase, "survival of the fittest," which he published in 1852, seven years *before* Darwin published the ***The Origin of Species.***

The Malthusian doctrine and Spencer's Social Darwinism formed the ideology of the rich and powerful. Those who had wealth did not see their money as created by the labor of the very workers they regarded as inferior. They saw it as deriving from their "superior fitness, hard work, and strong will." They saw the business and financial world as a natural social order, with themselves as the winners and therefore the fittest. John D. Rockfeller said in a Sunday-school address: "The growth of a large business is merely survival of the fittest.... the American Beauty rose can be produced in the splendor and fragrance which bring cheer to its beholder only by sacrificing the early buds which grow up around it. This is not an evil tendency in business. It is merely the working-out of a law of nature and a law of God."[3]

Andrew Carnegie, who became a millionaire from the labor of his steel workers said of business competition: "It is here; we cannot evade it; no substitutes for it have been found; and while the law may sometimes be hard for the individual, it is best for the race, because it insures the survival of the fittest in every department."[4] James J. Hill, defending business consolidation, argued that: "The fortunes of railroad companies are determined by the law of the survival of the fittest."[5]

William Graham Sumner, the American sociologist and political economist at Yale, was perhaps the central Social Darwinist in the United States. His works, like those of Spencer, were some of the most influential writings of the nineteenth century. Sumner held in high regard those he felt were the "fittest": "Let it be understood that we cannot go outside of this alternative: liberty, inequality, survival of the fittest; [or] not-liberty, equality, survival of the unfittest. The former carries society forward and favors all its best members; the latter carries society downwards and favors all its worst members."[6] To Sumner, the fittest were the millionaires: "The millionaires are a product of natural selection... because they are thus selected that wealth – both their own and that entrusted to them – aggregates under their hands.... They may fairly be regarded as the naturally selected agents of society for certain work. They get high wages and live in luxury, the bargain is a good one for society."[7]

The other side of Sumner's glorification of the wealthy was his derogation of the poor. He viewed poverty to be part of the natural order of things and a natural aspect of the struggle for existence. He felt that poverty would not be eliminated by social change but only by more competitive struggle. It was a simple case, he felt, that the poor lacked the necessary moral and economic virtues: "Let every man be sober, industrious, prudent, and wise, and bring up his children to be so likewise, and poverty will be abolished in a few generations."[8]

With Sir Francis Galton, these supposed scientific theories of inferiority were augmented by the belief that the degree of inferiority could be scientifically measured. Galton, a cousin of Charles Darwin, was England's most eminent psychologist in the nineteenth century. With Galton begins a long line of influential Anglo-American psychologists as contributors and

formulators of theories about the inferiority of the poor. Galton did not invent intelligence tests, but he tried. In the 1880s and 1890s he invented various apparatus for testing specific perceptual and motor abilities, tests he regarded as measures of individual differences in ability. The mental tests he developed did not survive as tests of intelligence, but his doctrine of psychometrically measurable individual differences in innate human intelligence did. The kind of test that came to be used as a measure of differences in innate intelligence was subsequently developed by Alfred Binet, in the early 1900s in France, and the concept of intelligence quotient (IQ) was developed by William Stern in Germany.

Galton's views were very similar to those of Spencer and Sumner. He believed that achievement in society is a fair test of natural ability. A person successful in business thereby proved his inherent superior ability. Galton believed that the ancient Greeks were much superior to modern Europeans and that blacks constituted a "subrace." As a prominent member of the British ruling class, Galton had a favorable view of the upper classes and an unfavorable view of the working class: "There can be no doubt but that the upper classes of a nation like our own, which are largely and continually recruited by selections from below, are by far the most productive of natural ability. The lower classes are, in truth, the 'residuum'."[9] Galton proposed a system of artificial selection, later called eugenics, because he felt that public sentiment would not permit a return to "natural selection." He proposed that the "superior" individuals of a population should be encouraged to intermarry and breed numerous offspring, thus forming a "gifted class" or caste. Likewise, those of "inferior" variations should be prevented from marrying by the weight of community sentiment or by "stern compulsion." Galton helped establish the eugenics education society in 1908 and became its first honorary president. In 1906, he founded the Galton Laboratory of National Eugenics at the University of London with Karl Pearson as director. He endowed a chair in eugenics which was occupied by Pearson until 1933. It was Galton's view that heredity was a far more powerful agent in human development than nurture. In his first book, ***Hereditary Genius***, Galton attempted to demonstrate that natural ability followed family lines and that eminent families were interrelated. Extending this analysis, he attempted to show that superior ability followed national and racial classifications. Galton began the practice of combining work in psychology with work in eugenics, which many American psychologists emulated.

Galton's viewpoint has been properly described as anti-democratic. He wrote: "Our present natural dispositions make it impossible for us to attain the ideal standard of a nation of men all judging soberly for themselves, and therefore the slavishness of the mass of our countrymen in morals and intellect, must be an admitted fact in all schemes of regenerative policy. The hereditary taint due to the primeval barbarism of our race... will have to be bred out of it before our descendants can rise to the positions of free members of an intelligent society."[10] Galton's disciple, Karl Pearson, said of

Galton's viewpoint: "Democracy – moral and intellectual progress – is impossible while man is burdened with the heritage of his past history. It has bound mankind to a few great leaders: It has produced a mass of servile intelligences: And only man's insight – man breeding man as his domestic animal – can free mankind. This was Galton's view."[11,12] (Galton also concluded that women were inferior to men in all abilities.)

Galton is a key figure in the history of psychology. He began the psychometric tradition, the psychometric approach to intelligence, the area called individual differences, and many of our statistical procedures. The psychological test has been American psychology's major product, and testing is probably the largest area in American psychology today. Surely, the most common activity in applied psychology is the giving of tests. The history of most of American psychology is, therefore, the psychometric tradition, rather than the laboratory-experimental tradition.

As Galton's pupil, Karl Pearson developed increasingly a strong hereditarian, conservative position similar to Galton's. In 1905, Pearson wrote: "You will see that my view – and I think it may be called the scientific view of a nation – is that of an organized whole, kept up to a high pitch of internal efficiency by insuring that its numbers are substantially recruited from the better stocks, and kept to a high pitch of external efficiency by contest, chiefly by way of war with inferior races, and with equal races by the struggle for trade routes."[13] Pearson believed that the environment played a very insignificant role in producing differences among individuals: "We inherit our parents' tempers, our parents' conscientiousness, shyness and ability, even as we inherit their stature, forearm and span."[14] By this reasoning, he brought forth data which he thought indicated intelligence, conscientiousness, health (including tuberculosis), and many other traits to be determined by hereditary factors.

Pearson was also very much worried about Jewish immigration into England. He concluded, after some studies, that Jewish people were innately inferior in physique and innately dirtier and that Jews as a race tended toward radical doctrines and city life. About the issue of cleanliness he wrote: "It does not seem to us that there can be any doubt as to the inferences to be drawn from these results, especially when we remember that personal cleanliness of the children is largely a measure of parental standards in these matters."[15] Pearson neglected to analyze the difficulties of living in very poor slum areas or to consider the origins of his own prejudices.

Pearson's general position concerning social and economic measures was stated in 1912: "Selection of parentage is the sole effective process known to science by which a race can continuously progress. . . . Where the battle is to the capable and thrifty, where the dull and idle have no chance to propagate their kind, there the nation will progress. . . . Give educational facilities to all, limit the hours of labour to eight-a-day – providing leisure to watch two football matches a week – give a minimum wage with free medical advice, and yet you will find that the unemployables, the degenerates and the

physical and mental weaklings increase rather than decrease."[16] Pearson's view about intelligence may be summed up as: "Intelligence can only be bred and no education or training can create it."[17] So stated the creator of the product-moment correlation coefficient, extensively used in psychology and education today.

Another influential psychologist was William McDougall, who came to America from England in 1920 to assume chairmanship of the Department of Psychology at Harvard University. McDougall wrote ***Introduction to Social Psychology*** in 1908, one of the first textbooks in that field and one which "has gone through more editions than any other text in psychology."[18] In that text, McDougall developed his theory of instincts and his belief in the predominant role of hereditary factors in human affairs. In 1934, McDougall wrote: "Innate constitution can be only superficially modified by environmental influences, whether in physique, in temperament, in disposition, in temper or in intellectual capacities."[19] McDougall felt that the characteristic features of French and English institutions and traditions are explained in terms of the larger amount of "Nordic blood" possessed by the English. Typical of his thinking is his statement that: "The colored men of the northern states showed distinct superiority to those of the south, in respect of their performance in the army intelligence-tests. Have they not a larger proportion of white blood? I do not know, but I suspect it."[20]

Strongly anti-democratic, McDougall felt that the operation of democratic forces would lead inevitably to a breakdown of civilization. In 1921 he wrote in his book, ***Is America Safe for Democracy?***, that Great Britain would decline as a civilization chiefly because of the successful development of its democratic institutions.[21] McDougall felt the same about democracy in the United States. He wrote in 1932: "They have already gone so far that it may well be questioned whether there is any hope for the survival of democratic institutions in America: whether some form of fascism or oligarchy does not offer the only hope of order."[22] McDougall was very much for "law and order" and believed that environmentalism was socially disruptive, as he believed Freudian psychology was disruptive, while an emphasis on heredity was "socially stabilizing."

Is America Safe for Democracy? was McDougall's warning about the perils of race intermixture. His theme was the inherent "superiority of the Nordics." To him, the achievements of the ancient Greeks derived from their "Nordic blood," whereas the Mediterranean blood of the Romans explains their lack of talent. The Nordics he regarded as innately more curious. The Swedes, he says, have so strongly developed the trait of curiosity that they have a high suicide rate, in which they attempt "to penetrate the impenetrable veil."[23, 24] This last statement of McDougall's is typical of many race theorists, who transform seeming defects into virtues.

Edward Lee Thorndike, another influential psychologist and professor of educational psychology at Teachers College, Columbia University, from 1898 until 1940, authored the epoch-making three volume ***Educational Psychology***

in 1913. In his political views, Thorndike was a conservative and a defender of capitalism. He wrote as late as 1940: "The poor in civilized countries now receive very much better value from the world than they give to it. . . . It is well to remind ourselves that this social order [capitalism] which also permits many. . . robbers and bums to live off the decent and industrious, many feebleminded to commit arson for pleasure, many mothers to pawn their children's clothes in order to get drunk, and many fathers to seduce their children as means of sex-gratification, is nearly or quite as good as any that man has yet operated, and that the difficulties may lie more in the persons themselves than in the social order by which they are managed."[25] Thorndike believed that since the "upper classes" contain a larger proportion of the intelligent and good people, educational opportunity and political and economic power should be distributed unequally to favor them.

Thorndike also believed that innate racial differences determined intellectual ability. Some early studies of ability, one by R.M. Bache in the 1890s and one by B.R. Stetson in 1897, gave results in which black children made scores *higher* than whites. Thorndike explained the results in this way: "The apparent mental attainments of children of inferior races may be due to lack of inhibition and so witness precisely to a deficiency in mental growth."[26] R. M. Bache, in whose study whites performed more slowly than blacks, explained his results by saying: "Their reactions were slower because they belonged to a more deliberate and reflective race than did members of the other two groups."[27]

Arthur Jensen in his 1969 *Harvard Educational Review* article favorably quotes E. L. Thorndike: " 'In the actual race of life, which is not to get ahead, but to get ahead of somebody, the chief determining factor is heredity.' So said Edward L. Thorndike in 1905. Since then, the preponderance of evidence has proved him right, certainly as concerns those aspects of life in which intelligence plays an important part."[28] E. L. Thorndike made this statement at a time when "Nothing was known about genetics outside of attempts to confirm Mendel's paper."[29]

II. IQ Testing and the History of Blame

IQ tests developed early in this century, precisely when the theories about innate differences between races based upon such "evidence" as whether one's head is longer than wider, or *vice versa*, were waning. Yet the myth of race and class inferiority continued – with renewed enthusiasm provided by the scientific trappings of the Intelligence Quotient. What appeared to be scientific evidence from the new "intelligence tests" was exactly what many people needed to justify and rationalize their racist beliefs.

Henry H. Goddard began around 1908 using tests developed by Alfred Binet in France. Curiously, although Goddard introduced the Binet tests into the United States, Goddard's interpretation of the test scores was exactly the *opposite* of Binet's, who was bitterly opposed to the idea of a fixed or innate

intelligence, a concept he regarded as a "brutal pessimism." Binet stated that one can literally become more intelligent with practice, enthusiasm, and method.[30] But Goddard was the director of the Department of Research of the Training School for Feeble-Minded Children at Vineland, New Jersey, and wrote the well-known book, ***Kallikak Family***. He was extremely hereditarian in his views. "The menace of the feeble-minded is not a figure of speech. . . . We need to hunt them out in every possible place and take care of them, and see to it that they do not propagate and make the problem worse."[31] "We may reasonably hope that such a policy carefully followed will in a generation or two largely reduce our feeble-minded population, and thereby our problems of Pauperism, prostitution, disease, drunkenness, and crime."[32] Goddard's view of democracy was that: "The people rule by selecting the wisest, most intelligent and most human to tell them what to do to be happy."[33] "The truest democracy is found in an institution for the feeble-minded and it is an aristocracy – a rule of the best."[34] Goddard felt that slums existed because of the nature of the people who lived in them: "If all the slum districts of our cities were removed tomorrow and model tenements built in their places, we would still have slums in a week's time, because we have these mentally defective people who can never be taught to live otherwise than as they have been living."[35] He also felt that low mentality determines low wages. He concluded that 45% of the American people were either feeble-minded or in the moron class.[36]

With Lewis M. Terman, who revised the Binet test and developed it into the Stanford-Binet, we encounter a man whose lifetime work was devoted to intelligence testing, individual differences, and studies of giftedness. Terman, like the others discussed in this section, was one of the most influential American psychologists. He was elected President of the American Psychological Association in 1923. In his autobiography Terman said, "The major differences in the intelligence test scores of certain races, as Negroes and whites, will never be fully accounted for on the environmentalist hypothesis."[37] Terman later modified his earlier views, however, and in 1948 wrote: "I still strongly suspect the existence of race differences, but I am now inclined to think that they may be less than I formerly believed them to be."[38]

In 1916, Terman stated that his tests showed a low level of intelligence to be "Very, very common among Spanish-Indian and Mexican families of the southwest, and also among Negroes. Their dullness seems to be racial, or at least inherent in the family stocks from which they come." He admitted that the question had not been sufficiently studied, but he thought he knew what future studies would disclose. He predicted that when future research is done, "There will be discovered enormously significant racial differences in general intelligence, differences which cannot be wiped out by a scheme of mental culture." Such tests, he felt, would probably demonstrate that many children "are uneducable beyond the merest rudiments of training. No amount of school instruction will ever make them intelligent voters or capable citizens in

the true sense of the word." Such children were doomed to be the future "hewers of wood and drawers of water." "Children of this group should be segregated in special classes and be given instruction which is concrete and practical. They cannot master abstractions, but they can often be made efficient workers, able to look out for themselves. 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."[39] The above quote from Terman is taken from the book ***The Measurement of Intelligence***, which was the manual and guide for administering the ***Stanford-Binet Intelligence Scale***, the prototypic and most important of all the so-called "intelligence tests."

Terman also wrote such things as: "The average Portuguese child carries through school and into life an IQ of about 80,"[40] while the "Nordic" child has an average IQ of 100. Terman made these kinds of statements up into the 1920s, but he did, apparently, revise his opinion in later years. However, as the father of the Stanford-Binet Intelligence Scale, did his change of belief substantially change the uses of that instrument? That is the important question. I think the answer is no. Arthur Jensen, for instance, has recently asserted that blacks are genetically inferior to whites to the tune of 15 IQ test points. There is nothing original in Jensen's thesis, except that his theory is buttressed with considerable statistical stitchery and finery. What he is saying has been said many times before, and if he had been writing just sixty years ago, he would have been only one of many such writers. The importance of Arthur Jensen is only that he has again raised this very explosive issue and has made arbitrary conclusions based upon very questionable assumptions and ambiguous data.

One should not assume that the "legacy of Malthus" has expired. We even have a poem dedicated to Malthus by one of the more outspoken modern Malthusians, Garrett Hardin:

> Malthus! Thou shouldst be living in this hour:
> The World hath need of thee.[41]

Hardin, who developed the notion of "lifeboat ethics," stated in 1969: "How can we help a foreign country to escape overpopulation? Clearly the worst thing we can do is send food.... Atomic bombs would be kinder. For a few moments the misery would be acute, but it would soon come to an end for most of the people, leaving a very few survivors to suffer thereafter."[42]

III. IQ Tests and Immigration Quotas

A rather unknown chapter in the history of "blaming the poor" was the use of IQ tests early in this century to label various white ethnic minorities as being genetically inferior and feeble-minded, a story presented in Leon J. Kamin's ***The Science and Politics of IQ*** in a chapter on "Psychology and the

Immigrant."[43] Immigration into the United States had shifted at the turn of the century from being primarily from northwestern Europe (English, Germanic and Scandinavian peoples) to being predominantly from southern and eastern Europe (Italian, Greek, Polish, Russian, and Jewish immigrants). There was much written about the "new immigrants" and their lack of the superior qualities of the Anglo-Saxon groups.

In 1923 Carl C. Brigham, psychology professor at Princeton, published *A Study of American Intelligence*, which contained his interpretation of the scores from the tests given to thousands of United States Army recruits in World War I.[44] Brigham studied the IQ tests scores of immigrant recruits with the central finding that test scores were related to the number of years immigrants had lived in the United States. This finding suggested to Brigham that the immigrants who had lived just a few years in the United States were essentially "feeble-minded," while those who had lived here for twenty years or more were as "intelligent" as native-born white Americans. Brigham's finding would ordinarily be interpreted as indicating that exposure to the culture and language found in the United States was reflected in the IQ test scores. Brigham disagreed. He asserted that: "We must assume that we are measuring native or inborn intelligence."[45] Brigham had estimated the percentage of Nordic, Alpine, and Mediterranean "blood" in each of the European countries with the conclusion that: "As the proportion of Nordic blood has decreased, and the proportions of Alpine and Mediterranean bloods have increased, the intelligence of the immigrants . . . decreased."[46] Added to these "races" were the Irish and Slavic "races." The Jews were difficult for the race-classifiers to categorize but were, nevertheless, labelled as "Alpine Slavs."

The work of Carl Brigham and many other psychologists was used by the United States Congress to pass the Johnson-Lodge Immigration Act of 1924. This law excluded the peoples labelled as "biologically inferior" (from southeastern and central Europe) and set up national origin quotas. Kamin wrote of this law: "The law, for which the science of mental testing may claim substantial credit, resulted in the deaths of literally hundreds of thousands of victims of the Nazi biological theorists. The victims were denied admission to the United States because the 'German quota' was filled, although the quotas of many other Nordic countries were vastly undersubscribed.[47] The quota limitation on emigrants from Germany prevented many Jews from escaping Nazi Germany.

Immigrants were also deported, apparently, through the use of IQ tests. Goddard was invited in 1912 by the United States Public Health Service to Ellis Island, then being used as an immigrant receiving station. He administered the Binet test to the immigrants and reported that 83% of the Jews, 80% of the Hungarians, 79% of the Italians, and 87% of the Russians were "feeble-minded."[48] Goddard reported in 1917 that "The number of aliens deported because of 'feeble-mindedness' increased approximately 350 percent in 1913 and 570 percent in 1914."[49]

Brigham later retracted his interpretation of the IQ test scores from the World War I testing program. In a 1930 article in the ***Psychological Review***, he stated that his interpretation of the World War I United States Army IQ data was "without foundation."[50] But even though the retraction was made, the effect on social policy and immigration law was not undone. Also, to make so massive a blunder apparently did not greatly hinder Brigham's career. After his book came out in 1923, "Brigham moved on to the secretaryship of the College Entrance Examination Board. There he designed and developed the Scholastic Aptitude Test, the primary screening instrument for admission to American colleges. By 1929 Brigham had been elected secretary of the American Psychological Association, and, after his death, the library building of the Educational Testing Service was named in his honor."[51]

IV. IQ Is Not The Same As Intelligence

It would seem that those who make profound claims about the intelligence of other people must certainly have a valid and sturdy measure of intelligence. But such is not the case. From the very beginning of IQ testing, it was simply assumed that the tests were measures of intelligence and that genetically-determined intelligence was what was being measured. One can search in vain through Lewis Terman's 1916 book, ***The Measurement of Intelligence***, for evidence of validity but will find only the assumption that his test does, indeed, measure native intelligence.

One validity claim of the IQ tests rests uneasily upon the correlation of IQ test scores with measures of school performance – such as teachers' ratings, grades, and scores on other tests. But these correlations, although they do indicate a relationship between school performance and IQ tests, can hardly be regarded as evidence of validity. Successful school performance is not the exclusive indicator of high intelligence, pure and simple. Since the content of the items on IQ tests is highly "school-related" and the tasks on the tests are similar to what one would find in the classroom, IQ tests *should* correlate with school performance. IQ tests are simply a sample of what is taught in the classroom.

Another claim that IQ tests are measures of intelligence is the assertion that: "Intelligence is what intelligence tests measure." This assertion first silently transforms IQ tests into "intelligence tests," and then tells us that we have to accept as the definition of intelligence that which the tests measure. This meaningless, circular approach defines one unknown in terms of another unknown and does not tell us anything. Yet this has been called the "operational definition" of intelligence. It is not a definition at all, but is, rather, an operational *specification.*[52]

There are other problems with the tests. While a detailed examination of the content of an IQ test would indicate what the test "measures,"[53] legal and other difficulties preclude such an examination. The actual content of the IQ tests is kept secret from the American public, and only qualified

professionals and a few others are generally allowed to look at the tests, which are kept under lock and key. Not only are they protected by copyright laws, but psychologists and others who use the tests are required to protect their secrecy. It is indeed ironic that IQ tests, whose scores have influenced the lives and careers of countless people, cannot be examined – or should I say "cross-examined" – by the very people who have been "sentenced" by them.

If we were to examine the ***Stanford-Binet Intelligence Scale***,[54] the first widely-used IQ test in the United States, we would discover a great variety of items. However, a common denominator runs through all of them. The words and other items on the test are said to be "familiar objects," but they are most familiar to persons from an educated, white, middle-class, early 20th-century culture. Some familiarity with these objects and items can be gained from children's storybooks and from nursery schools, those "creative playthings" strikingly similar to the toys, blocks, and other items used in IQ tests. On the Stanford-Binet and other IQ tests, a child is asked not only to be acquainted with an object or item, but also to know "what it is called." The answer is marked wrong if it is not the one which the scoring standards of the test suggest is the correct answer. So, a child who is unfamiliar with certain objects, or with the words used in the dominant white, middle-class culture to label them, will tend to get a low IQ score and thereby be labelled as "unintelligent." This bias is built into the tests and penalizes all children who are not white and middle-class, but particularly the low-income and working-class groups – ethnic whites as well as Blacks, Mexican-Americans, Asians, and Native Americans.

Further, the IQ testing situation itself has strong influences on the scores obtained. The testing situation is one of considerable stress and uncertainty for many children. A child who might be labelled as "mute," "monosyllabic," or "of low intelligence," in the testing situation might be energetic and articulate in a different situation. William Labov, a linguist, tested children in two different situations. One was the standard test situation to assess language competence. Here, an eight-year-old Black child's speech was monosyllabic, placing him in danger of being labelled "linguistically and culturally deprived," even though the interviewer was a Black person known in the neighborhood. The same child acted very differently in a less formal setting where the same interviewer went to the boy's home, brought one of the boy's friends with him (as well as some potato chips), lay down on the floor, and began talking about taboo topics in dialect. "Under these circumstances the mute interviewee becomes an excited participant in the general conversation." Labov's conclusion from this and similar examples was that the standard testing situation elicits intentional defensive behavior from the child, who realistically expects that to talk openly is to expose himself to possible insult and harm.[55]

It is often ambiguous to children just what is going to happen in the IQ testing situation except that the event is usually very serious to the adults in

charge. Children usually do sense that they are being tested and evaluated. (It would be an interesting study to collect the actual explanations that are given to children when they are to be IQ tested.)

In an experiment conducted in 1970, William Fryckman and others looked at the effects on children of two different "IQ testing situations": 1) A standard, "serious" situation, and 2) A game-like, informal situation. Ten children, aged 3, 4, and 5 years, were in each situation. Each of the twenty children were presented the 18 cards from the Stanford-Binet with pictures of objects on them. But a nineenth card was added, which was totally blank and the standard question was asked with each card: "What is it; what do you call it?" To the blank card, all of the children in the game-like situation responded immediately with: "Hey, there's nothing on it!" or similar responses. Very different responses occurred in the standard testing situation: nine of the ten children did not answer at all and cast their eyes downward or away from the experimenter. These children seemed very stressed by the situation and uncertain about what to do.[56]

Curiously, Arthur Jensen himself has contributed evidence about the influence of the testing situation on the IQ scores obtained. He wrote that a retesting of a child "From a poor background and of a different race from the examiner . . . results in a boost of 8 to 10 IQ points as a rule."[57] Jensen is the person who has based his theory of genetic difference between blacks and whites upon an average 15 IQ point separation. Because the IQ examiner is usually white, and Jensen's data are most likely based upon the first testings and not retesting, he should reduce by 8 or 10 points that average 15-point difference.

In short, the IQ score is not a "pure measure" that exists in pristine isolation from the rest of the human environment. The data obtained from IQ testing reflect a very special, "hot-house" kind of situation, and one must be cautious in generalizing to other situations. A child's mood and motivation also affect IQ results. A child may receive high scores on one day and low scores on the next. A child who is more familiar with the speech patterns of the examiner will be more comfortable in the situation than one who is not and will also have an advantage in understanding subtle verbal cues and knowing what the examiner is getting at. The IQ test score itself does not indicate what influences were acting upon it; therefore, exactly what it represents for each child is uncertain.

V. The Doctrine of Limited Potentiality and the Prediction Model of Education

The use of IQ and similar tests is embedded within a doctrine which asserts that every person has limits to his intellectual capacity: the doctrine of "limited potentiality." A whole series of assumptions are contained in this doctrine: 1) That every person has limits to his/her intelligence; 2) That these limits are located *within* the person; 3) That intellectual capacity is

fixed or fairly unchangeable over time; 4) That some people are more intelligent than others; 5) That intelligence is a biological trait, or similar to a biological trait, rather than being a social construct; 6) That intelligence is validly measured by our present IQ tests.

The doctrine of limited potentiality in the schools has led to a tremendous amount of testing, labelling, classifying, sorting, and tracking of school children because the proper role of the school, as seen in this doctrine, contains the following elements: 1) Each student's capacity can be ascertained by testing; 2) Students should be placed according to their abilities in their proper class (or track) or proper reading group within a class; 3) Children are benefitted by being so tested and placed; and 4) Children should receive instruction at a level of complexity "according to their abilities." This differential and unequal form of education follows directly from a commitment to the doctrine of limited potentiality.

IQ scores thereby become predictive statements about a child's intellectual capacity. An IQ score suggests that a person will remain at that IQ Level. Any statement about a person's intelligence or capacity includes a silent prediction (assumption) about the person's future performance. Statements that a student is "graduate school material" or "college material" or "she's an A-student" or "he's only a C-student" are also predictive statements. Common to all such predictions is the "is form." The statement that "George is stupid" asserts that he is now stupid and silently asserts that he will continue to be that way in the future. The "is form" prediction is frequently heard in teachers' coffee room chit-chat and is often seen in the cumulative records kept on each student in the school office. Anyone who is around a school for any length of time soon becomes accustomed to the constant conversation and concern about "who is capable" and who is not.

The use of testing for predictive purposes is often defended or advocated on the grounds that "tests predict success" and "tests tell us who the smart ones are." This is true, but with some very serious problems about *why* the predictions become true. It is also true that tests predict failure. Any test from which we derive differential predictions will be used to predict success for some and failure for others. In fact, with success or "good marks" being defined as possible for only a few capable people at the top, tests predict failure more massively than they do success. To predict failure and not attempt to prevent it is a form of fatalism.

Worse, prediction often becomes destiny. The predicted "level of ability" often becomes, tragically, the actual level of performance of the child. This self-fulfilling prophecy has become well-known from the work of Robert Rosenthal, who with Lenore Jacobson published ***Pygmalion in the Classroom***. Subsequently, Rosenthal has reported 242 studies of the self-fulfilling prophecy, which he labels the "Pygmalion effect."[58] What happens is that teachers tend to bring about the actual level of performance in their students that they expect from them. They do this by teaching more, demanding more, challenging more, and giving more feedback to those students whom

they regard as capable. The teachers also act more warmly toward their "special" students. To the students whom the teachers regard as less capable, they act less favorably toward them in all of the above aspects. Rosenthal has also reported a study in which black, low-income children surpassed their teachers' expectations of them only to receive resentment and complaints from their teachers instead of praise.

The assumption often made in educational prediction is that the processes or events that give us valid predictions are located "inside the child." The assumption is that the relationship between the predictor (a test score) and the predicted events (grades in later years) derives from inferred constancies *within* the person. Yet it is just as realistic – and indeed more realistic – to "relocate" the predictors and see them as deriving from the environment: in the teacher-learner interaction in the classroom, for example. In this approach, the relationships that occur between predictors and predicted events are due to constancies in the teaching-learning environment. All those correlation coefficients listed as validity data by IQ test publishers can be seen as evidence of constancies in the educational environment rather than as evidence of fixed IQ.

An example of relocating the source of our predictions into the environment might be a simple coin-tossing analogy.[59] Suppose that a coin has been tossed 1,000,000 times with results of 50% heads and 50% tails. What would we predict for the next toss of the coin, and what information would we need? When this example is presented to a class, almost everyone asks *only* about the coin and about the prior sequence of tosses and not about the landing surface. However, if a trick is involved and a table with rows of narrow slots is suddenly introduced as the landing surface, the next toss will definitely land on edge. The importance of the environment, the landing surface, cannot be overstated. The obvious analogy here is that the coin and its properties represent the school child and his/her inferred stable competencies. In the cases of both the coin and the child, we typically assume that our predictions derive from the object and its characteristics rather than from the environment.

Prediction becomes destiny for reasons in addition to differential teacher expectations. "Tracking," itself, can *cause* differential achievement because of differences in education between tracks. A standard three-track system in the public schools might have: 1) A college-bound track for the students regarded as the most capable; 2) A business or general track for the students in the middle; and 3) A vocational track for those students predicted to be "going nowhere." In elementary schools, names of birds are sometimes used for identification: robins, bluebirds, and orioles were once very popular. Names of colors are in vogue in other schools: orange, red, and brown. Or, tracks may be referred to as "self selected ability groups" or "homogeneous interest groups." Schools and school districts usually deny the existence of tracking, but a question put to a child in almost any school about: "Where is the dummy class?" or "Where is the smart kids' class?" will get an immediate

answer. The school children themselves often refer to the tracks as: "the bookworms, the socials, and the dummies." The tracking system, no matter how it is camouflaged by pseudonyms, is a form of segregation *within* schools that replaces segregation between schools. The tragedy of this form of differential education is that once a child is assigned to an ability-level, he tends to be trapped there. Prediction then does become destiny.

Tracking can also occur *within* a single classroom. Children can be assigned to various "reading groups" on the basis of their predicted reading ability. In a class of 32 students, there may be eight reading groups, with one group of four students the "fastest readers" and on down to the "slowest readers." The children in each group will be taught "according to their abilities," with the fast readers being taught more difficult and challenging material. The differential treatment leads to differences in achievement. Teachers then congratulate themselves on how well they have been able to predict future school performance.

Why all the predicting and differential treatment? It derives directly from a commitment to the doctrine of measurable, limited potentiality, making education into a very competitive business with constant concern for "who is capable." It is a kind of horse race (or rat race!) in which the attempt is made for early identification of the winners. IQ scores and percentile scores are nothing more than rankings, but such rankings do not give us information about how well a person is doing in school, except in terms of how well a person is doing *as compared to others.* It gives us information only of the kind: "He came out 37th in the race." This is truly competitive-comparative testing, and it reveals what seems to be the basic commitment of American education.

A competitive and differential model of education is clearly not compatible with a democratic educational system. The purpose of our public schools should be to produce ever-increasing capabilities in *all* our students and not to predict who the winners will be. An educational system which predicts that many of its students will fail and then acts to bring about the fatalistic prediction is engaging in a destructive, self-fulfilling prophecy. This is the "brutal pessimism" that Alfred Binet so forcefully denounced many years ago.

The Bakke case constitutes a recent example of the use of such prediction models. First, the Medical College Admission Test (MCAT) lacks adequate validity for selection purposes,[60] and second, even if a predictive instrument does have adequate validity for selection purposes, it can still perpetuate discrimination. If we think of a predictive instrument (MCAT or IQ test) not as a predictor, but as a criterion measure whose scores reflect prior educational experience, ethnic and low-income groups will score differently from affluent, middle-class people because of differing educational experiences. Test score differences, therefore, provide a measure of the degree of previous discrimination in education, rather than indicating immutable differences in ability.

VI. The Theory and Policy of Unlimited (Unknowable) Potentiality.

A neglected possibility throughout the history of American education has been the theory of unlimited potentiality, a theory in complete opposition to the limited potentiality doctrine and to the predictive model of education.[61] "Potentiality" is an umbrella term which includes such concepts as intelligence, capability, capacity, competence, and ability. Under the theory of unlimited potentiality, the concept of intelligence is transformed completely. The sequence of seven assumptions that are part of the doctrine of *limited* potentiality become transformed as follows under the theory of unlimited potentiality:

1. **A person does not have knowable limits to his/her intelligence.** The theory of unknowable potentiality receives strong support from the field of genetics. The evidence derives from the concept of the norm of reaction, the most basic concept in developmental genetics. The norm of reaction of a genotype shows its phenotypic expression (the resulting characteristics) that develops in a series of different environments. Richard C. Lewontin states that it is *not* a viewpoint of modern genetics that "The genes set the limit or the maximum of a character while the environment determines how much of that 'limit' will be realized or fulfilled. . . . There is nothing in developmental genetics to sustain this idea of differing genetic potentials." One would need to know the norm of reaction for intelligence in order to know something about the limits of intelligence. The type of experiment that would be required to ascertain the norm of reaction would be a barbaric one: "But such an experiment is quite impossible for any human trait, especially any human behavioral trait, because it is simply impossible to produce a large number of human beings, all of whom have the same genetic constitution, and then to raise each one in a different controlled environment. We would need a large number of groups of 'centuplets' and dictatorial power to put each in a different environment, obviously an absurdity. For that reason, *no one has ever been able to characterize human norms of reaction for any behavioral trait* (or for any human trait at all)."[62]

The developing intelligence of an individual has a norm or range of reaction that is not predictable in advance. Jerry Hirsch, a behavior-geneticist, says of this: "In most cases the norm of reaction remains largely unknown; but the concept is nevertheless of fundamental importance, because it saves us from being taken in by glib and misleading textbook cliches such as 'heredity sets the limits.' Even in the most favorable materials only an approximate estimate can be obtained for the norm of reaction, when, as in plants and some animals, an individual genotype can be replicated many times and its development studied over a range of environmental conditions."[63] The inhuman and grotesque experiments that would be required to support any statements about the limits of intelligence have not been done; let us hope that they are never done, for they need not be.

Similarly, evidence to support the opposing doctrine of limited intelligence is lacking. What "evidence" does exist has usually been in the form of studies which purport to demonstrate that IQ is largely inherited or genetically-determined. The work of Sir Cyril Burt has been frequently quoted as the basic support, although his work has recently been thoroughly discredited because of fraud or carelessness by Burt. Kamin, in his review of Burt's research concluded: "The numbers left behind by Professor Burt are simply not worthy of our current scientific attention."[64] Oscar Kempthorne, in an analysis of methodological and conceptual errors in the "nature-nurture" controversy, said of Burt's work: "It seems to be agreed by all protagonists that there are good grounds for considerable doubt on the data base he used. . . . Even if Burt's data were 'clean,' the Burt studies are not experiments, they are merely controlled observations."[65]

Kamin also unearthed serious errors in three other frequently-cited twin studies. In one of these, the Shields study on separated identical twins, we learn that what Shields meant by "separated" was not very separated at all. One pair of twins was brought up within a few hundred yards of one another, another pair lived next door to each other. In only 10 of 40 cases were the twins clearly separated.[66] The Shields study, like Burt's studies, supposedly provided evidence of high correlations between the IQs of members of identical twins reared separately. If they had actually been reared in genuinely different environments, these correlations might have provided evidence of the genetic determination of IQ scores, which is often regarded as evidence for fixed limits to IQ.

2. **Any limits or blocks to one's increase in intelligence are located in the environment, or derive from the environment, and are removable by environment-person interaction.** This approach locates limits in the environment, rather than within the person. Constancies in the environment can produce constancies in IQ test scores over time, scores which reflect the environmental constancies of the persons tested, rather than any supposed fixed abilities within the person. We should not blame the schools and teachers, however. It would be fairer to state that our hierarchically organized, competitive system forces upon the schools an ideology and a set of priorities that make an equal and productive education of all students impossible.

A good part of being able to learn in school depends upon correctly and thoroughly learning what was previously taught. Many students incorrectly or only partially learn something but are pushed on to new material because a curriculum plan or some schedule demands it. Thus, the student has even greater difficulty learning the new material, which requires mastery of prior material. To counteract such limits or blocks to continued learning, process analysis (a procedure described in the final section of this paper) can be used to analyze how a student thinks or solves a problem.

3. **Intellectual capacity is not fixed or unchangeable.** Once we have gone beyond the notion that intelligence or IQ is fixed or genetically-determined,

we can begin to ask some interesting questions: What are the influences operating on IQ scores? What brings about the variability among individuals and differences between groups in IQ scores? We know that various identifiable ethnic groups do differ in terms of average scores on IQ and other tests, but these very differences in IQ scores – and in the scores from other tests, too – which have been cited as scientific justification for discrimination and inequality in education, can just as well provide powerful evidence of discrimination and inequality in education.

4. **Some people may be described as "being more intelligent" or as "acting more intelligently" than other people, but this says nothing about the fixity or constancy of intelligence.**

5. **Intelligence is a social construct.** The term "intelligence" is like a chunk of soft clay that can fit into any set of preconceptions held by the definer of the term. Often, a person is judged to be intelligent to the degree that he is similar to the person with the power to do the judging. A favorite definition of the concept in Western European society is that intelligence is the "ability to do abstract thinking." Linked to this definition is often the statement that mathematics and other forms of abstract thinking are difficult to do and are done well by only a few people. Therefore, it is concluded, abstract thinking is a form of "higher intelligence." But there is no necessity to reach such a conclusion: those who have learned mathematics may be those persons who were taught well. We may not know how to teach mathematics or other abstract systems very effectively.

Cultures and societies differ in how they define intelligence. Even within a given culture or society, there is considerable disagreement about what actions are labelled as intelligent. Within the field of psychology, there is a whole array of definitions of intelligence. In a study by Cole, the Kpelle rice farmers of North Central Liberia in Africa were very skillful at estimating the quantity of rice in various containers, while Yale students were not. Yale students, however, were more skillful in tasks such as distance judgments.[67] What skills should be included in the concept of intelligence? Both? Or do we simply decide that whatever complex skills are highly valued in a society shall be classified as intelligence?

There is also the problem of how many components of intelligence exist. Some psychologists have opted for just one component, a "general intelligence;" some say just a few components; and some say very many. Guilford has written of some 120 components of intellect.[68] With these conceptual problems, the status of the concept of intelligence as a cultural and social concept seems evident.

6 and 7. **Intelligence, as a capacity, is not measurable, and it is therefore not validly measurable.** While performance is "measurable," capacity or potentiality is not. In addition, what is meant by "measurement" is often much less than what we have been led to believe. The lowest level of measurement is merely categorization ("nominal measurement"), such as separating a box of fruit into apples, peaches, and plums. The next level is

ranking, or "ordinal measurement," such as assigning first, second, and third, and fourth place to the runners in a race. Most of what is called measurement in psychology is at these two low levels.

VII. The Generative Model of Education.

The purpose of democratic education is to generate, create, and produce increased abilities in *all* students with every year spent in school. This generative model requires a commitment to the allied theory and policy of unlimited potentiality. Our current testing and assessment procedures are destructive of this purpose, simply producing scores that are used to rank or compare students against one another, a comparative kind of information that is not useful to the teacher, student, or parents. All testing and assessment procedures should indicate directly to the teacher and student "what to do next" in the teaching/learning process, rather than producing static descriptions of inferred capacities and capabilities that are used competitively.

The generative model of education would demand that we look for and develop what a child already knows when he enters school. It would ask that we look for knowledge and strengths in a school child, rather than emphasizing and recording his weaknesses. We would nourish and build upon these strengths. Children enter school with various cultural and ethnic backgrounds which are not deficits, but indicators of differences in knowledge which should be regarded as strengths. To generate increased ability in all children would require a respect for all cultural and ethnic experiences. Some of the educational methods that might be utilized could be the "key vocabulary" of Sylvia Ashton-Warner[69] or the "generative themes'" of Paulo Freire.[70] But the generative model of education is not a set of teaching procedures. It is a policy and a commitment of the entire society and its educational system to the generation of competence and knowledge in all of its citizens. The ideology which asserts that some individuals and groups are more intelligent than others is destructive of equal education for all people.

VIII. Process-Analysis: A Procedure that Derives from the Generative Model of Education.

Many possible teaching/learning methods would be effective within the generative model, but one of the best would be "process-analysis," a procedure in which the goal is to make the student's thinking process as observable as possible: to analyze *how* a student thinks and does his work, rather than to ascertain his score or his comparative ranking with others. The emphasis at all times is on the thinking of a child – to find out the actual steps and procedures a child uses in solving problems in math, in reading, and in writing. The thinking of the student must be respected and carefully observed, regardless of what that thinking is.

Since thinking is a covert process, various procedures are necessary to make the process more observable:

1. The student should talk out loud as s/he works.
2. The teacher or tutor should talk out loud as s/he shows the student how to work problems, etc.
3. A dialogue may be started by asking questions: What goes here? Why did you do that? Are you sure that is correct?
4. Fingers or pencils should point and move during the work. The written word must be connected with the spoken word, speaking synchronized with pointing.
5. Abstract, cognitive tasks should be connected via actions with objects or pictorial representations.
6. The teacher's attitude must emphasize the process and not "getting it right" on the first attempt. (The correct way can come later.) Teachers should take a game-like, playful approach to learning.

At first glance these procedures look as if they can be followed only in a one-to-one relationship utilizing tutors. Though process-analysis does, indeed, work quite effectively in that situation, teachers can also use it with the large classes currently seen in the schools. A teacher can spend a few minutes with each student who is blocked in his/her progress. If this were done regularly as the need arose for a particular student, it should require no additional time of the teacher over the course of a semester.

Many teachers have been using procedures similar to process-analysis for a long time. I now realize that when I was a student in a two-room country school with four grades in each room, the teacher was very effectively observing how we worked. Out of sheer necessity and correct thinking, she had us talk out loud as we did our arithmetic at the blackboard. She listened carefully to our thinking processes as we worked and could see exactly *how* we arrived at our conclusions. Many other teachers are presently using similar procedures, but they must be followed more universally and systematically. In general, students are a wasted resource in most classrooms. Students could teach and tutor one another, an activity they seem to enjoy and from which they seem to benefit greatly.

The concept of process-analysis derives from the philosophy of Jean Piaget, the eminent Swiss psychologist. An example of process-analysis from Piagetian Herbert Ginsburg illustrates the technique.[70] A nine-year-old student named Jane was having trouble in school with arithmetic. She had been given many of the usual tests, which provided only the information that she was having trouble in arithmetic and ranked at the 14th percentile in computation – which her teacher already knew, except for the precise percentile ranking. All of these tests results were not helpful. But process-

analysis revealed exactly what Jane's problem was: she was asked to add 132 + 14. She replied, "I can only do them on top of each other," then wrote:

$$\begin{array}{r} 132 \\ 14 \\ \hline 272 \end{array}$$

adding the numbers beginning on the left. A series of numbers was then dictated to her for addition: 2,342; 79; 163; 15,700; 6; and 940. Jane wrote:

$$\begin{array}{r} 6 \\ 79 \\ 163 \\ 940 \\ 2342 \\ 15700 \\ \hline \end{array}$$

When asked how to say out loud how she would add up the numbers, she answered that she would begin with the left column and carry to the right.

Jane was consistent in her errors. Her prior learning had led her to do arithmetic computation in an incorrect way by lining up the numbers to the left, beginning addition with the left column, and carrying to the right. She "solved" problems consistently in terms of her understanding of the proper procedures and produced what we call "errors," but she obtained the correct answer in terms of her own "cognitive map." Once her consistent error was discovered, it was corrected, and Jane was soon moving forward in mathematics. Process-analysis thereby removed a limit or block due to prior learning – which derived from the environment, in this case, from prior instruction where Jane partially or incorrectly learned how to do her arithmetic computation.

Conclusion. Thus we see the use of IQ tests in the history of blaming the poor and claiming their inferiority. IQ tests are part of the philosophy of limited potentiality, a doctrine which tragically produces what it predicts. The limited potentiality doctrine lacks scientific support, just as IQ tests, as measures of intelligence, lack validity. IQ tests provide measures of discrimination, rather than indications of inferiority. American education has been for too long a discriminatory education, dedicated more to the prediction of incompetence, rather than to the generation of competence. IQ tests and the concept of limited potentiality have inhibited the generation of competence and intelligence. The philosophy of unlimited potentiality and the generative model of education have been available to American education from the very beginning, but neglected. We should now be able to see that to participate and to be useful in a highly complex and information-saturated world requires that *all* of us, not just some of us, must become increasingly knowledgeable and competent. The survival and success of all of us requires the intelligence of each of us.

[1] Thomas Malthus, in *An Essay on the Principle of Population*, Book IV, Chap. 5 (second edition, 1803), appeared in Allan Chase, *The Legacy of Malthus* (New York: Alfred Knopf, 1977), p. 68.

[2] Herbert Spencer, *Social Statics* (New York: D. Appleton & Co., 1874) appeared in Richard Hofstadter, *Social Darwinism in American Thought* (Boston: Beacon Press, 1955), page 41.

[3] Quoted in William J. Ghent, *Our Benevolent Feudalism*, p. 29, appeared in Hofstadter, p. 45.

[4] Andrew Carnegie, in *North American Review*, appeared in Hofstadter, p. 45-46.

[5] James J. Hill, *Highways of Progress* (New York: 1910), p. 126, appeared in Hofstadter, p. 45

[6] William Graham Sumner, quoted in Hofstadter, p. 51.

[7] William Graham Sumner, *The Challenge of Facts and Other Essays* (New Haven: Yale Univ. Press, 1914), p. 90, quoted in Hofstadter, p. 58.

[8] *Essays of William Graham Sumner*, A. G. Keller & M. R. Davie, editors, (New Haven: Yale Univ. Press, 1934), Vol. I, p. 109, quoted in Hofstadter, p. 61.

[9] Francis Galton, *English Men of Science- Their Nature and Nurture* (London: Dutton, 1908), p. 23.

[10] Francis Galton, *Inquiry into Human Faculty and its Development* (London: Dutton, 1908), p. 56.

[11] Quoted in *The Nature-Nurture Controversy*, by Nicholas Pastore, King's Crown Press, Columbia Univ., New York, 1949, p. 28.

[12] This book by Pastore is a rich source of information about the correlation of the political views of several English and American scientists with their beliefs on the nature-nurture controversy.

[13] Karl Pearson, *National Life from the Standpoint of Science*, (2nd edition), (London: Black, 1905), p. 46.

[14] Karl Pearson, On the laws of inheritance in man, *Biometrika*, 1904, *3*, p. 156.

[15] Karl Pearson, *Problem of Alien Immigration into Great Britain*, illustrated by an examination of Russian and Polish Jewish children, *Annals of Eugenics, I*, 1925, p. 47.

[16] Karl Pearson, *The Groundwork of Eugenics* (London: Dulau, 1909), p. 20.

[17] Karl Pearson, 1904, p. 160.

[18] Pastore, p. 48

[19] William McDougall, *The Frontiers of Psychology* (New York: Appleton-Century, 1935), p. 185.

[20] William McDougall, *Is America Safe for Democracy?* (New York: Scribner, 1921), p. 54.

[21] McDougall, p. 157.

[22] William McDougall, *World Chaos*, (New York: Covici Friede, 1932), p. 43.

[23] McDougall, 1921, *op cit.*, pp. 100-102, quoted in Thomas F. Gossett, *Race: The History of an Idea in America*, New York: Shocken Books, 1965), p. 378.

[24] The book by Gossett is an excellent source on race theories in the 19th and 20th centuries.

[25] Edward Lee Thorndike, *Human Nature and the Social Order* (New York: Macmillan, 1940), p. 956.

[26] E. L. Thorndike, *Educational Psychology* (New York, 1903), p. 139, quoted in Gossett, *op cit.*, p. 304.

[27] Quoted in Gossett, *op cit.*, p. 364, from "Reaction Time with Reference to Race," *Psychological Review*, II, 1895, 474-86.

[28] Arthur Jensen, "How Much Can We Boost IQ and Scholastic Achievement?" *Harvard Ed. Review, 39*, Winter, 1969, p. 25.

[29] Richard C. Lewontin, "Race and Intelligence," *Bulletin of the Atomic Scientists*, March, 1970, p. 5.

[30] R. D. Tuddenham, "The Nature and Measurement of Intelligence," in L. Postman (ed.), *Psychology in the Making* (New York: A. A. Knopf, 1962), p. 488.

[31] H. H. Goddard, The Menace of Mental Deficiency From the Standpoint of Heredity, *Boston Medical and Surgical Journal*, 1916, 175, p. 271. Quoted in Pastore, *op cit.*, p. 82.

[32] H.H. Goddard, "The Basis for State Policy, Social Investigation and Prevention," *Survey*, 1912, 27, p. 1856. Quoted in Pastore, *op cit.*, p. 82.

[33] H. H. Goddard, *Psychology of the Normal and Subnormal* (New York: Dodd Mead, 1919), p. 231.

[34] Goddard, p. 238.

[35] Goddard, p. 70.

[36] Goddard, "In the Light of Recent Developments. . . . ," *Jr. of the American Institute of Criminal Law and Criminology*, XI, 1920, p. 427, quoted in Pastore, *op. cit.*, p. 83. What is even more amazing than the outrageous statements made by Goddard, is that he *retracted* his entire thesis in 1928. See Chase, *op cit.*, pp. 318-319.

[37] Lewis M. Terman, "Autobiography: Traits in Psychology," in *A History of Psychology in Autobiography*, C. Murchison (ed.) (Worcester, Mass.: Clark Univ. Press, 1932), p. 28.

[38] Lewis M. Terman, Letter to Nicholas Pastore, March, 1948, appeared in Pastore, *op cit.*, p. 88.

[39] Terman, *The Measurement of Intelligence* (Boston: Houghton-Mifflin, 1916), pp. 91-92.

[40] Terman, quoted in N. J. Block and Gerald Dworkin, *The IQ Controversy*, (New York: Random House), 1976, p. 38.

[41] Hardin, Garrett, *Population, Evolution and Birth Control*, 2nd ed. (San Francisco: W. H. Freeman, 1964), p. 88.

[42] Hardin, "The Immortality of Being Softhearted," *Stanford Alumni Almanac*, Jan. 1969, quoted by Barry Commoner, "How Poverty Breeds Overpopulation," *Ramparts*, Aug./Sept. 1975, Vol. 13, p. 59.

[43] Leon J. Kamin, *The Science and Politics of IQ*, (New York: Lawrence Erlbaum Assoc., 1974).

[44] Carl C. Brigham, *A Study of American Intelligence* (Princeton: Princeton Univ. Press, 1923).

[45] Brigham, p. 100, quoted in Kamin, *op cit.*, p. 20.

[46] Brigham, quoted in Kamin, *op cit.*, p. 21.

[47] Kamin, *op cit.*, p. 27.

[48] H. H. Goddard, "The Binet Tests in Relation to Immigration," *Journal of Psycho-Asthenics, 18*, 1913, 105-107, quoted in Kamin, *op cit.*, p. 16.

[49] H. H. Goddard, "Mental Tests and the Immigrant," *Journal of Delinquency*, 2, 1917, p. 271, quoted in Kamin, *op cit.*, p. 16.

[50] Carl C. Brigham, "Intelligence Tests of Immigrant Groups," *The Psychological Review*, 1930, p. 165, appeared in Kamin, *op cit.*, p. 22, and in Chase, *op cit.*, p. 322.

[51] Kamin, *op cit.*, p. 22.

[52] Psychologists seem to be generally unfamiliar with the work of Sir Karl Popper and other philosophers of science who give us this distinction.

[53] The concept of "measurement" is ambiguous. It may mean only classification at its lowest level, or merely ranking, or "ordinal measurement" at its second level. IQ test scores are ordinal measures.

[54] Lewis M. Terman and Maud A. Merrill, *Stanford-Binet Intelligence Scale* (Boston: Houghton-Mifflin, 1973). This is the latest revision of the original 1916 *Stanford-Binet.*

[55] William Labov, "The Logic of Non-Standard English," in F. Williams, (ed.), *Language and Poverty* (Chicago: Markham Press, 1970).

[56] William Fryckman, *et al.*, students at San Jose State University, Spring, 1970.

[57] Arthur Jensen, *op cit.*, p. 100.

[58] Robert Rosenthal, "The Pgymalion Effect Lives," *Psychology Today*, Sept., 1973, p. 57.

[59] From Sir Karl Popper, lectures given at University of California, Berkeley, Fall, 1961.

[60] Several studies have shown the lack of validity of the Medical College Admission Test. The classic study is: Harrison G. Gough, Wallace B. Hall, & Robert E. Harris, "Admissions Procedures as Forecasters of Performance in Medical Training," *Jr. Med. Ed., 38*, Dec. 1963, 983.

[61] Eldred E. Rutherford, *American Psychology and Democratic Idealism: The Record and the Challenge*, unpublished manuscript.

[62] Richard C. Lewontin, "The Fallacy of Biological Determinism," *The Sciences*, March/April, 1976, pp. 8-9.

[63] Jerry Hirsch, "Behavior-Genetic Analysis and its Biosocial Consequence," p. 163, in Block and Dworkin, *op cit.*

[64] Kamin, *op cit.*, p. 47.

[65] Oscar Kempthorne, "Logical, Epistemological and Statistical Aspects of Nature-Nurture Data Interpretation," *Biometrics, 34*, March, 1978, 1-23.

[66] Kamin, *op cit.*, pp. 50-51.

[67] T. Gay & M. Cole, *The New Mathematics and an Old Culture* (New York: Holt, Rinehart & Winston, 1967).

[68] J. P. Guilford, *The Nature of Human Intelligence* (New York: McGraw-Hill, 1967).

[69] Sylvia Ashton-Warner, *Teacher* (New York: Bantam Books, 1963).

[70] Paulo Freire, *Pedagogy of the Oppressed* (New York: Seabury Press, 1974).

[71] Herbert Ginsburg, *The Myth of the Deprived Child* (Englewood Cliffs, New Jersey: Prentice-Hall, 1972).

Bakke vs. Minority Students: Did the Success of Minority Recruitment Programs Create the Bakke Case?

Bernadene V. Allen

JUST as affirmative action practices governing admission to graduate and professional schools have been challenged by the Bakke suit to the United States Supreme Court, barely ten years ago a similar challenge was directed toward entrance to undergraduate education. The two are obviously intricately related, for the genesis of the Bakke case began some fifteen years ago in the soil of American education when the initial efforts to integrate college campuses began. The success of undergraduate recruitment programs for minority students during the past decade did not have to be striking to bring the pressure of that success to the doors of professional schools. The overall number of openings available in professional schools is relatively small for a nation as large as the United States; alter the makeup of

the accepted applicants even slightly, attach social and moral significance to that alteration, and pressure of explosive dimensions is assured.

This paper will examine the alteration within the context of the past decade's success in minority recruitment programs. The analysis will reveal that the old wine of institutional racism is still alive and well in the new bottle of racism carefully blazoned under the seal of constitutional rights. As in the 1800s, the forces of racism appealed to the United States Supreme Court to help them deny what reason and common decency, and in the history of this decade, theory and practice, show ought not to be denied.

Undergraduate Recruitment Programs. In the mid-1960s, only one per cent of the students on predominantly white college campuses were from minority racial or ethnic backgrounds, awareness of which fueled the civil rights movement to demand changes. As a consequence, American higher education began to open its doors to students of diverse racial heritage when the civil rights movement converged with the War on Poverty to force long delayed social change. Through the implementation of recruitment programs, increasing numbers of minority students entered colleges and universities across the country. By the late 1960s, both public and exclusively private institutions were recruiting minority students, with programs at University of California and Yale University receiving some of the early publicity.[1]

Although minority recruitment programs have enjoyed more than a decade of success, they have not been without criticism and attack. During the little more than a decade that has elapsed since the inception of the movement to educate large numbers of minority students, two major and well-publicized challenges have occurred. The first, although not directly focused upon minority admissions *per se*, surfaced in 1969 when the educational programs were but in their infancy. It centered around an article written by Arthur Jensen[2] and published in ***Harvard Educational Review*** in which Jensen purported to offer evidence that black children were genetically intellectually inferior to white children. As there were numerous methodological, statistical, and conceptual weaknesses and errors in Jensen's work, it seems likely that at another time his paper would have been largely ignored.[3]

Instead, a furor arose, a furor which developed in large part because Jensen gave voice to the silent beliefs, prejudices, and fears of lay and professional Americans who were quite mindful of the growing numbers of brown faces among the white on American campuses. Given the entrenched and lengthy history of institutional racism in America, it should not be surprising that a commitment to an open society was not universal. Rather soon it became evident to those dedicated to opening higher education to a broad spectrum of ethnic and racial groups that the acceptance of Jensen's major tenet could be used to abort the emerging minority recruitment programs.

Nearly a decade has passed since Jensenism emerged; a decade within which to evaluate the progress of minority recruitment programs, as well as the impact of Jensen's views upon American education. In addition, the

decade provides a perspective within which to view the development of the second major attack upon affirmative action admission procedures, of which the much publicized Bakke case is an example.

The movement to expand the narrow, predominantly white, middle-class structure of American college campuses as well as lunch counters, was initiated by introducing special recruitment and admission programs in colleges and universities. Although some variation existed in the programs from state to state, they shared in common recruitment efforts, special admission procedures, and financial assistance. As minority education programs in the state of California are well-documented and not dissimilar to programs in other locales, they will be used as a paradigm to discuss undergraduate programs in general. On the University of California (UC) and California State University and College (CSUC) campuses, the programs are called Educational Opportunity Programs (EOP). In 1964, EOP was established at University of California

> . . . to provide access and academic support services for students with demonstrated academic potential, who for socioeconomic reasons, might not otherwise have pursued higher education; to ensure retention of such students; to increase the number of students from ethnic and economic groups underrepresented in the University; and to increase the cultural diversity of the University's student enrollment. These goals remain unchanged.[4]

With the introduction of Educational Opportunity Programs, a dramatic increase in numbers of minority students on the UC campuses occurred. In the fall of 1965, there were 100 minority students admitted to the six UC campuses through the newly established EOP. By 1977, there were more than 9,000 EOP students on the eight UC campuses.[5]

In 1968, EOP programs were introduced onto the State University and College campuses, and by 1975, there were 13,585 students enrolled at the 19 CSUC campuses.[6] In 1969, Alfred Alquist's California Senate Bill 164 was enacted into law to provide funding for Extended Opportunities Programs and Services (EOPS) at the two-year community colleges. Five years later, 36,777 students were enrolled at 93 California Community Colleges (CCC) through EOPS.[7]

Perhaps few programs have been as extensively and continuously evaluated, studied, and probed as the EOP/EOPS. Their successes, failures, achievements, and shortcomings have been open to a public scrutiny since their inception unlike few other programs. Nearly every year, major evaluations have been conducted, beginning with the 1970 Kitano Report,[8] including annual reports from the President of the University of California and the most recent studies by the Evaluation and Training Institute contracted by the California Community Colleges Chancellor's Office and CSCU. At least a brief overview of the EOP/EOPS is necessary to evaluate their goals and achievements.

Augmented Admission Services. Prior to the introduction of the EOP and during the first year of its operation, students not meeting the academic requirements of UC were admitted under the "one percent rule," which allowed one per cent of the new admissions to include students who did not meet admission requirements. In the past, the one per cent were typically athletes, talented musicians, artists, or children of wealthy alumni and other influential people. However, with the birth of the EOP, for the first time larger numbers of minority students were encouraged to matriculate. As the EOP flourished, the rule changed to two per cent, and in 1974, it was changed to four per cent. Today, as many as four per cent of the new admissions to both the UC and CSUC campuses may be minority and/or economically and educationally disadvantaged students who do not meet admission requirements. While not all EOP/EOPS students are from minority racial or ethnic groups, by far the majority are.

Academic qualifications of the EOP/EOPS students vary across the three segments: UC, CSUC, and CCC. At the University of California, a large number of EOP students are being admitted who are academically qualified. Sixty-four per cent of the new enrollees in 1974-75 were qualified for regular admission to the UC campuses.[9] The average high school Grade Point Average (GPA) for new EOP students was 2.95, only slightly under a *B* average, whereas the GPA for the new non-EOP freshmen was 3.55.[10]

In contrast to the University of California, the EOP programs of the California State Universities and Colleges focused upon the student who was academically ineligible for regular admission. On the CSUC campuses, eighty-nine per cent of the freshmen EOP students in 1974-5 were admitted as exceptions under the four per cent rule.[11] In fact, there has been a good deal of dissension concerning the four per cent rule; in 1974-75, for every student admitted under it, two were turned away indicating a much larger demand for admission to CSUC than slots available.

At the California Community Colleges (CCC), there are no academic requirements for admission. However, EOPS students do not appear to be academically disadvantaged compared to other community college students. Forty-two percent of the EOPS students reported high school grades of *B* or above, and eighty-nine per cent reported GPAs of *C* or above. Only eight per cent reported grades below a *C*. A large scale study of the CCC suggests that EOPS students are not significantly different academically from the non-EOPS students.[12]

Financial Assistance. A second service instituted immediately after the augmented admission services was financial assistance. Those directly involved in administering EOP/EOPS consider financial aid the heart of the programs. The majority of EOP students come from families whose average annual income is below $10,000, and the majority of families of EOPS students have annual incomes below $6,000.[13] Among the University of California EOP

students, approximately eighty-two per cent receive financial aid.[14] On the CSUC campuses, approximately forty-seven per cent of the EOP students receive financial aid. Although there are no available statistics for EOPS students, it is estimated that the majority receive some form of financial assistance. A sizeable proportion of minority students on the UC and CSUC campuses are admitted through EOP for financial assistance, rather than for academic assistance, and it is apparent that without financial assistance many minority students can not attend college.

Tutoring and Counseling Services. In addition to augmented admission and financial aid, EOP/EOPS includes support services. Academic skill development and career and personal counseling were originally intended as programs to facilitate the retention and progression of students. The form, variety, and emphasis of the support services vary from campus to campus within and across the three educational segments. However, all campuses within and across the three educational segments offer tutoring services which are being used in growing numbers by non-EOP/EOPS students as well.

> Probably as a result of the increasing numbers of skill-deficient high school graduates, including those who have earned quite respectable GPAs, tutorial assistance, once solely the province the EOP/EOPS students, now ranges from individual tutoring on an appointment basis to tutoring centers housed in large learning resources and media centers, and has become a mainstay for many so-called traditional students. In fact, EOP/EOPS has been credited with providing the impetus and model for the system of peer tutoring provided to students campus wide.[15]

Success of Special Admission Programs. The large number of minority students enrolled on college campuses belies the implications of Jensen's thesis that minority students are less capable intellectually than white students. On the contrary, the success of the EOP/EOPS lends support to the hypothesis that minority students have been shut out of higher education; and with the opening of previously closed doors, racial and ethnic minority students have not only come in large numbers to college and university campuses, they have performed academically on a par with other students.

Although the EOP students entering UC and CSUC report lower high school GPAs on the average than the non-EOP students, the EOP students generally improve their GPAs in college. In addition, the EOP/EOPS students maintain equal or better retention rates than their non-EOP/EOPS counterparts.[16]

During the first ten years of existence of the EOP on the UC campuses, 3,777 students graduated from the University.[17] By 1976, 5,797 students who had participated in EOP had received baccalaureate degrees from the University.[18] Comparable rates of successful graduation from college are

found for EOP and EOPS students at CSUC and California Community Colleges.

Another indication of the success of minority recruitment programs is the dramatic nationwide increase in numbers of minority college students. Prior to 1965, fewer than one per cent of college students were racial or ethnic minorities. According to surveys of United States colleges conducted by the Office of Civil Rights, in 1976, 16.2 per cent (nearly 1.8 million out of 11 million) of full-time undergraduate, graduate, and first-professional students enrolled in higher education were members of minority groups.[19] (These figures may be slightly inflated in comparison to other data because they included, for the first time, data from Hawaii and Alaska as well as first-professionals.) According to other data, in the fall of 1977, 8.7 per cent of the entering college freshmen, nationally, were minority students; and of that percentage, blacks constituted 6 per cent of the entering freshmen, Asians 1.5 per cent, and American Indians, Mexican-Americans, Chicanos, and Puerto Rican-Americans each constituted less than one per cent of the entering class.[20] Publications focusing on black students only reported that in 1970 five per cent of the college seniors in the United States were black; and by 1985, it is estimated that there will be a pool in excess of one million black college graduates in this country.[21]

From Jensen to Bakke. As a result of the special admission programs, for the first time significant numbers of minority students have earned college diplomas. The academic success of those students helped to deflate the Jensen argument of genetic inferiority of minority students. In the face of thousands and thousands of minority students matriculating and graduating from college and universities, continued support of Jensen's thesis became ludicrous.

However, one must not erroneously assume that racist ideas, such as Jensen's, are permanently buried. Unfortunately, racist ideas appear and reappear but never seem to disappear. It is not by chance that a growing number of minority college graduates are pressuring graduate and professional schools for entrance at the very time that forces behind the Bakke suit have united to close those doors. To block entrance to graduate and professional programs, in effect, will prevent minority people from gaining positions of decision making, policy setting, and power. That the Bakke suit was carefully blazoned under a seal of constitutional rights does not alter the essential injustice of that attack.

Entrance to Graduate and Professional Schools. Graduation from college is but the first step on a road to social and economic equality which education offers, but it is an important first step in America where the primary means of upward mobility for working class people is through education. However, in the past, a college diploma has not guaranteed equal access to appropriate jobs for minorities. Consequently, as the first group of minority students

from recruitment programs neared graduation from college, pressure to obtain appropriate jobs and/or entry into graduate and professional training began to build. It was not a unique situation, for blacks in particular, because the black community had all too frequently found a college diploma equal to little more than a janitorial job. However, the final impetus for social change occurred suddenly with the assassination of Martin Luther King and the full-scale riots which followed in 1968. From the ashes and rubble emerged a commitment to affirmative action policies and practices on the part of individuals and government agencies.

The need for affirmative action policies and practices has been readily apparent to the objective observer, a need that is cogently summarized in a 1977 report to the California Subcommittee on Postsecondary Education:

> The California Legislature has in recent years recognized the enormous underrepresentation of persons of differing color, culture, and sex, among the ranks of the professionals and powerful in California, and an identical underrepresentation within its institutions of post-secondary education at both graduate and undergraduate levels. As a result, the Legislature, Governor, and post-secondary education institutions have undertaken a comprehensive effort to increase educational opportunities for ethnic minorities, the poor and women. . . .
> Despite these efforts, the presence of ethnic minorities remains limited and insufficient within California's colleges and universities, particularly within graduate and professional schools.[22]

In 1972, minority representation among professionals was shockingly low. Only one out of every 420 Ph.D.s was black; blacks constituted only 4 per cent of the Ph.D. sociologists, 5 per cent of Ph.D. psychologists, 2 percent of Ph.D. economists, and one per cent of the Ph.D.s in history, physics, biology, and chemistry.[23] By the mid-1970s only 2 per cent of the physicians in the United States were black, and only 2.5 per cent of the dentists were black.[24] Other minority group representation was even smaller.

Because the Bakke case specifically challenged the affirmative action policy for medical education, a closer view is required of minority representation within medical schools.

Minority Students in Medical School. Beginning about 1970, increasing numbers of minority students have been admitted to medical schools in the United States, due in large part to the increasing numbers of graduating minority students and pressure from governmental funding agencies for affirmative action admission practices. In December 1970, the Executive Council of the Association of American Medical Colleges adopted a policy statement on medical education of minority students. The policy statement committed member institutions, among other courses of action, to:

(1) move aggressively toward the recruitment of minority group students into medical schools;

(2) cooperate with pre-professional colleges to provide specific programs toward preparing a greater number of minority group students for medical careers; . . .

(5) recognize the special talents that minority group students may possess that would enhance their capacities as medical students, and subsequently, as practicing physicians . . . .[25]

In 1969-70, of the 10,422 entering freshmen into United States medical schools, 4.8 per cent (501) were minority. Nearly all of the minority students were black (440), and 27 per cent (120) were enrolled in the predominantly black medical schools of Howard and Meharry. By 1975-76, the percentage of minority students enrolled as freshmen in medical schools had increased to 9.1 per cent of the 15,295 freshmen. Again, the largest proportion was black (6.8 per cent) and of those, 19 per cent (197) were enrolled at Howard and Meharry Medical Schools.[26]

As the affirmative action thrust has been directed toward increasing the number of minority students in predominantly white graduate schools, appropriate figures are of interest. In 1969-70, minority students made up 3.7 per cent of the first year medical students in predominantly white medical schools. By 1975-76, minority students were 7.9 per cent of the first year medical students in predominantly white medical schools. Although some headway had been achieved through affirmative action policies and practices, the increment began to level off between 1973 and 1975, and by 1975-76, there was a slight decrease, a decrease which continued into 1977.[27]

Despite these efforts, only two per cent of the physicians in this country today are black. There is one white physician for every 700 whites in the nation in contrast to one black physician for every 3,000 blacks, one American Indian physician for every 20,000 Indians and one Chicano physician for every 30,333 Chicanos.[28] To the argument that white physicians can minister to the needs of minority patients, which obviously is true, it must be pointed out that white physicians, by and large, do not choose to work in ghettos and impoverished areas where the majority of minority people live; thus, there continue to be fewer physicians per capita for minority people than for white people. For it to be otherwise, predominantly white medical schools will have to continue to recruit and train larger numbers of minority physicians for decades to come.

Conclusions: The visible results of affirmative action are readily apparent: minority newscasters greet us on the evening news; minority politicians command time in the media; California has a black Lt. Governor and an Asian woman as Secretary of State; the United States has a black Ambassador to the United Nations and a black United States Supreme Court Justice; on

college campuses minority racial and ethnic students have increased from one per cent to sixteen per cent of the enrollment. Such visible gains, for which affirmative action programs and policies can take their share of the credit, are important and in some respects impressive.

Far more impressive is the fact that the changes occurred in a little more than a decade, proof that social change can be mandated and can be achieved.

What remains to be accomplished is even more important: the invisible as opposed to the visible must be dealt with. The annual average income for black families (1974) was but $7,808 in contrast to $13,335 for white families; the unemployment rate for minority workers is nearly twice that of white workers. Minority groups are under-represented in every profession and over-represented among the unskilled, low-paying jobs. For all the success of minority recruitment programs, no minority group today has parity representation in colleges and universities consistent with population representation.

Bakke's law suit was a reaction to the visible manifestations of affirmative action. But it will be the continuing pressure from the invisible factors that will be of paramount importance for minority students and workers of the next decade. As long as there are gross inequalities between majority and minority cultures in education and employment, the press for parity, the need for equality, and the pressure for justice will continue.

As a result of affirmative action, there exists, today, massive documentation by municipal, state, and federal agencies showing minority representation in every facet of employment and education. Employers, colleges, graduate and professional schools have been forced to report numbers of racial and ethnic students and employees. Those figures, when compared to proportional minority representation in the general population, have been used to enforce affirmative action policies. As a result of this documentation, we can no longer plead ignorance of minority under-representation in the areas of education or employment.

Nor can we argue anymore that once admitted or hired, minority members do not succeed: the data overwhelmingly demonstrate the opposite. Once doors are opened and minority students and employees are allowed across the thresholds, they achieve at a level comparable to majority students and employees.

Hopefully, the Bakke law suit is not a signal for the dismantling, truncating, or terminating of affirmatiive action programs, for there is a compelling need to continue unabated – indeed, to allow major growth – toward the as yet unachieved goal of equal access to education and employment. Affirmative action represents the first conscious effort made by majority-Americans, since Reconstruction, both to acknowledge the educational and economic inequalities of racial and ethnic citizens and to work vigorously toward correcting those inequalities. Of prime importance to achieving the goals of affirmative action is a vision of a society that is multi-racial and multicultural in all facets. If universities and professional

schools continue to encompass that vision, which they so vigorously strove to attain during the past ten years, we, indeed, may look forward to a second reconstruction which, unlike the original Reconstruction, will reach fruition.

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