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#### ABSTRACT

### A THUMB ON THE SCALE: BIOLOGICAL DETERMINISM AND THE ESSAYS OF STEPHEN JAY GOULD

### by Kevin F. Ryan

Biological determinism is a field of scientific theory that attributes human behavior, relationships, and social structures predominantly to hereditary and biological rather than cultural and environmental influences. In almost twenty-five years of published essays, the Harvard evolutionary biologist, Stephen Jay Gould, has sounded an alarm that biological determinism—through its scientific rationalization of slavery, eugenic sterilization, Nazi atrocity, and more subtle forms of injustice—perennially poses a real and dangerous threat to humanity. This thesis explores the career-long anti-hereditarian thread permeating Gould's published works on evolutionary history and the history of science. Gould's assertions regarding the cultural embeddedness of science are emphasized—as well as his view that the human species' role within the "big picture" of geological time and space is often dangerously misinterpreted. His alternative view, biological potentialism, is presented and defended.

### A THUMB ON THE SCALE: BIOLOGICAL DETERMINISM AND THE ESSAYS OF STEPHEN JAY GOULD

by Kevin F. Ryan

A Thesis

Submitted to the Faculty of New Jersey Institute of Technology in Partial Fulfillment of the Requirements for the Degree of Master of Science in Professional and Technical Communication

Department of Humanities and Social Sciences

January 2000

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### APPROVAL PAGE

### A THUMB ON THE SCALE: **BIOLOGICAL DETERMINISM AND THE ESSAYS OF** STEPHEN JAY GOULD

Kevin F. Ryan

Dr. Robert E. Lynch, Thesis Advisor Professor of English Department of Humanities and Social Sciences, NJIT

Dr. Burt Kimmelman, Committee Member Associate Professor of English Department of Humanities and Social Sciences, NJIT

Dr. Thomas B. Swanzey, Committee Member Associate Dean, New College of General and Continuing Studies Fairleigh Dickinson University

Date

Date

Date

### **BIOGRAPHICAL SKETCH**

Author: Kevin F. Ryan

Degree: Master of Science

Date: January, 2000

### Undergraduate and Graduate Education:

- Master of Science in Professional and Technical Communication New Jersey Institute of Technology, Newark, NJ, 2000
- Bachelor of Science in Medical Laboratory Technology Utica College of Syracuse University, Utica, NY, 1984

Major: Professional and Technical Communication

To those who look for the forest around the trees.

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# CHAPTER 1 INTRODUCTION

[*The Mismeasure of Man*] is not really a serious book. It is merely a Marxist polemic. . . . Ordinarily a book this loaded with errors is just ignored. Why not this one? Because its author is a popular and influential writer, and this book has had a major impact on the public. Its first edition sold 125,000 copies. It has been lavishly praised by literary publications like the *New York Review of Books*. . . . So a lot of people not only accepted it but loved it. Why? I think the reason is that it panders to what people want to believe.

### Frank Schmidt, in Personnel Psychology

Gould uses evolutionary theory to argue not for racial superiority, of course, but for racial equality. This might seem surprising on its face. If anything, evolution predicts differentiation. Not even in *Animal Farm*, and surely not in Darwin's theory, do all animals end up equal. Gould makes fun of his predecessors for drawing the (plausible) inference of inequality from evolution and proceeds to draw a most implausible one himself. The hare might beat the tortoise, or the tortoise the hare, but it would be irrational to predict a dead heat between the two. Still, Gould treats evolution with such a proprietary air that he seems to feel he can make it come out any way he wants—including dead heats where needed. **Tom Bethel, in** *American Spectator* 

These are harsher criticisms than might ordinarily be expected about someone whose ostensible field has been simply the study and teaching of paleontology. They are written about Stephen Jay Gould, professor of paleozoology at Harvard University. If it were possible to read the between the lines and distill a meta-message from these comments, one might conclude that some element of Gould's work has struck a nerve in these critics. That element may well have been Gould's twenty-five-year offensive against biological determinism—the lingering and insidious misapplication of biological science as justification for inequities in social systems.

Biological determinism is a field of scientific theory which attributes human behavior, human relationships (both within our species and with other species), and persisting social structures predominantly to biological rather than cultural or environmental influences.

The subject of this thesis is the career-long thread of anti-biological-determinist argument in Stephen Jay Gould's published works. His topics have included the nineteenth-century theory of polygenism (which cast races as separate species, and was employed to rationalize slavery) and the application of mental testing to immigration restriction, eugenic sterilization of the mentally retarded, and socioeconomic planning. In all, his ongoing goal seems to be the inoculation of the lay audience against passive acceptance of what can seem a powerfully intimidating force: the "scientifically proven," monolithically unalterable "fact of nature." Gould believes that lay people need better information to perceive the social ramifications of biological determinism (which is also known as hereditarianism).

In addition to academic research and teaching in geology, paleontology, and the history of science, Gould has contributed a monthly essay, "This View of Life," to *Natural History* magazine since 1974. By 1999 he had contributed over 200 essays to this column, which he expects to discontinue in the year 2000. Gould has gained a mass popular audience with this prolific and uninterrupted string of essays, with a series of collections repackaging them in book form, and with original book-length works. Although, as with his book, *Ontogeny and Phylogeny* (1977), he has written for audiences of scientific peers, his authorial success has derived chiefly from popular essay collections that include *Ever Since Darwin* (1977), *The Panda's Thumb* (1980), *The Flamingo's Smile* (1985), and *Bully for Brontosaurus* (1991). His most celebrated popular work and indeed his most avowedly anti-hereditarian effort, *The Mismeasure of* 

*Man* (1981), has been named one of the one hundred best non-fiction books of the century by a Random House panel. He has won the National Book Award, The National Book Critics Circle Award, the Phi Beta Kappa Science Award, and the MacArthur award.

Ironically, it is Gould's very popularity that is often cited by critics attempting to dismiss his credibility. How can a scientist / author remain faithful to the technical nuances of his discipline, they argue, while writing for a popular audience? And yet as a prolific essayist Gould consistently avows just such a goal—the goal of writing with respect for the intellect of the perceptive lay person. In a secular era when credulous awe of the mysteries of religion is frequently dismissed and supplanted by a sometimes equally credulous deference to the mysteries of science, Gould seems to view himself as a clarifying advocate for the informed consumption of bioscientific information. His goal: informing a general public all too easily manipulated and enlisted by pseudo-technical obfuscation.

Stephen Jay Gould was born in 1941 in Queens, New York. His decision to become a paleontologist occurred at the age of five on a visit with his father to New York's American Museum of Natural History. After completing undergraduate work at Antioch College, Gould earned his doctorate in paleontology from Columbia University in 1967, and began his long affiliation with Harvard University that same year as an assistant professor of geology. He became a full professor by 1973 and later the Curator of Invertebrate Paleontology at the Harvard Museum of Comparative Zoology. An authority on West Indian snail species, Gould was also recognized in 1972 (with collaborator Niles Eldredge) for introducing the evolutionary theory of punctuated equilibrium, which described evolutionary history as long periods of stasis separated by sudden intervals of major change. This contrasts with the long-held theory that evolutionary change is slow and gradual. Among numerous career honors, Gould is the current president of the American Association for the Advancement of Science.

An ardent scholar of evolutionary theory, Gould has imbued his essays with a scientific historian's subtle sensitivity to the real-world contexts and consequences of Darwinism and of other important biological and geological theories. He is an unabashed celebrant of science as an important, affirming, and immensely creative human activity. Indeed, much of Gould's appeal may stem from the multi-faceted "Renaissance Man" ethos that permeates his essays. Gould's ability to present technical concepts interest-ingly to a popular audience seems to derive from deliberate attention to readers' non-scientific realms of interest. Instead of presenting science in a dryly technical "just the facts" style, Gould establishes interest and relevance for science through allusions to historical and political contexts, art, the literature of Mary Shelley and James Joyce, philosophical theory, music, and baseball.

Relatedly, the cultural embeddedness of science is one of Gould's recurrent themes. Gould rejects two common opposing views of science: 1) science as an impassive and mechanical processor of objectively acquired facts, and 2) science as a sequence of purely isolated "Eureka!" events entirely encompassed within the creativity of the scientists. Instead, Gould welcomes the admission that the cultural context of science is integral to its own identity, while cautioning about the social ramifications of this interrelatedness:

Science is no inexorable march to truth mediated by the collection of objective information and the destruction of ancient superstition. Scientists, as ordinary

human beings, unconsciously reflect in their theories the social and political constraints of their times. As privileged members of society, more often than not they end up defending existing social arrangements as biologically foreordained. (*Ever Since* 15)

To him, a true scientist loses no credibility in the admission of his or her own cultural influences. Only in the obfuscation of the relationship does Gould see danger. He sees biology and culture as "interpenetrating opposites" best interpreted by a dialectical / synthetic approach (*Urchin* 153).

Gould's dyed-in-the-wool anti-hereditarianism did not arise in a vacuum. His arguments against biological determinism advance a torch carried by the American journalist Walter Lippman in the second decade of this century, by the Swedish sociologist Gunnar Myrdal in the 1940s, by the author Ashley Montagu in the 1950s, and by contemporary allies such as Northeastern University psychologist, Leon Kamin. In respect for his venerable antecedent, Gould praises Gunnar Myrdal's 1944 book, *An American Dilemma*, for its stand against scientific racism. Gould uses the following quote from Myrdal's book to support his own concern that many cultural biases are buried so deeply as to be unrecognizable:

But there must be countless errors of the same sort that no living man can yet detect, because of the fog within which our type of Western culture envelops us. Cultural influences have set up the assumptions about the mind, the body, and the universe with which we begin; pose the questions we ask; influence the facts we seek; determine the interpretation we give these facts and direct our reaction to these interpretations and conclusions. (qtd. in *Urchin* 216)

To Gould, the history of science is rich with (often ulterior) social implications,

implications he has explored in his essays for a quarter of a century. To this exploration he has applied his distinguishing gifts as a writer: his breadth of knowledge, the clarity and readability of his work, his ability to enliven the history of science through his multifaceted "Renaissance Man" pedagogy, and the credibility that comes from wide recognition of his work.

The argument between advocates of biological determinism, opposing advocates of pure environmentalism, and outspoken moderates like Gould is often heated. It has inflamed social and political polarization at many levels. Although often cast as an extremist by critics, Gould supports what can be considered the hybrid theory of "biological potentialism," which embraces *both* hereditary and environmental influences in the determination of human behavior, achievement, and social structures. Theoretical moderation notwithstanding, the argument against pure, "high-potency" hereditarianism is an endeavor to which Stephen Jay Gould has indefatigably applied more energy than anyone.

#### CHAPTER 2

### FOCUSSING ON BIOLOGICAL DETERMINISM

#### 2.1 The Nature of Biological Determinism

Biological determinism is a set of theories used to explain human social and political

behaviors and institutions as the inevitable consequences of natural biological laws.

The archetypal biological determinist statement contends that one race, class, or subgroup

of humans is biologically (and, therefore, inevitably) superior to another. To Gould,

biological determinist ideas garner strong appeal among individuals occupying favored

positions within their societies. He argues that

appeals to innate biology for the explanation of human behavior have often been advanced in the name of enlightenment. The proponents of biological determinism argue that science can cut through the web of superstition and sentimentalism to instruct us about our true nature. But their claims have usually had a different primary effect. They are used by the leaders of class-stratified societies to assert that a current social order must prevail because it is the law of nature. . . . (*Ever Since* 223)

To biological determinist theorists, nature proscribes an essentially inevitable and

unalterable character to human behavior, achievement, and social status. On human

intelligence, for example, the early twentieth-century determinist, Henry Goddard, wrote:

Stated in its boldest form our thesis is that the chief determiner of human conduct is a unitary mental process which we call intelligence: that this process is conditioned by a nervous mechanism that is inborn: that the degree of efficiency to be attained by that nervous mechanism and the consequent grade of intelligence or mental level for each individual is determined by the kind of chromosomes that come together with the union of the germ cells: that it is but little affected by any later influence except such serious accidents as may destroy part of the mechanism.

As a consequence any attempt at social adjustment which fails to take into account the determining character of the intelligence and its unalterable grade in each individual is illogical and inefficient. (1)

To Stephen Jay Gould, however, human behavior and social status—although undeniably influenced to some extent by biology—are in significant part sociocultural constructs for which biological determinism serves as a powerfully homeostatic rationalization.

After the publication of Charles Darwin's *Origin of Species* in 1859, biological determinism as a driving social theory gained widespread support. Science-based rationalizations for racism increased sharply. They did so largely through the deterministically rich concept of recapitulation, which propounded that "ontogeny recapitulates phylogeny." More simply put, recapitulation contended that the embryological, infantile, and juvenile stages of human development (human ontogeny) reenact the evolutionary stages through which the human species evolved from ancestral species. According to the theory, contemporary human juveniles resemble ancestral primate *adults*. In *Ontogeny and Phylogeny* (1977), Gould examined for an audience of his peers the history and hereditarian ramifications of recapitulation theory.

Writing on a more formal, scholarly level than that of the more popular works that would follow, Gould laid the groundwork in *Ontogeny and Phylogeny* for antihereditarian arguments that were to recur frequently throughout his subsequent work. These arguments emphasize culture's influence upon science, the continuing lack of corroborating data for determinist contentions, and the ever-present a priori conclusion the subconscious bias or intentional "thumb-on-the-scale" prejudice that can make science anything but objective. Gould wrote "the sway of biological determinism, the lack of sensitivity to environmental influence, and the blatant desire to crown one's own group as biologically superior are quite characteristic of the time—and scarcely extinct today" (*Ontogeny* 130). One early and influential recapitulationist was the German biologist, Ernst Haeckel. A contemporary of Darwin's and a fervent promoter of Darwinism in his own country, Haeckel postulated that the gill-like slits in human embryos represent the gills of ancestral adult fishes. Haeckel believed strongly in the inheritance of acquired traits (Lamarckianism) through terminal addition, which theorized a progressive incrementing of the number of sequential traits reenacted in the embryo-to-adult development process as new species evolved from existing species. For humans, as more and more advanced traits were added to the end of our evolving ancestors' hypothesized embryo-to-adult developmental sequences, the amount of time spent by individuals reenacting the earlier phases would necessarily "condense" to accommodate the increased number of traits. This ensured that the ever-increasing number of developmental stages would still be completed by the time the juvenile entered adulthood.

Gould contends that "recapitulation intruded itself into every subject that offered even the remotest possibility of a connection between children of 'higher' races and the persistent habits of 'adult savages'" (*Ontogeny* 117). Mainstream scientists—not a fringe group of crackpots—seemed eager to contribute to the recapitulation movement. Carl Vogt, a respected German anatomist, wrote in 1864:

The grown-up Negro partakes, as regards his intellectual faculties, of the nature of the child, the female, and the senile white. . . . Some tribes have founded states, possessing a peculiar organization; but, as to the rest, we may boldly assert that the whole race has, neither in the past nor the present, performed anything tending to the progress of humanity or worthy of preservation. (qtd. in Gould, *Ontogeny* 130)

With statements like this one epitomizing the expressed sentiments of many mainstream scientists after 1860, Gould asserts that evolutionary theory "quickly became the primary weapon for many efforts in social change" (*Ontogeny* 120).

Recapitulationism's race-conscious orientation was epitomized in the words of Harvard's widely respected Swiss-born naturalist, Louis Agassiz (1807-1873), who stated that "the brain of the Negro is that of the imperfect brain of a seven month's infant in the womb of the White" (qtd. in Gould, *Ontogeny* 127). The British polymath, Herbert Spencer (1820-1903), echoed this sentiment in 1895: "The intellectual traits of the uncivilized are traits recurring in the children of the civilized" (qtd. in Gould, *Ontogeny* 128).

An example of applied recapitulationism lay in the work of Italian physician, Cesare Lombroso (1835-1909), who with his theories of "criminal anthropology" attempted to construct a scientific method for segregating criminals and underachievers from the general population. Lombroso's theories descended from Franz Joseph Gall's early nineteenth-century theory of phrenology, which attributed mental attributes to localized and palpable physiognomic skull features. In 1909, looking back at his career, Lombroso wrote of the personal epiphany wherein, by examining one offender's skull, he discovered the connection between atavistic physical features and criminal tendencies:

This was not merely an idea, but a revelation. At the sight of that skull, I seemed to see all of a sudden, lighted up as a vast plain under a flaming sky, the problem of the nature of the criminal—an atavistic being who reproduces in his person the ferocious instincts of primitive humanity and the inferior animals. Thus were explained anatomically the enormous jaws, high cheek-bones, prominent superciliary arches, solitary lines in the palms, extreme size of the orbits, handle-shaped or sessile ears found in criminals, savages, and apes, insensibility to pain, extremely acute sight, tattooing, excessive idleness, love of orgies, and the irresistible craving for evil for its own sake, the desire not only to extinguish life in the victim, but to mutilate the corpse, tear its flesh, and drink its blood. (xxv)

Relying heavily on the interpretation of physical appearance, Lombroso's theory lent credence to an intuition that every schoolyard bully, Wild West vigilante, and road-rageready motorist might support: that one can tell by appearance alone that certain people are "unsavory criminal types." The concept resembles today's controversial law enforcement practice of racial profiling, an apparently abused but arguably notaltogether-indefensible police practice of selecting potential suspects based on criminal race demographics (Kennedy).

Lombroso believed that criminals were biologically inferior to evolutionarily advanced, law-abiding, morally upright people. He believed that a significant percentage of criminality was inherited and that certain "born criminals" represented a lower stage in human evolution. Children, lower animals, and criminal adults represented primitive, lawless phases along the phylogenetic and ontogenetic path to adult morality and lawfulness. Criminals possessed physical traits Lombroso called "stigmata," which, to a trained eye, could clearly identify a person's past, present, and potential criminality. Stigmata betraying criminal proclivities included such traits as long arms, low and narrow forehead, large ears, thick skull, large jaw, hairy chest, brown skin, tattoos, and decreased sensitivity to pain.

Lombroso argued that punishments should not fit the crime as much as the *criminal*—imposing more lenient sentences upon criminals whose actions seemed compelled by passion or circumstances, and harsher sentences upon "biological" criminals. Characterizing Lombroso's followers as self-described "enlightened modernists" tending towards liberal and socialist politics, Gould believes that their movement was tragic "because it shifted so much attention from the social basis of crime to fallacious ideas about the innate propensity of criminals" (*Mismeasure* 141).

By the beginning of the twentieth century, with the increasing acceptance of Mendelian genetics and improved understanding of the mechanisms of heredity,



Figure 2-1. Evidence of Neoteny in Chimpanzees. (*Mismeasure* 332)

recapitulation could no longer be sustained as a feasible hypothesis. The developmental theory that superceded it, neoteny (also called paedomorphism), was proposed in 1909 by W. Garstang and J. Kallman. It hypothesized that the human developmental sequence from embryo and fetus through infant and juvenile to adult actually represents a *retarding* and *truncating* of the developmental sequence followed by the ancestral species from which humans evolved. Humans' longer juvenile dependency-neoteny hypothesizedshows that humans experience a prolonged period of juvenile growth not experienced by chimps, gorillas, and other primates. The most important consequence of this slowed development and prolonged growth is the development of an enlarged brain. The functional capabilities enabled by our more highly developed brain-determinists and environmentalists agree—sets us far apart from other species on earth. Figure 2-1, reproduced from Gould's Mismeasure of Man, illustrates the remarkable physical resemblance between the juvenile chimpanzee (upright posture, vertical jaw, small and flat face) and the adult human, while showing that the adult chimpanzee loses these characteristics in subsequent growth stages unshared by humans. Among contemporary evolutionary biologists, neoteny still retains general support (with some zones of disagreement).

Neoteny, despite its complete contradiction of recapitulation, was nonetheless embraced by many determinists. Gould highlights what he perceives as the complete reversal of determinist consensus that occurred as neoteny first gained acceptance. Scientists who had hitherto expended great energy gathering data to argue similarities between apes, the adults of "lower" races, and the children of "higher" races now were

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attempting to prove that "higher" races were more developmentally *retarded* than "lower" races.

One such scientist was the Dutch anatomist, Louis Bolk, who believed that Negroes pass through a developmental stage that has already become the final stage for Caucasians. In 1929 Bolk wrote that "qualitative differences in fetalization and retardation are the base of racial inequality. Looked at from this point of view, the division of mankind into higher and lower races is fully justified.... The white race appears to be the most progressive, as being the most retarded" (qtd. in Gould, *Ontogeny* 358). With ostensible objectivity at his side, Bolk strove to validate the presumed superiority of his own race.

In addition to recapitulation and neoteny, other biological determinist efforts in the last two centuries have aimed to rank sexes, races, and nationalities by measurable parameters such as skull volume, brain weight, and IQ test score. In numbers, there is a tangible and ineluctable power that is lacking in mere qualitative theory. "Numbers don't lie" is the aphorism, an aphorism with which Gould often disagrees. Many of his essays are devoted to criticism of scientists' numbers—the methods by which they are obtained, the contexts in which they are applied, and the perceptional schema through which they are interpreted.

The goal of the nineteenth-century Philadelphia physician, Samuel Morton, was to validate polygenism scientifically, the concept that Caucasians, Negroes, and Native Americans represent distinctly different biological species. Morton's specialty was the measurement of human skull volume, which he pursued with great fervor (as his career collection of six hundred skulls attests). Morton measured the volumes of skulls obtained worldwide. His technique was to pour mustard seeds into the skull's *foramen magnum* until the skull was full, and then to pour the seeds out into a graduated cylinder for precise measurement. Morton computed statistical summary data on skull volume for a number of racial groups, and published his comparative findings in charts such as Table 1-1, which appeared in his 1839 book, *Crania Americana*:

RACE	Ν	MEAN	LARGEST	SMALLEST
Caucasian	52	87	109	. 75
Mongolian	10	83	93	69
Malay	18	81	89	64
[Native] American	144	82	100	60
Ethiopian	29	78	94	65

 Table 1-1. Summary of Internal Cranial Capacity (in cu. in.) by Race. (Morton)

Morton's book presents a methodical analysis of the races of the globe, with each race's chapter being organized primarily into elaborately detailed cranial description and sociocultural commentary. The book is exquisitely illustrated with lithographs of human skulls. Of the American Indian, Morton wrote:

The intellectual faculties of the great [Native American] family appear to be of a decidedly inferior caste when compared with the Caucasian or Mongolian races. They are not only averse to the restraints of education, but for the most part incapable of a continued process of reasoning on abstract subjects. . . . Their proximity for more than two centuries to European institutions, has made scarcely any appreciable change in their mode of thinking or manner of life; and as to their own social condition, they probably resemble in most respects what they were at the primitive epoch of their existence. . . . However much the benevolent mind may regret the inaptitude of the Indian for civilization, the affirmation of this question seems to be established beyond a doubt. (81-82)

The book makes frequent allusions to different racial groups' apparent statuses along a ranked continuum of civilization and progress and is highly critical of the Negro and Native American capacity for social, cultural, and political achievement.

Gould obtained access in 1977 to Morton's original skull collection and to his experimental notes, and considers them to be clear indicators that Morton's experiments were finagled attempts to create data supportive of an a priori conclusion—namely that Caucasian skulls were larger than those of other races. He notes in *The Mismeasure of Man* that the averages listed in the above chart are incorrect because they represent Morton's selective bias favoring the inclusion of certain racial subsamples over others (57-60). For example, Morton *excluded* many of his Hindu skulls (a smaller-brained White subsample) because reporting them would have brought the Caucasian mean down to 84.4. He *included* a disproportionately large number of Peruvian Inca skulls (a smaller-brained Native American subsample), which, if weighted equally along with other Native American subgroups, would have brought the Native American mean up to 83.8.

Gould found several key methodological flaws in Morton's work, including a failure to account for known correlations of skull size with age, sex, and body stature. Also, Morton's notes indicated that his measurements switched from mustard seed to lead shot between 1839 and 1844, and Gould observed, much to his surprise, that lead shot consistently gave higher and more reproducible measurements than mustard seed. Gould re-measured the *Crania Americana* skulls by the lead shot method and found that for Ethiopians, Native Americans, and Caucasians, the mustard seed results published by Morton were lower by 5.4, 2.2, and 1.8 cubic inches, respectively. To Gould, these

numbers represent proof that the Morton's mustard seed results were finagled consciously or subconsciously to fit a preordained conclusion about racial ranking (*Mismeasure* 68). The manipulation, Gould speculates, probably consisted of tamping and shaking of the easily-compressible mustard seeds in order to produce the desired measurement.

Another nineteenth-century biological determinist was the French professor of medicine, Paul Broca, who studied brain size and weight. From his observations, Broca asserted that the brains of upper class White men of western European extraction were larger than the brains of women, of other races, and of other social classes. Broca inferred social superiority directly from his observations, and invoked the argument—perennially recurrent among biological determinists—that those social classes with proven lower brain measurements were incapable of significant learning, and a resource drain to attempt to educate.

In *The Mismeasure of Man* Gould cites numerous examples of circular reasoning in which Broca dismissed his own observations for no apparent reason other than their dissonance with his a priori conclusions. For example, in addressing the argument that women's brains might be smaller because women's body's are smaller, Broca confuses hypothesis with established fact:

We must not forget that women are, on average, a little less intelligent than men, a difference which we should not exaggerate but which is, nonetheless, real. We are therefore permitted to suppose that the relatively small size of the female brain depends in part upon her physical inferiority and in part upon her intellectual inferiority (qtd. in Gould, *Mismeasure* 104).

His *hypothesis* (not his established fact) was that women are less intelligent as proven by a smaller average brain weight than men. Gould cites the contemporary South African anthropologist, P.V. Tobias, who argues that brain size bears no relationship to intelligence, and that any variation Broca may have observed may be attributed to differences in age, height, body size, nutritional level, and specimen handling (*Mismeasure* 111-112).

Near the beginning of the twentieth century, proponents of biological determinism turned away from the concrete physical measurement of physiological structures such as brains and skulls. They redirected their considerable energies into the more abstract (and slippery) realm of psychometric testing, otherwise known as Intelligence or IQ testing. The goal remained the same: to paint an ostensibly incontrovertible scientific proof that certain groups of human beings are biologically inferior and, therefore, deserve inferior social, political, and economic status.

The concept of "intelligence testing" was introduced in 1905 by the French psychologist, Alfred Binet. In *The Mismeasure of Man*, Gould paints Binet as a wellintentioned educator whose chief motivation was the development of an effective method for early identification of children in need of special education services. This would permit those children to be given the added training that they needed to cope with the practical tasks of everyday living.

Binet described his tests as measuring a cluster of important practical skills, but made no claim to the existence of a single measurable entity called "intelligence" (Lippman 562). He based his test questions on real-life, practical problems of logic, counting, and spatial understanding relevant to the child's ability to cope with tasks of everyday living. Binet did not see intelligence as a single fixed quantity, and feared that educators would misinterpret the utility of his tests and use them with "brutal pessimism" to the detriment of those children who needed help (Kamin, "Pioneers" 477). Unfortunately, by Gould's account, Binet's work was often distorted and abused to simply isolate underachieving children, *removing* resources from those children most in need of special help. Indeed, had Binet lived beyond 1911, he would have witnessed the driving force of intelligence testing research and development shift quickly from his own altruistic motives to motives more attuned to eugenics, forced sterilization, and racial segregation. Binet had unintentionally sparked the hereditarian theory of IQ.

During the second decade of this century, Henry Goddard was research director at New Jersey's Vineland Training School for Feeble-minded Girls and Boys. As one of the first to promote intelligence testing in the United States, Goddard asserted that intelligence was a unified mental entity that was measurable along a unilinear, rankable scale. The lower end of this scale was populated, in order of decreasing ability, by "morons," "imbeciles," and "idiots." He viewed intelligence as strictly inherited from generation to generation, and feared that both the immigration of foreign morons and the unrestricted reproduction of domestic morons jeopardized the nation's well-being.

Intelligence studies and theories by Goddard and by the American psychologists Howard Yerkes of Harvard (the 1917 "Army Study"), Carl Brigham of Princeton (in the 1920s), and Louis Terman of Stanford (between 1910 and 1935) successfully disseminated biological determinist views widely among the general public. They also helped to effect tangible social policy changes in the United States.

Hereditarian arguments based on intelligence testing persist to this day and have generally followed the same pattern as those based on physical measurements (such as Broca's brains or Morton's skulls). They have interpreted test measurements as suggesting that inherent biological group differences exist among races, ethnicities, or social classes—and subtly or not-so-subtly advocated conservative, exclusionary social policy changes. From the 1960s through the present day, hereditarian theories with controversial social ramifications have been advanced by academics like Berkeley psychologist emeritus, Arthur Jensen; the American Enterprise Institute fellow, Charles Murray; the late Harvard psychologist, Richard Herrnstein; the British psychology professor, Richard Lynn; and the University of Western Ontario professor, J. P. Rushton. The 1994 publication of Herrnstein and Murray's popular book, *The Bell Curve*, is a strong indication of the extent to which biological determinist views are still embedded in the American psyche. Chapter 3, "Ideas Matter," will discuss what Gould perceives as the serious social ramifications of twentieth-century intelligence testing.

#### 2.2 Behold—or Imagine—The Great Ladder of Progress

But recapitulation, neoteny, and measurements of physical and mental ability are not the only weapons within the biological determinist arsenal. Intrinsic to the hereditarian ethos are distinct beliefs about the role of humans—especially particular subgroups of humans—within the time-space continuum of life on earth. If recapitulation, neoteny, skull and brain measurement, and intelligence testing could be considered the "oils" of biological determinism, the "great ladder of progress" can be considered its canvas. Or, like a musical "rest," the ladder is often as significant as the bolder elements superimposed on it, and often goes unrecognized in the background of thought. Seeing dangerous implications in subconsciously grounded assumptions, Stephen Jay Gould repeatedly uses his essays to call attention to and criticize our concept of progress.

The "ladder of progress" comprises the often subliminal assumptions and beliefs that we as humans often harbor about our species' importance in the scheme of life on earth (or, indeed, the universe). Intimately tied with both religious "creation stories" and with Western utilitarian philosophy—and enlisting the support of Darwinistic interpretations wherever plausible—the "ladder of progress" is the tacit but widely held *species-ist* opinion that humans were somehow predestined to rise above other species and dominate nature. By extension, it also encompasses the racially biased assumption that certain groups of humans have been preordained by nature to rise above other human groups. The ladder's chief tenet is that evolutionary history has consisted of a forward-marching progression of life from creation to the present, with humans representing the preordained pinnacle of this process. The ladder is consistent with the Platonic concept of an essential and universal Natural Law, driving ever forward toward a preordained goal.

This writer (and I suspect a majority of lay people in Western nations over several recent generations) took from his elementary and secondary school science training the notion the Darwinian evolution represented a *straight line of gradual change* over time. We had learned that bacteria evolved into amoeba, which somehow evolved into small multi-celled marine life, then into fishes, then amphibians, then into mammals, then into hominid antecedents like the Cro-Magnon. *Homo sapiens* evolved as the last link on this chain or "ladder of progress."

But in essays collected in books such as *Ever Since Darwin*, *The Flamingo's Smile*, *Bully for Brontosaurus*, *Dinosaur in a Haystack*, and *Wonderful Life*, Gould repeatedly stresses his view that this is not the way evolution occurred at all. Much to our discomfort in considering the full implications of the statement, Gould considers evolution purposeless, non-progressive, and materialistic—far from the preordained and unilinear process it is often considered. Life on earth has evolved not as a ladder or a march, Gould claims, but rather in a "punctuated equilibrium" involving a rich "bush" of coeval species interrelated by genealogical branches and twigs. Long stretches of species stasis have been punctuated by sudden and geologically brief periods of rapid, unpredictable change, often resulting in extinctions. Gould believes that the element of chance played such a pivotal role that it is highly unlikely the evolutionary process could rerun to the same current result.

According to Gould, the chief driving force of evolutionary change is not progress, but contingency and chance: "Humans are not the end result of predictable evolutionary progress, but rather a fortuitous cosmic afterthought, a tiny little twig on the enormously arborescent bush of life, which, if replanted from seed, would almost surely not grow this twig again, or perhaps any twig with any property that we would care to call consciousness" (*Dinosaur* 327). As one support he cites current theories that an extraterrestrial body's collision with the earth was responsible for the extinction of dinosaurs, and contends that without this cosmic happenstance, mammals might not have risen and humans might not have evolved. In *Wonderful Life*, while describing the diversity of new (but now mostly extinct) multi-cellular species that arose 500 million years ago during a brief but critical geological period called the Cambrian Explosion, Gould comments that the seemingly insignificant survival of one worm-like genus at that time, *Pikaia*—the first known chordate—was a prerequisite for human existence today.

But what has evolutionary change to do with biological determinism? One of Gould's recurrent subjects is the inextricability of science from its cultural context. The concepts of cultural and biological progress are intertwined, according to Gould, and the

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perception of a forward-marching progression deeply pervades the culture and ideology of Western civilization. In *Dinosaur in a Haystack*, he describes the duality of change versus constancy as a politically charged mental construct: "A fundamental tenet of Western life, at least since the late eighteenth century, has proclaimed change as natural, constant, and inevitable. . . . Evolution is a fact of nature—one that could probably not have been perceived, and certainly not widely promulgated, before preference for change in this cardinal duality swept the Western world" (134).

The utilitarian concept of progress implies the inferiority and undesirability of that which came before, the unspoken urge to advance and improve, and the freedom (indeed, even the duty) to eradicate what is perceived as imperfection. A clear example of this sentiment is found in this passage on Native Americans from the appendix of Samuel Morton's *Crania Americana*, written by George Combe, a lawyer and phrenology proponent who was Morton's friend and supporter:

The aspect of America is still more deplorable than that of Africa. Surrounded for centuries by European knowledge, enterprise and energy, and incited to improvement by the example of European institutions, many of the nations of that continent remain at the present time the same miserable, wandering, houseless and lawlesss savages that their ancestors were, when Columbus first set foot upon their soil. . . . It is certainly a striking and mysterious fact that a race of men should thus have continued for ages stationary in a state of the rudest barbarism, that tendency to improvement, a principle that has been thought more than perhaps any other to distinguish man from the lower animals, would seem to be totally wanting in them. Generation after generation passes away, and no traces of advancement distinguish the last from the first. (272)

Combe's repugnance for Native Americans is blatantly manifest in this passage. In the words of the language scholar, Steven Katz, the sense of progress can foster a dangerous "ethic of expediency" in which scientific, technological, and perceived societal advancement become in themselves subsuming moral ends, justifiable at any cost, even if the ends involve the displacement of a Native people or atrocities like the Holocaust (Katz 257, 2 62, 265).

The twentieth century has seen biological determinism align itself with the ethic of progress and expediency—commanding respect for its perceived objectivity; influencing public opinion, social policy, and legislation; and affecting, sometimes tragically, the lives of millions of people. Having confined the discussion thus far to hereditarian theory, in the next chapter we will explore through Gould's eyes some of the palpable, real-life ramifications of biological determinism's emphasis on progress and linear ranking.
## CHAPTER 3 "IDEAS MATTER"

Ideas can have important social consequences with impacts upon the lives of millions. Old notions may emerge later, often in curiously altered contexts, but their source can still be recognized and traced to claims made in the name of science yet never really supported by more than the social prejudices (often unrecognized) of their proposers. Ideas matter in tangible ways. **Stephen Jay Gould** (*Flamingo* 321)

As with the atom bomb, birth control technology, or genetic engineering, the most controversial manifestations of science are those with distinctly practical relevance. Biological determinism, especially in its interpretation of evolutionary science, is no exception. If hypotheses about skull volume, brain weight, and intelligence testing were an isolated field of inquiry—set apart from the real world as ivory tower musings of academics—biological determinism would likely have waned long ago. But its longevity and vitality bespeak a deeply rooted relevance to the day-to-day function of governments, economic and educational systems, and individual lives. According to Gould, biological determinism is almost always cited as justification for social action, social policy, or maintaining the social status quo. This chapter will examine palpable examples of hereditarianism in action.

## 3.1 A Thumb on the Scale—The A Priori Judgment in Action

Biological determinist ideology ripples throughout American history as a support for slavery, for the American invasion of the Philippines in 1899, for forced sterilization of the mentally retarded, for strict immigration restriction laws of the 1920s, and for the recent upswing in the anti-welfare and anti-affirmative action sentiment. Worldwide, its

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stretch has reached from Nazi Germany to Singapore. Through popular books like *The Bell Curve* (1994), millions of contemporary readers have been exposed to biological determinist ideology.

In *The Mismeasure of Man*, Gould emphasizes that hereditarianism has been promoted not through the crackpot musings of marginal scientists, but rather by the serious work of premier scientists at the forefront of their fields. One example was the renowned naturalist / paleontologist / geologist, Louis Agassiz (1807-1873)—whose Harvard professorship Gould now occupies. For achievements that included groundbreaking studies of fish fossils and the discovery of geological evidence for ice ages, Agassiz was perhaps the most widely respected naturalist of his time. What is it about Agassiz that Gould finds objectionable? Agassiz believed strongly that different human races represented different species. This and his widespread credibility helped provide a scientific rationalization for pro-slavery sentiments (Lurie 1: 73).

By denying that his scientific theories possessed political ramifications, Agassiz avoided openly acknowledging that his polygenistic views defended slavery:

... Let the politicians, let those who feel themselves called upon to regulate human society, see what they can do with the results.... We disclaim, however, all connection with any question involving political matters. It is simply with reference to the possibility of appreciating the differences they have originated all over the world, and under what circumstances, that we have here tried to trace some facts respecting the human races. (qtd. in Gould, *Mismeasure* 45)

The inquiry for objective truth is Agassiz's only avowed interest here, not political influence. But Gould presents Aggassiz's defense as an archetypically-veiled rationalization for discrimination against Negroes, citing the following personal correspondence to his mother after Agassiz had been served by Negro waiters at a Philadelphia hotel restaurant:

In seeing their black faces with their thick lips and grimacing teeth, the wool on their head, their bent knees, their elongated hands, their large curved nails, and especially the livid color of the palm of their hands, I could not take my eyes off their face in order to tell them to stay far away. And when they advanced that hideous hand towards my plate in order to serve me, I wished I were able to depart in order to eat a piece of bread elsewhere, rather than dine with such service. (qtd. in Gould, *Mismeasure* 45)

Though such overt racial bias may not have been uncommon among statesmen and scientists of the Civil War era, it is difficult to imagine this frame of mind not influencing the objectivity of the scientist.

Gould describes a series of letters written by Agassiz to S. G. Howe, a member of Abraham Lincoln's administration, who had solicited Agassiz's opinion about the optimal post-war role of Negroes. In his advice to Howe, Agassiz acknowledged the importance of granting legal equality to Negroes, but balked at the suggestion that they be afforded true *social* equality:

Social equality I deem at all time impracticable. It is a natural impossibility flowing from the very character of the Negro race... No man has a right to what he is unfit to use.... Let us beware of granting too much to the negro race in the beginning, lest it become necessary to recall violently some of the privileges which they may use to our detriment and their own injury. (qtd. by Gould, *Mismeasure* 48)

These were not the isolated musings of an ivory tower academic. These were words that reflected and reinforced racially oppressive sentiment widespread in the American South after the Civil War. It is easy to suspect that thoughts such as these contributed to an intellectual bulwark, both spoken and unspoken, that kept Jim Crow alive for the next one hundred years in the American South.

Recapitulationist theory (subsequently disproved entirely by the theory of neoteny

/ paedomorphism) was easily applied in the political realm in support of colonialism.

Because it ranked the *adults* of undeveloped nations with the *children* of civilized

nations, the logical inference was that the people of underdeveloped nations were unfit to govern themselves. Reverend Josiah Strong was a prominent New York cleric who, in this 1900 rebuttal, criticized Henry Clay for expressing doubts about the morality of this inference :

Clay's conception was formed when the old carpenter theory of the universe obtained, before modern science had shown that races develop in the course of centuries as individuals do in years, and that an undeveloped race, which is incapable of self-government is no more of a reflection on the Almighty than is an undeveloped child who is incapable of self-government. The opinions of men who in this enlightened day believe that the Filipinos are capable of selfgovernment because everybody is, are not worth considering. (Strong 289-290)

Not a tolerant view from this man of the cloth, but cited by Gould as clearly illustrative of the cultural-political embeddedness of both religion *and* science. Gould alludes to a similar view propounded by British philosopher, Benjamin Kidd, who in 1898 argued that tropical Africa was manifestly fit for colonization because its "child-like" natives were so obviously unfit to govern themselves (*Ontogeny* 131). Africa's wholesale sub-division into colonies ensued.

Although twentieth-century biological determinism has downplayed physical measurement comparisons in favor of the more abstract concept of intelligence differences, its goal of influencing social policy persisted. New Jersey's Henry Goddard championed the first spirited association of intelligence testing with social advocacy. He argued that intelligence constituted a raw material critically important to the construction of a sound society:

The significance of [intelligence testing] for human progress and efficiency can hardly be appreciated at once. Whether we are thinking of children or adults it enables us to know a very fundamental fact about the human material. The importance of this in building up the cooperative society such as every community aims to be, is very great. The mechanical engineer could never build bridges or houses if he did not know accurately the strength of materials, how much of a load each will support. Of how infinitely greater importance is it then we seek to build up a social structure that we should know the strength of our materials. (28-29)

Goddard saw intelligence testing as a means to assure that every person assumed a position in society commensurate with his or her intellectual raw material. He also equated lower levels of measured intelligence with antisocial tendencies, stating that "every investigation of the mentality of criminals, misdemeanants, delinquents, and other antisocial groups has proven beyond the possibility of contradiction that nearly all persons in these classes and in some cases all are of low mentality" (72).

Highly concerned about what he saw as an excessive number of morons in America, Goddard performed a study of newly arriving immigrants at New York's Ellis Island in 1912. Often illiterate and without adequate knowledge of English, immigrants were selected (by Goddard's own procedural description) for visible signs of possible mental defectiveness and asked to take an intelligence test. The process by which Goddard and his assistants selected participants is, in itself, a case study of "thumb-onthe-scale," a priori bias. According to Gould's examination of Goddard's experiment notes, Goddard instructed his assistants to pick out the feeble-minded by sight and to exclude the "obviously normal" from the sample (Gould, *Mismeasure* 165). Though he would subsequently promote it as an objective study, the experimenter's subjective impressions about what people "look like" were well apparent.

Goddard's report concluded that among arriving immigrants, 83 percent of the Jews, 80 percent of the Hungarians, 79 percent of the Italians, and 87 percent of the Russians were indeed morons. He advocated strict immigration policies to combat the influx of such feeble-mindedness into the United States and took satisfaction that the number of immigrants deported for feeble-mindedness increased several fold in 1913 and 1914 (Gould, *Mismeasure* 168).

Goddard's concern, echoed by other twentieth-century determinists, was that American social fabric was under attack on two fronts: 1) the immigration of mentally inferior people, and 2) the unregulated reproduction of mentally inferior people already here. The enactment of several forced-sterilization laws nationwide attests to the popularity of Goddard's "moronic threat" view on the domestic level. A 1913 Iowa law, for example, dedicated itself to "the prevention of the procreation of criminals, rapists, idiots, feeble-minded, imbeciles, lunatics, drunkards, drug fiends, epileptics, syphilitics, moral and sexual perverts, and diseased and degenerate persons" (Kamin, "Pioneers" 484).

The 1917 Army Study on Intelligence by Harvard psychologist Robert Yerkes as well as its subsequent interpretation and nationwide popularization by psychologists Louis Terman of Stanford and Carl Brigham of Princeton—helped propel "IQ Testing" into national consciousness and fostered the legislative atmosphere that enacted the strictest immigration regulations in the nation's history. Gould characterizes Robert Yerkes as a psychologist dissatisfied with his field's lack of respect among "hard sciences," such as physics and chemistry. To counter this image, Gould suggests, Yerkes discerned the tremendous increase in prestige and credibility that would accompany the injection of quantitative method into psychology.

The U.S. Army commissioned Yerkes to provide mental assessment protocols that would aid in the job classification of draftees. Yerkes developed a "point scale" version of Binet's test, deliverable in two formats: "Alpha" for administration to English speakers, and the more visually oriented "Beta" format for those who had not mastered English. The Army Study tested over two million men, and would prove to be the most extensive IQ study done to that date.

Its results provided extensive intelligence data for a wide variety of racial and ethnic groups, and fuel for the biological determinists. Yerkes's study reported an intelligence hierarchy based on nationality, with primarily Nordic and Teutonic countries (such as Canada, Britain, and Scandinavia) at the top, and Latin, Slavic, and Eastern European countries (such as Italy, Hungary and Poland) at the bottom. It was also the first study to show a higher average intelligence score for American Whites as compared to American Blacks.

Yerkes wrote the foreword to Carl Brigham's 1923 work, *A Study of American Intelligence*. Commenting there on Brigham's application of the Army Study to immigration advocacy, Yerkes wrote that "the author presents not theories and opinions but facts. It behooves us to consider their reliability and their meaning, for no one of us as a citizen can afford to ignore the menace of race deterioration or the evident relations of immigration to national progress and welfare" (Yerkes vii-viii).

In his 1923 work, *A Study of American Intelligence*, Carl Brigham invoked Darwinian theory to draw hereditarian conclusions from the Army data:

If intelligence counts for anything in the competition among human beings, it is natural to expect that individuals of superior intelligence will adjust themselves more easily to their physical and social environment, and that they will endow their children not only with material goods, but with the ability to adjust themselves to the same or a more complex environment. To select individuals who have fallen behind in the struggle to adjust themselves to the civilization their race has built as typical of that race is an error, for their position itself shows that they are, for the most part, individuals with an inferior hereditary endowment. (194)

Brigham's staunch advocacy helped afford the scientific legitimacy required by Congress to pass the Johnson-Lodge Immigration Act of 1924. Though neither Brigham nor

Yerkes testified at congressional hearings, their influence was manifest in the frequent allusions made to their work by witnesses such as Harry Laughlin, Expert Eugenics Agent of the House Committee on Immigration and Naturalization (Kamin, "Pioneers" 499-500). The Johnson-Lodge act successfully rolled back annual immigration from Southern and Eastern European countries to quotas representing two percent of each nationality's American representation in the 1890 American census. No such restriction was imposed on immigration from Northern or Western European countries. The quotas remained in effect throughout the 1930s, denying entrance to large numbers of German Jews who were attempting to leave Germany. About these people, Gould writes eloquently, "we know what happened to many who wished to leave but had nowhere to go. The paths to destruction are often indirect, but ideas can be agents as sure as guns and bombs" (*Mismeasure* 233).

Although Gould acknowledges the Army Study's widespread impact, he criticizes Yerkes's protocol as providing recruits with inadequate instructions, dim light, a highly stressful ambiance, and culturally loaded questions (e.g., asking what is missing from a picture of a gramophone lacking a sound horn) (*Mismeasure* 200). He also faults Yerkes for failing to separate genetic and environmental components from his data. To Gould, Yerkes was a scientist who—supported by the societal power structure—abandoned objectivity to advance a priori conclusions reinforcing that structure. In this case, the thumb was under the scale of Blacks and other "inherently less intelligent races," whom Yerkes believed he had proved uneducable to the same level as Whites (*Ever Since* 243).

Gould notes with interest Brigham's interpretations of two Army Study findings that contradicted determinist tenets. The first was the observation that median intelli-



**Figure 3-1.** Army Study: Average Immigrant Test Performance vs. Years of Residence. (Brigham 94)

gence scores of Blacks from four northern states (Illinois, New York, Ohio, and Pennsylvania) were significantly higher than the median scores of Whites from four southern states (Mississippi, Kentucky, Arkansas, and Georgia) (Bond 597). In *A Study of American Intelligence*, Brigham did not address this "northern Black over southern White" detail; he wrote instead only that the Army study detected a superiority of northern Blacks over southern *Blacks*:

The superior intelligence measurements of the northern negro [sic] are due to three factors: first, the greater amount of educational opportunity, which does affect, to some extent, scores on our present intelligence tests; second, the greater amount of admixture of white blood; and third, wages, better living condition, identical school privileges, and a less complete social ostracism, tending to draw the more intelligent negro to the North. (192)

Thus, while acknowledging a minimal role for limited environmental influence, Brigham managed to infuse his discussion of this discrepancy with an essentially hereditarian tone. One cannot help but admire Brigham's skill as a rhetorician. Heads, he wins; tails, an unfavored race loses.

A second Army Study obstacle for Brigham's determinism was its demonstration that, after twenty years of U.S. residency, the intelligence test performance of immigrant recruits equaled that of "native born" Americans. Figure 3-1, reproduced from Brigham's *A Study of American Intelligence*, illustrates the phenomenon. Gould criticizes Brigham for failing to acknowledge the more plausible environmentalist hypothesis for the phenomenon depicted in this graph—that test-taking ability increased as immigrants became more acclimated to American customs and language. In *The Mismeasure of Man*, Gould argues that Brigham simply assumed a priori that his tests measured innate intelligence, and applied the "tails you lose" tactic to his rhetorical counterattack by claiming that the intellectual caliber of recent immigrants (who were predominantly from Eastern and Southern Europe) must be inferior to that of past immigrants (who contained a much higher number Northern Europeans, or "Nordics," Brigham's favored racial group) (*Mismeasure* 228). Figure 3-2 was employed by Brigham to illustrate the Army Study's differing performance distributions for Nordics, Mediterraneans, and American Blacks—and to argue against racial interbreeding:



Figure 3-2. Army Study: Intelligence Testing Distributions by Race. (Brigham 200-201)

Brigham founded the College Entrance Examination Board, helped develop the first version of the SAT college-entrance exam, and was a board member of Educational Testing Service in Princeton, New Jersey. It is disconcerting to note that so prominent a figure as Brigham once wrote that "running parallel with [European immigration trends] we have the most sinister development in the history of this continent, the importation of the negro" (xxi) and that "the able Jew is popularly recognized not only because of his ability, but also because he is able and a Jew " (190). It might be argued that the first remark was intended to express indignation at the institution of slavery. In view of Brigham's penchant for racial ranking and the order he propounded, this seems unlikely.

With advocates like Goddard, Brigham, and Stanford psychologist Lewis Terman (the developer of the highly standardized and widely distributed Stanford-Binet intelligence test), laws permitting forced sterilization of the developmentally disabled and of others deemed "mentally defective" became more and more common. By 1935, about 20,000 forced sterilizations had been performed in the United States based on sterilization-warranting "hereditary" conditions that included alcoholism, drug addiction, blindness, and deafness in some states (*Flamingo* 309).

Researcher Nancy Gallagher notes that although California led the nation in eugenic sterilization laws, even small states such as Vermont joined the trend. The Vermont Eugenics Survey of the 1920s and 1930s culminated in the 1931 Vermont law allowing for the sterilization of the feeble-minded and handicapped. In a recent interview she emphasized that such laws did not arise as isolated aberrations; they were often enmeshed with progressive or even liberal social welfare reform issues like Special Education and other reforms affecting children (Gallagher). Her research on the Vermont Eugenics Survey indicates that it targeted the poor, families in trouble, unwed teenage mothers, and Abenaki Indians. The Abenakis were a northeastern tribe whose reluctance to abandon itinerant traditions and accept American culture had made them unpopular. Gould would quickly point out the equation of unpopularity with mental inferiority here.

Gould's gift for inspiring human empathy through his writing is typified in "Carrie Buck's Daughter," a case study of a one such victim of the eugenic movement. In 1924, Carrie Buck, a resident of the Virginia State Colony for Epileptics and the Feeble-Minded in Lynchburg, became the plaintiff in a case argued all the way to the U.S. Supreme Court. Both she and her mother (also deemed feeble-minded) were residents, and Carrie had recently given birth to an illegitimate daughter. In his oft-quoted 1927 pronouncement that "three generations of imbeciles are enough," Judge Oliver Wendell Holmes delivered the majority opinion that her sterilization warrant should not be rescinded.

With touching irony, Gould relates the true story of Carrie Buck's incarceration. (It is probable that she was institutionalized to protect the foster family relative that had raped and impregnated her.) Dr. K. Ray Nelson, the director of the institution in 1980, reexamined records of past residents and tracked down Carrie, who was still alive and residing in a nearby town. His visits, along with those of reporters and scholars, found her to be woman of normal intelligence (Flamingo 313). Carrie's daughter, Vivian, died in 1932 at the age of eight. Gould obtained Vivian's last school report card and observed average performance grades. With Wendell Holmes's "three generations of imbeciles" statement exposed as erroneous, Gould comments: "I don't know that such correction of cruel but forgotten errors of history counts for much, but I find it both symbolic and satisfying to learn that forced eugenic sterilization, a procedure of such dubious morality, earned its official justification (and won its most quoted line of rhetoric) on a patent falsehood" (Flamingo 318). Ironically, contemporary pro-life groups, viewing abortion as a procedure of dubious morality, might feel similarly about the ultimately recanted rape claim initially charged in Roe v. Wade.

Forays by late twentieth-century hereditarians into social and legislative advocacy embrace intelligence testing as proof for innate race and class differences. For example, in 1969 Arthur Jensen argued in a Harvard Review article entitled "How Much Can We

Boost IQ and Scholastic Achievement?" that perceived failures in remedial education

programs were not the result of children's environmental deprivations:

Compensatory education has been tried and apparently it has failed.

Compensatory education has been practiced on a massive scale for several years in many cities across the nation. It began with auspicious enthusiasm and high hopes of educators. It had unprecedented support from Federal funds. It had theoretical sanction from social scientists espousing the major underpinning of its rationale: the "deprivation hypothesis," according to which academic lag is mainly the result of social, economic, and educational deprivation and discrimination—an hypothesis that has met with wide, uncritical acceptance in the atmosphere of society's growing concern about the plight of minority groups and the economically disadvantaged.

The chief goal of compensatory education—to remedy the educational lag of disadvantaged children and thereby narrow the achievement gap between "minority" and "majority" pupils—has been utterly unrealized in any of the large compensatory education programs that have been evaluated so far. (1)

Jensen ascribes the perceived problem, instead, to IQ's unresponsiveness to outside

(environmental) correction, citing monozygotic twin studies by Cyril Burt as support

(47). While acknowledging that environmental factors do play a role (especially with

regard to school grades, as opposed to IQ), he uses Cyril Burt's twin studies to calculate

that 80 percent of variability in people's IQs can be attributed to hereditary causes.

According to Gould, the first of Jensen's unsupported assumptions—and the central assumption of all hereditarian arguments about intelligence—is that there exists a single, definite, reified entity called "intelligence" or "Spearman's g factor"<sup>\*</sup> (after its principal theorist, Charles Spearman). Second, while acknowledging that intelligence is molded by environmental as well as genetic influences, it gave the genetic component the "control-ling interest" by stating that intelligence was 80 percent heritable. Jensen's claims relied on identical twin studies reported by the preeminent British psychologist and statistician,

<sup>\*</sup> Spearman's concept of g will be examined in Chapter 4.

Cyril Burt (1883-1971). Studies of twins separated into different environments at birth are considered the only valid experimental vehicle through which to study heredity-vs.-environment phenomena.

Despite the discrediting of Jensen's argument, Gould uses it as an example of the power of ostensibly objective scientific observation to influence political policy. Although in 1976 Burt's twin studies would be exposed as having been based largely on falsified data (Dorfman), Jensen's article was read by many, including Singapore Prime Minister Lee Kwon Yew in the early 1980s. Lee had seen the statistic that collegeeducated women in Singapore gave birth on average to 1.65 children, while uneducated women averaged 3.5 children. He then concluded that Singapore's status as a thriving business center in the East would be undermined if the relatively high reproductive level of less intelligent women were not countered.

Through a nationwide media campaign ostensibly motivated by concerns about unintelligent masses enlarging their numerical advantage, Lee exhorted Singapore's better-educated women to marry and have more children. In an essay in *The Flamingo's Smile*, Gould rolls his eyes at Lee's citing of Jensen, and Jensen's citing of Burt, in a veritable cascade of pseudo-scientific misinformation. Referring to Lee's wholesale acceptance and promotion of Jensen's 80 / 20 "Nature / Nurture" ratio, Gould relates that "it sent a frisson of déjà-vu up my spine" (*Flamingo* 324). To Gould, the Singapore episode indicates that the plea for governmental intervention to curb reproduction of the less intelligent is a worldwide phenomenon—and it is misinformed.

Political efforts for social reform that are undergirded by the hereditarian view of intelligence have continued to be major issues throughout the final quarter of the twentieth century. During the 1960s the American physicist William Shockley, Nobel prize-winning inventor of the transistor, proposed a monetary incentive system whereby individuals with IQs below 100 would be compensated for undergoing voluntary sterilization (Gould, *Mismeasure* 28). The lower the IQ, the higher the compensation.

In 1971 the Harvard psychologist, Richard Herrnstein, published the article,

"IQ," in *Atlantic Monthly*. It claimed that socioeconomic class distinctions were chiefly a function of inherited intelligence, and that—paradoxically—as society strives to equalize opportunities for all through social programs, it strengthens the stratification of an intelligence-based "meritocracy." In the article's 1973 companion book, *IQ in the Meritocracy*, Herrnstein wrote:

The ties among I.Q., occupation, and social standing make practical sense. . . . If virtually anyone is smart enough to be a ditch digger, and only half the people are smart enough to be engineers, then society is, in effect, husbanding its intellectual resources by holding engineers in greater esteem, and on the average, paying them more. . . . The critics of testing say that the correlations between I.Q. and social class show that the I.Q. test is contaminated by the arbitrary values of our culture, giving unfair advantage to those who hold them. But it is no mere coincidence that those values often put the bright people in the prestigious jobs. By directing its approval, admiration, and money towards certain occupations, society promotes their desirability, and hence, competition for them. (124)

Herrnstein wrote to confront what he described as the prevailing liberal-egalitarian orthodoxy in psychology at the time, which he claimed had been suppressing discussion of the social ramifications of intelligence's proven high heritability since the early days of mental testing. He equated this egalitarianism with Marxism and with what he perceived as failed "Great Society" programs of the 1960s.

Herrnstein contended that egalitarian efforts to equalize opportunity actually engender "a society sharply graduated, with ever greater innate separation between the top and the bottom and ever more uniformity as far as inherited abilities are concerned," and he commented (perhaps disingenuously) that "naturally we find this vista appalling, for we have been raised to think of social equality as our goal" (221). Herrnstein's essential warning was that egalitarianism, with its alleged failure to recognize individuals' inherent mental differences, accentuates the dangerous class divisions that it aims to equalize.

One of the most widely read recent works promoting hereditarian views on intelligence was *The Bell Curve*, published in 1994 by Herrnstein and Charles Murray. It advances Herrnstein's concept of a "cognitive elite," born as the unintended consequence of today's more equitable social opportunities and ever more sharply alienating lower from upper classes:

The upshot is that the scattered brightest of the early twentieth century have congregated, forming a new class. . . . Membership in this new class, the cognitive elite, is gained by high IQ; neither social background, nor lack of money will bar the way. But once in the club, usually by age eighteen, members begin to share much else as well. Among other things, they will come to run much of the country's business. In the private sector, the cognitive elite dominate the ranks of CEOs and the top echelon of corporate executives. Smart people have no doubt always had the advantage in commerce and industry, but their advantage has grown as the barriers against the "wrong" nationalities, ethnicities, religions, or socioeconomic origins have been dismantled. (510).

Herrnstein and Murray first dispute the strict environmentalist claim that parental socioeconomic status and local educational opportunities are the major factors determining intelligence and life success—and offer an alternative hypothesis in which inheritance of parental intelligence plays the predominating role. The book's second contention, strongly implied but never directly stated, is that demonstrable race differences in IQ play predominating causal roles for crime, overpopulation, unemployment, and other social ills.

The Bell Curve articulately promoted to a large popular audience the following

determinist tenets and related social policies:

- Intelligence is a single, concrete, and verifiable entity that is easily quantifiable by one variable defined originally by Charles Spearman as "g."
- IQ tests measure "g" very well, and "when properly administered, the tests are not measurably biased against socioeconomic, ethnic, or racial groups. They predict a wide variety of socially important outcomes" (15).
- There exist differences in intelligence between groups of people, and these differences are largely (though not entirely) inherited. Environmental influences exist, but are not predominant.
- Ethnic IQ differences correlate with differences in social traits such as crime, illegitimacy, morality, and civic-mindedness.
- People at the top and bottom of the socioeconomic ladder are in their respective places *primarily* because of biological predestination, not "nurture" or environment.
- Egalitarianism is detrimental to society. Interventionist social policies such as inner city supplemental education programs and Affirmative Action programs have failed. They have failed because the limitations of innate low intelligence are insurmountable. Herrnstein and Murray believe that "the egalitarian ideal of contemporary political theory underestimates the importance of the differences that separate human beings. It fails to come to grips with human variation. It overestimates the ability of political interventions to shape human character and capacities" (532).
- Past hereditary and wealth-based inequities of social structure have now been supplanted by a color-blind meritocracy that is based predominantly on intelligence differences. Everyone is now free to assume his or her rightful place on the hierarchy, based on intellectual merit.

Herrnstein and Murray, whose arguments will be explored further as this thesis

progresses, serve as the torch-bearers for a cadre of hereditarian theorists that also

includes Arthur Jensen, Richard Lynn, and J. P. Rushton. In the following section we

will examine the rhetorical techniques employed by some of these theorists---in the face

of what Gould insists is a lack of demonstrable data—to disseminate biological determinist views and gain support for related social policy.

**3.2** Science and Rhetoric—Or, How to Win Friends and Eliminate People It is one thing to theorize about eugenic sterilization or racial / class discrimination, but it is yet another to persuade others successfully to one's cause. Gould's major selfappointed role is a counter-rhetorical one. With the aid of Kamin, Montague, and other skeptics of biological determinism, Gould aims to expose and refute what he perceives as the misuse of biological science to validate sociopolitical inequity.

"Propaganda" connotes the use of verbal underhandedness in argument and persuasion. Its negative connotation generally assures that we apply the word only to arguments to which we are opposed, so it is not surprising that hereditarians and opponents such as Gould might dismiss many of each other's arguments as propaganda. A reader may very well consider this thesis propaganda for its acknowledged positive framing of Stephen Jay Gould's work. A truly impartial reader—aware of the frequently rhetorical aspect of writing—must weigh the value of a written work with the author's apparent motive in mind. Credibility should rest on the author's apparent honesty and fairness of motive. *The perspective of the evaluator— itself prone to bias by personal circumstance and belief systems—is key.* 

In day-to-day life, calculated misinformation is ubiquitous, but often hidden. Historian Oliver Thomson, in his work, *Mass Persuasion in History* (1977), contends that political persuasion can occur at an almost subliminal level wherein political assumptions and preferences are easily presented as incontrovertible facts. He considers this insinuation of sociopolitical ideas into everyday experience with great concern:

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The spreading of these ideas is slow and insidious. It is not necessarily deliberate or controlled by even an identifiable elite, but does quite genuinely trap whole peoples in a lifetime of acquisitiveness or racial hatred or useless conflict or obsessive puritanism. The ideas spread so widely that they become confused with absolute truths. . . . It becomes evident that the most dangerous propaganda is the kind which is not recognized as such at all, either by its audience or even by its perpetrators. It is the steady drip, drip, drip of aggressive, prejudiced or materialist ideas which those competing to be social leaders project through all the media in their fight for personal success. (132)

It is just such an insinuative quality that Gould rallies to highlight in the work of biological determinist theoreticians, and just the element that he labors hard in the details to disentangle and lay bare for the non-scientific reader.

In *A Rhetoric of Motives* (1950), the rhetorician Kenneth Burke emphasizes the human tendency to view others not as individuals, but as members of groups, classes, or audiences that need to be wooed, courted, deceived, forced, or otherwise compelled toward a particular way of thinking—in other words, as objects to be manipulated. To rally people to our cause or belief system, Burke writes, we must convince them that we *identify* with their own values, and that—in a world of *Us* 's and *Them* 's—we are an empathetic member of their own superior group of *Us* 's, not of the evil, undesirable, or untidy *Them* 's (19-27). Burke views *mystery* as a sort of awe-demanding smoke screen whose purpose is to cloud people's discernment of the persuasive forces directed at them (114-127, 331-332).

Although without direct reference to Burke or other rhetorical scholarship, Gould portrays biological determinists as employing the rhetorical devices of identification and mystery. Much as Gould himself is accused (by critics such as Frank Schmidt) of "preaching to the choir" by propounding comforting egalitarian notions that many unscientific lay people want to hear, so too do the ideas of hereditarian theorists provide a comforting sense of *identity* to those occupying relatively privileged positions within societies—telling *them* what *they* want to hear.

For example, in his book, *Human Efficiency and Levels of Intelligence* (1920), Henry Goddard flattered his readers (courting their identification) by stating that only readers of above-average intelligence would be interested in reading about intelligence ranking (32). Determinist arguments are quick to align with a dispassionate and objective science, in effect invoking science as a higher power, much as our less secular ancestors might have invoked a deity to which blind faith was due.

It might be argued that science, despite its claims to dispassionate objectivity, is just as much a mystery to the average human as any notion of a divine power—and therefore just as potentially persuasive. To the common person, science may often be perceived with the same sense of awe, intangibility, unprovability, mystery—and credulous deference.

Gould describes the pro-slavery sympathies harbored by the polygenist Louis Agassiz, who was considered by many to have been America's greatest nineteenthcentury biologist. Though Agassiz was known to be a highly religious man, he believed Negroes were a separate species from Caucasians. This inconsistency causes Gould to wonder whether Agassiz applied toward Negroes the biblical command to "love thy neighbor" (*Ever Since* 243). Might polygeny, with the exonerating biblical exclusion it offered, have been a message that a southern plantation owner would have welcomed? How many plantation owners, "wanting to believe," would have questioned its veracity? Or would they simply have accepted it as they would the Sermon on the Mount? Why question a scientist, who by definition is much better equipped to "know"? Gould decries the sometimes sinister homeostatic role that such ostensibly credible contentions have played repeatedly throughout the history of science in bolstering ideological support for oppressive social systems. Gould responds sharply to Agassiz's antiegalitarian rhetoric (which resurfaces perennially in determinist writing):

Similar arguments, carrying the apparent sanction of science, have been continually invoked in attempts to equate egalitarianism with sentimental hope and emotional blindness. People who are unaware of this historical pattern tend to accept each recurrence at face value: that is, they assume that each statement arises from the "data" actually presented, rather than from the social conditions that truly inspire it. (Gould, *Ever Since* 243)

As a scientist, writer, and historian of science, Gould is keenly aware of the misconceptions to which the lay audience is vulnerable. In "hard" sciences such as chemistry and physics, a well-written lab report can be almost as informative as seeing a phenomenon with one's own eyes in the laboratory. This is not so in the less palpable realm of racial comparisons, however, where the "conclusion" may well have been written before the experiment was even conducted—as seems to have been the case with Cyril Burt's twin studies (Dorfman). Gould asserts that all nineteenth-century polygeny and physical measurement theories supporting racial differences—however prominent their proponents—have since been discredited.

The most notorious application of biological determinism to social policy, of course, occurred throughout the German Holocaust of the 1930s and 1940s. Gould, Kenneth Burke, and the North Carolina State University language scholar Steven Katz provide an interesting triangulation upon the rhetorical mechanisms that helped to organize Nazi bureaucracy into a monolithic killing machine. In "The Most Unkindest Cut of All" in *Dinosaur in a Haystack* (1995), Gould discusses the German Wannsee Protocol of 1942—the high-level government conference at which plans for the "Final Solution" (eradicating Jews from German-held nations) were solidified. Gould explores what he sees as Adolf Hitler's utter misappropriation of Darwinian theory, "the distortion of a statement about differential reproductive success into a bogus validation of mass murder as natural" (316).

The technical details of just how to classify people as "sufficiently Jewish" to warrant expulsion or death were hashed out at the Wannsee conference. Half-breeds (humans having one Aryan and one Jewish parent) and full-breed Jews were to receive an expulsion or death sentence, with exemptions being available only for half-breeds who had reproduced with full-blooded Aryan mates. Such exemptions required high level approval, as well as submission to sterilization. A quarter-breed was exempted, but authorities could rescind his or her exemption for reasons as ludicrous as having a general appearance that was "racially particularly objectionable so that he already outwardly must be included among the Jews" (314). Gould asks, "What can be more insane than madness that constructs its own byzantine taxonomy—or are we just witnessing the orderly mind of the petty bureaucrat applied to human lives rather than office files?" (314).

In *Mein Kampf* (1925, 1927), Adolf Hitler harnessed what Gould describes as an incomplete understanding of Darwinian theory to urge an inevitable and biologically preordained triumph of the strong over the weak. The idea was that helping the weak went against the iron logic of nature and was detrimental to the strong. Invoking the "good of the species," Hitler wrote:

In the struggle for daily bread all those who are weak and sickly or less determined succumb. . . . And struggle is always a means for improving a species' health and power of resistance and, therefore, a cause of its higher development. . . . For, since the inferior always predominates numerically over the best, if both had the same

possibility of preserving life and propagating, the inferior would multiply so much more rapidly that in the end the best would inevitably be driven into the background, unless a correction of this state of affairs were undertaken. Nature does just this by subjecting the weaker part to such severe living conditions that by them alone the number is limited, and by not permitting the remainder to increase promiscuously, but making a new and ruthless choice according to strength and health. (284-286)

It is easy to imagine how this skillful (though longwinded) invocation of an ostensibly ineluctable mystery of nature might have helped Adolf Eichmann to rationalize dispassionately the "difficult living conditions, then kill the survivors" approach of his Jewish master plan.

Gould labels such thinking a misinterpretation of evolutionary theory by quoting Darwin from *Origin of Species*: "... I use the term Struggle for Existence in a large and metaphorical sense, including dependence of one being on another, and including (which is more important) not only the life of the individual, but success in leaving progeny.... A plant on the edge of a desert is said to struggle for life against a drought" (qtd. in *Dinosaur* 316). Gould believes that the role of *competition* in species survival, though undeniable, was overemphasized in popular opinion during periods of aggressive expansion and conquest. To Gould, the role of *cooperation* has been under-emphasized or ignored.

In "The Ethic of Expediency: Classical Rhetoric, Technology, and the Holocaust," Steven Katz analyzed a 1942 German technical document proposing structural modifications to gas vans used to "process" Jews by carbon monoxide asphyxiation. A Mr. Just, the writer of the memo, makes the following recommendations to his supervisor, Walter Rauff:

• He advises that the volume of the vans must be decreased to improve vehicle stability and to improve efficiency by requiring less carbon monoxide to

displace the contained air: "If the load space is reduced, and the vehicle is packed solid, the operating time can be considerably shortened" (qtd. in Katz 255).

- He suggests that improved lighting is necessary because "the load" has a tendency to press hard against the doors in unlighted vans, following the external light. "Also, because of the alarming nature of darkness, screaming always occurs when the doors are closed. It would therefore be useful to light the lamp before and during the first moments of the operation" (qtd. in Katz 256).
- For easier cleaning, Just advises that a floor drain be installed in each van.

The memo refers only to the "load," the "merchandise," and the number of "pieces to be processed." It never uses terms that might remind the reader of the humanity of those for upon whom the vans were to operate. To Katz, and I am sure to Gould as well, the anesthetizingly rhetorical power implicit in this document's coldly objective ethos is just as appalling as the process it was supporting. To me, Henry Goddard's ideally efficient society and Richard Herrnstein's driving meritocracy of the cognitive elite embody certainly not in degree, but in kind—this same, coldly objective frame of mind.

The rhetorician Kenneth Burke shares Katz's indignation at the subtle ability of impersonal technical language to legitimize genocide in Nazi Germany: "The history of the Nazis has clearly shown that there are cultural situations in which scientists, whatever may be their claims to professional austerity, will contrive somehow to identify their specialty with modes of justification, or socialization, not discernible in the sheer motions of the material operations themselves" (Burke 32). This describes well the coldly efficient utilitarianism so obvious in Just's letter to Rauff. Just is a methodical, detail-oriented technical worker, trying conscientiously to improve the process at hand, to further the progress of his organization and himself, and to *identify* himself seamlessly

with dominant power. Burke comments as well on the sense of mystery shared by both science and deity:

In its transcendence of natural living, its technical scruples, its special tests of purity, a clinic or laboratory can be a kind of secular temple, in which ritualistic devotions are taking place, however concealed by the terminology of the surface. Unless properly scrutinized for traces of witchcraft, these could furtively become devotions to a satanic order of motives. At least such was the case with the technological experts of Hitlerite Germany (32).

Burke is describing a technology garbed in a persuasive air of mystery. By virtue of its general incomprehensibility to the average person, science may paradoxically intensify its persuasive power over those conditioned to awe its mystique.

To Gould, scientists bear rightful responsibility only for confirming or refuting facts, and for *informing* ethical thought—not for *executing* moral / ethical decisions. Ethical decisions to him are outside the scientific realm, subject only to our own individual sense of humanity and empathy. "Science can supply information as input to a moral decision," Gould states, "but the ethical realm of 'oughts' cannot be logically specified by the factual 'is' of the natural world—the only aspect of reality that science can adjudicate" (*Dinosaur* 318). Gould sees important limits to the authority of science, limits that in his view have often been transgressed to provide rhetorical ammunition for the perpetuation of social injustices like the Holocaust.

The overt and scientifically rationalized racial hatred of the Nazi era has been universally denounced, with the affirmation, "never again," being widely heard. No atrocity on its scale has occurred since, although recent events in Rwanda, Serbia, and East Timor evoke great concern. It is clear from these events that the building blocks of racial hatred have not been forever dismantled. How can such building blocks remain stockpiled at the close of the twentieth century? Perhaps one perpetuator is the ideology of biological determinism, subtly embedded within public policy debate.

Herrnstein and Murray's 1994 book, *The Bell Curve*, offers a more contemporary example of the brand of biological determinist argument to which Gould is so mightily opposed. Two key points of the book are that group IQ differences correlate well with differences in social status, law abidingness, illegitimacy, morality, and civic-mindedness; and that Blacks—who have demonstrated a lower average IQ—are correspondingly less well endowed with these attributes. Another point is that past inequities in societal structures have today been superceded by a color-blind meritocracy based only on intelligence differences, with all people now being free to assume their place in a hierarchy based increasingly on (primarily innate) intellectual merit.

Herrnstein and Murray present their case in an easy-to-read, "We're just telling you the facts" style. "Much as some observers wished it were not true," they write, "there is often a need to assess differences between people as objectively, fairly, and efficiently as possible, and even the early mental tests often did a better job of it than any of the alternatives" (6). The book relies heavily upon statistical analyses performed by the authors upon data from the National Longitudinal Survey of Youth (NLSY). This survey tracked a wide variety of educational, occupational, and social variables for over ten thousand American youth who were between the ages of fourteen and twenty-two when the ongoing survey began in 1979. The authors performed their analyses on data that had accumulated up to the early 1990s.

Herrnstein and Murray portray American society at the close of the twentieth century as a society undergoing an unprecedented stratification into classes of differing intellectual capacities. Although they attempt to associate many social ills such as out-ofwedlock births, unemployment, and even health problems with group intelligence deficits, Herrnstein and Murray believe that cognitive stratification does offer benefits:

Chief among them is the triumph of an American ideal. Americans believe that each person should be able to go as far as talent and hard work will take him, and much of what we have described is the realization of that conviction, for people with high IQs. The breadth of the change was made possible by twentieth-century technology, which expanded the need for people with high IQs by orders of magnitude. But the process itself has been a classic example of people free to respond to opportunity and of an economic system that created opportunities in abundance. (511)

But above all, the picture Herrnstein and Murray paint is one of fear—fear within the "cognitive elite" that the less intelligent are becoming more and more dangerous to live around, and fear among the less intelligent that a new type of conservatism is burgeoning in America, a conservatism that is "along Latin American lines, where to be conservative has often meant doing what is necessary to preserve the mansions on the hills from the menace of the slums below" (518).

At eight hundred pages, with over 250 pages of appendices, notes, and bibliographies, the book is ostensibly well-researched and documented. From a rhetorical standpoint, however—beneath the abundant citations, cross references, correlation charts, and linear regression analyses—there appears a permeating lilt of what Harvard psychologist, Howard Gardner, calls "scholarly brinkmanship":

Whether concerning an issue of science, policy, or rhetoric, the authors come dangerously close to embracing the most extreme positions, yet in the end shy away from doing so. Discussing scientific work on intelligence, they never quite say that intelligence is all-important and tied to one's genes; yet they signal that this is their belief and that readers ought to embrace the same conclusions. Discussing policy, they never quite say that affirmative action should be totally abandoned or that childbearing or immigration by those with low IQ's should be curbed; yet they signal their sympathy for these options and intimate that readers ought to consider these possibilities. Finally, the rhetoric of the book encourages readers to identify with the IQ elite, and to distance themselves from the dispossessed in what amounts to an invitation to class warfare. Scholarly brinkmanship encourages the reader to draw the strongest conclusions, while allowing the authors to disavow this intention. (Gardner 63-64)

So, in addition to what Gould and others see as questionable statistical data, Gardner perceives a disingenuously manipulative rhetoric to *The Bell Curve*. It is exemplified by the authors' calculated flattery towards readers arriving at page 121: "In all likelihood, almost all of your friends and professional associates belong in that top Class I [Very Bright] slice. Your friends and associates whom you consider to be unusually slow are probably somewhere in Class II [Bright]" (121). In this rhetorical ploy (perhaps used in homage to Henry Goddard), Herrnstein and Murray are clearly attempting to cultivate identification from readers.

For its poundage alone, this eight-hundred page tome can command particular veneration from already-sympathetic lay people unversed in statistical convention. As will be discussed in Chapter 4, Gould contends that *The Bell Curve*'s logical flaws are well camouflaged amidst the ample pages, seemingly by intent. This rhetorical technique overloads the reader with so much technical information that critical facts, possibly misrepresented, tend to be either missed entirely by the reader, or glossed through inattentively. Again, for many lay people the mystery of science can mean that the mere *existence* of a chart, graph, statistic, or formula is enough to seal the credibility of the thesis propounded. Scrutiny of the data is tedious at best; so much easier is it to take the author's word for its interpretation (especially if the writer propounds favored idea).

The same snow-them-with-poundage technique has also been used by Arthur Jensen in *his* eight-hundred-page work, *Bias in Mental Testing (Urchin 124-144)*. Here, Jensen writes this about documented Black / White IQ differences: Whatever the causes of the statistical differences between the test scores of various racial groups within the United States, the preponderance of evidence leads to the conclusion that the tests themselves do not contribute to the differences. The observed racial group differences are *real* in the sense that they are not merely an artifact of the measuring instruments. (737)

In his essay, "Jensen's Last Stand," Gould criticizes Jensen's book as being deliberately designed to capitalize on readers' lack of statistical expertise. "Numbers have undoubted powers to beguile and benumb," Gould writes, "but critics must probe behind numbers to the character of arguments and the biases that motivate them" (*Urchin* 144). As do most recent hereditarian works, *Bias in Mental Testing* presumes that intelligence has been indisputably proven to be embodied almost entirely within a single, reified mental entity (Spearman's "g" factor) that is measurable by linearly rankable IQ tests. Gould strongly disputes this point, as will be discussed in Chapter 4. Jensen also documents a 15-point average IQ difference between Black and White Americans (a difference Gould acknowledges), and devotes four hundred pages to proving that IQ tests are not "statistically biased."

Gould describes those four hundred pages as a rhetorical red herring, preying on reader unfamiliarity with the difference between "statistical bias" and what Gould terms "vernacular bias." In IQ testing, statistical bias is a methodological error that would be said to exist if a given IQ score possessed *two different predictive values for two different groups* of people. For example, a given test result would be statistically biased if it predicted one level of school grades for Blacks and another for Whites. But Gould and his allies *do not contend* that IQ testing is statistically biased; they concur that the same score generally has similar predictive value among different groups of people.

"Vernacular bias" is the bias connotation most familiar to the average layperson. It signifies unfair advantage to or special treatment of one party—and is usually what

comes to mind when most lay people hear the term "bias." Gould's belief that cultural and environmental influences play a strong role in IQ test performance *does* align itself with the assertion that IQ testing is subject to vernacular bias.

Because both sides of the debate agree with the assertion that "IQ testing is not statistically biased," Gould is appalled that Jensen devotes four hundred pages of charts, graphs, and statistics to its support:

In short, the primary content of this book is simply irrelevant to the question that has sparked the IQ debate and that Jensen himself treated in his 1969 article: what does the lower average score of blacks mean? His concept of bias [statistical bias] does not address this issue. Yet, since this issue is intimately associated with our vernacular meaning of bias, nonstatistical reviewers (in *Time* and *Newsweek*, for example) have been consistently confused into believing that Jensen's voluminous data force us to reject environmental causes as the basis for group differences in IQ scores (*Urchin* 131).

According to Gould, Jensen knew full well that many lay readers, scanning rather than scrutinizing, would misread his work as a proof against *vernacular* bias in IQ testing. Jensen's book seems to exemplify the rhetorical technique of "false implicature" described by University of Minnesota rhetorician Arthur Walzer.

According to Walzer (who draws from the work of H. P. Grice), a written communication is deceptive and unethical if it violates any of four important trusts that a reader is compelled to place in a writer. These trusts are that the information provided possesses adequate Quantity, Quality, Relevance, and Clarity (Walzer 152-153). Gould and Walzer would no doubt agree that *Bias in Mental Testing* falls shortest and is most deceptive in regard to the Relevance requirement. Readers assume Jensen is writing about the relevant topic of interest, vernacular bias, but he is not; he is writing about a red herring. In this chapter we have explored, from Stephen Jay Gould's perspective, some of the tangible human impacts of biological determinism in practice. We have also examined some of the persuasive techniques employed by biological determinists to enlist popular support. Chapter 4 will explore Gould's recurrent warning that "bad science" provides the cornerstone of the hereditarian argument.

## CHAPTER 4 EXPOSING BAD SCIENCE

Because, as the adage states, "the devil is in the details," we now turn our focus to some of the technical foundations of determinist hypotheses. It might be said that Stephen Jay Gould is to popular evolutionary science what Ralph Nader is to the consumer economy—an independent evaluator who is willing to work tenaciously and against the grain of peers for the protection of consumers. Both provoke the anger of prominent members of society, and both claim that their goal is to leave the world a better place. But while Nader's sirens wail against material dangers, such as the "unsafe at any speed" Chevy Corvair, Gould aims to protect the public from something more intangible and elusive: the misapplication of evolutionary science toward inequitable sociopolitical ends.

## 4.1 Scrutinizing the Cognitive Filter

Gould has described himself as a writer for the perceptive lay person and can project an ethos of an interpreter charged with explaining the forest to one familiar only with the trees. He seems to distrust blind allegiance in any human era or context—be it the tacit loyalty to papal or royal authority that once shaped the Western lay person's view of life on earth, or today's more enlightened yet nonetheless tacit trust in the importance of dozens of scientific specialties (e.g., medicine, economics, engineering, and technologies). In observing the cultural context of apparently objective scientific ideas, Gould seems to be attempting to raise us from the forest floor, broadening what may have been a parochial view of human life on earth.

Gould shows special interest in the mechanism by which the non-scientific community's *interpretation* of human evolution is forged. Since neither policy-makers nor lay people can be expected to command a scientist's breadth of knowledge, a mediating "cognitive filter" has always been necessary to provide explanations and interpretations of scientific theory. Gould's closest scrutiny is reserved for this translation / application phase of the scientific communication process, and it is here —in the interstices of popularization itself—that he searches for "forest and the trees" type bias. By this I refer to the rhetorical frame of reference that can clothe ostensibly objective popular translations of evolutionary theory. Later in this chapter, for example, we will examine Gould's assertion that Darwin's original theories were rhetorically metamorphosed for popular and political consumption.

Gould is sensitive not only to those cognitive filters that he believes misrepresent *valid* science, but also to those which mask breaches in scientific integrity and incursions of science into realms he considers beyond its purview—ethics and morality. What then is Gould's definition of "good" science? It is a science free from inappropriate metaphors and untestable conjecture, a science in which fruitful dissent is encouraged, and life's ultimate questions (such as the nature of life, the origin of the universe, the beginning of time, etc.) are recognized as beyond testability. As an ardent opponent of creationism, Gould asserts this last prerequisite loudly: "... 'creation science'—as an untestable set of dogmatic proposals—could not qualify as science by any standard definition (*Bully* 456)." To Gould, we must not vilify scientists for failing to supply answers to ultimate type questions because only demagogues would pretend to.

As an example of the fruitful dissent that Gould views as characteristic of the beauty of science, he cites three alternate theories propounded for the extinction of dinosaurs. The first was that planetary warming caused dinosaur testes to malfunction. The second theory posited that angiosperms (flowering plants), which began to evolve toward the end of the dinosaur era, might have produced addictive psychoactive toxins that dinosaurs were unable to detoxify metabolically—thus poisoning the dinosaurs into extinction. The third theory, now widely accepted, was Luis and Walter Alvarez's contention that a comet or asteroid collided with the earth and caused a global darkness with fatal consequences for dinosaurs.

According to Gould, the Alvarez theory has survived because it was *testable* and spawned hundreds of studies intended to confirm or refute its feasibility (*Flamingo* 425). In the most widely known studies, iridium—an element rare on earth but abundant in comets and meteors—was found to be abundant throughout the earth specifically at the geological stratum associated with the demise of dinosaurs. Inherently untestable, neither the Planetary Warming nor the Toxic Angiosperm theory generated tangible confirmatory research, and to Gould both must be discarded as unprovable conjecture. As for the Alvarez theory, evidence currently supports it, but as with all "good science," it will always be open to revision should future data prove contradictory.

Though acknowledging the importance of metaphor in the creative mechanism of scientific discovery (e.g., the discovery of DNA first required the conceptualized metaphor of "sequentially coded assembly instructions"), Gould believes that metaphors have often been misapplied in the *dissemination* of scientific knowledge. He is an ardent critic of some translational metaphors historically used to convey evolutionary theory to nonscientific audiences, particularly those theories that might be described as lingering vestiges of the Platonic tradition. A key Platonic tenet was belief in the existence of a single, overarching "Natural Law" to which all life has been and will continue to be subservient. As derivatives of this tradition, Gould cites the following "bad habits of Western Thought":

Atomism—The assumption that after dissection of a physical or conceptual "whole" into parts, inferences made from the parts about the whole are always valid.

**Reductionism**—The simplification of complex phenomena into more easily interpretable principles.

**Determinism**—The idea that all events have a definite, predictable, and determinable causes.

To Gould, metaphors can deceive as well as teach. For instance, the reductionist "ladder of gradual progress" from amoeba to fish to amphibian to mammal to *Homo sapiens* discussed in Chapter 2 is to Gould a gross misrepresentation of evolution.

Gould's reading of Darwin, the fossil record, and his own research culminating in the theory of punctuated equilibrium have convinced him that species evolve not gradually but in sudden geological bursts through a complex "bush" of ancestral lineages (most branches of which have died out long before our time). He sees the utilitarian "urge to progress" as the necessitating rationale for society's persistent clinging to comforting notions of gradual, unilinear evolution culminating in our own species. And, as we have explored, the perception of a directed, unilinear evolution to "higher races" has been a powerful and effective (mis)guiding rationale for slavery, imperialism, and Hitlerian atrocity.

A related element of this "progress-colored" cognitive filter, according to Gould, has been an over-reliance upon "essentialism" or "reification"—the abstraction of
ostensibly sharply defined mental constructs from more subtle and ambiguous shadings of natural reality. "Ever since Plato . . . essentialism has dominated Western thought [and] encouraged us to neglect continua and to divide reality into a set of correct and unchanging categories" (*Flamingo* 161). Indeed, Gould believes that essentialism often ignores individual uniqueness and results in unwarranted pigeon-holing of humans, insects, or whatever species is being studied. Reification invites quantification, measurement, comparison, and ranking of relative worth based on group membership. To Gould, reification has had its most insidious impact in the realm of intelligence testing, where measurement and ranking of a hypothesized, reified "g" factor has become the linchpin of twentieth-century biological determinist argument.

To Gould it is *variation* among individuals, not abstracted essences of "central tendency," that is the key to understanding physical reality and Darwinian evolution. He is skeptical of the power of statistics to adequately represent the nature of this individual variation, offering as an example the socioeconomic application of statistical means and modes to population income distribution. A reported gain in "mean income" might not represent an income gain for a large proportion of the population; it could be due largely to the highly weighted income gains of the minority in the very highest income levels. On the other hand, the rarely reported statistical "mode," which represents the *most common* income within a population, could be considered a truer representation of the overall population's income level. "Measures of central tendency differ in highly skewed distributions [such as those representing income distribution in Capitalist countries]—and a major source of employment for economic and political "spin doctors"

lies in knowing which measure to choose as the best propaganda for the honchos who hired your gun" (*Full House* 54).

Preferring the term "cultural change" to "cultural evolution," Gould argues that cultural advance throughout history has been a function of additive learning rather than biological Darwinian processes. "The common designation of 'evolution' then leads to one of the most frequent and portentous errors in our analysis of human life and history the overly reductionist assumption that the Darwinist natural paradigm will fully encompass our social and technological history as well" (*Full House* 219).

Jean Baptiste Lamarck was an early nineteenth-century evolutionary theorist who believed that acquired traits were transmissible by inheritance to progeny. Although the Lamarckian theory of biological evolution was superceded by Darwin's idea that natural selection acts upon undirected individual variation, Gould is quick to promote "cultural Lamarckianism" as the driving force of *cultural* change. "Lamarckian evolution is rapid and accumulative. It explains the cardinal difference between our past, purely biological mode of change and our current, maddening acceleration toward something new and liberating—or toward an abyss" (*Panda* 84). I am reminded of Steven Katz's description of the "ethic of expediency" in Nazi Germany. To him the Nazi juggernaut was ideologically fueled by the hypnotic mass delusion that Aryan biological superiority and cultural preeminence were not only manifest, but intimately entwined.

Although it is comforting to believe that the advance of civilization from the Stone Age to the Space Age was enabled by concurrent *physical* evolutionary changes in our species, Gould states that he has seen no evidence that either the human body or mind has changed functionally within the last 100,000 years (*Full House* 219). It is somehow humbling for us to conceive that, with proper training, a Cro-Magnon human would have been capable of intellectual endeavors that we twentieth-century humans often assume to exist solely within our own domain (e.g., art, mathematics, and science).

## 4.2 How to Misunderstand Darwin

Claptrap and bogus Darwinian formulations have been used to justify every form of social exploitation—rich over poor, technologically complex over traditional, imperialist over aborigine, conqueror over defeated in war. Every evolutionist knows this history only too well, and we bear some measure of collective responsibility for the uncritical fascination that many of us have shown for such unjustified extension. But most false expropriations of our chief phrase [natural selection] have been undertaken without our knowledge and against our will. **Stephen Jay Gould** (*Dinosaur* 315)

Darwin's *The Origin of Species* (1859) reverberated widely in the field of social reform. Reformers contended that Christian morality and fairness, which had figured strongly in the formation of Western civilization's social and legal systems, must now be superceded by the impartial and sometimes unpalatable objectivity of evolutionary biology. "Proposals for change might shock traditional ethics," Gould explains, "but if they brought social procedure into harmony with human biology, we might establish a beginning of a rational and scientific order freed from ancient superstition and therefore, in the long run, humane in the literal sense" (*Ontogeny* 120). It is Gould's contention, however, that extrapolations of Darwinian theory onto the societal plain represent unwarranted extrapolations from Darwin's original work and intentions.

Britain's Herbert Spencer wrote widely on evolution, science, and philosophy, and spearheaded the first application of evolutionary theory to the social milieu. He, not Darwin, coined the phrase "survival of the fittest" ("Spencer" and "Survival," Minerva).

Although Spencer used Darwin's work in forming his own theories (some of which have come to be known, mostly pejoratively, as "social Darwinism") he is credited with conceptualizing the evolutionary importance of the "struggle for survival" independently of Darwin.

In Spencer's view, immutable natural law dictates that the survival and economic success of individuals in society are limited to only the fittest members of that society, with the less fit relegated deservedly to inferior social status and living conditions. And because Natural Law was the moving agent, it would be fruitless, wasteful, and counter-productive to endeavor to improve the social fortunes of these lower classes. Social Darwinist ideology reputedly resonated well within laissez faire economic attitudes among the Victorian upper classes.

Gould has taken it upon himself to scrutinize the cultural context of Darwinian theory's exegesis. He states that evolutionary theory did not just arise out of thin air in some sort of "Eureka!" epiphany for Darwin, nor did it arise solely from pure observations of Baconian inductivism. It was a combination of both, plus the impact of Darwin's upper class background (which secured him his post on the H.M.S. *Beagle* and boosted his professional credibility) and his familiarity with the work of political economists Thomas Malthus and Adam Smith.

Malthus observed the logarithmic mode of population growth and the tendency of organisms to produce more offspring than can survive on existing food supplies. To Malthus this resulted in famines and epidemics as natural outcomes and could be checked only through the control of population. Darwin (and his co-discoverer of evolution,

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Alfred Russel Wallace) read Malthus and extended his theory to include a natural selection of the better adapted among organisms competing for survival.

Also indispensable to Darwin was Adam Smith's laissez faire theory of economics. In it, Smith propounded that individuals, working diligently to advance their own economic self interest, ultimately ensure the stability and good of the greater society. Gould describes Smith's concept:

The essence of Smith's argument is a paradox of sorts: If you want an ordered economy providing maximal benefits to all, then let individuals compete and struggle for their own advantage. The result, after appropriate sorting and elimination of the inefficient, will be a stable and harmonious polity. Apparent order arises naturally from the struggle among individuals, not from the predestined principles of higher control. (*Panda* 66)

Gould accepts Darwin's extraction of biological theory from economic theory. In fact, he seems to consider the biological version more valid than its economic progenitor: "It seems ironic that Adam Smith's system of laissez faire does not work in his own domain of economics, for it leads to oligopoly and revolution rather than to order and harmony" (*Panda* 68).

Gould targets as particularly fallacious the determinist framing of evolution promoted by Herbert Spencer. Spencer saw evolution as a unidirectional progression through history, culminating in the über-species of *Homo sapiens sapiens* and, by implication, über—and unter—subgroups within our species. In his book, *Social Statics, or the Conditions Essential to Human Happiness* (1851), Spencer wrote:

Humanity must in the end become completely adapted to its conditions.... Progress, therefore, is not an accident, but a necessity. Instead of civilization being artificial, it is a part of nature; all of a piece with the development of the embryo or the unfolding of a flower. The modifications mankind have undergone, and are still undergoing, result from a law underlying the whole organic creation; and provided the human race continues, and the constitution of things remains the same, those modifications must end in completeness. (65) To Gould this notion nurtures warm, fuzzy "for the good of the species" rationalizations that misread Darwin's more individualistic theories. "Darwin's mechanism works through the differential reproductive success of individuals who, by fortuitous possession of features rendering them more successful in changing local environments, leave more offspring" (*Dinosaur* 329).

Gould interprets Darwin's perception of "the greater good of the species" as being an analog to Adam Smith's perception that individual gain only *indirectly* benefits the entire group, as a secondary after-effect. Smith's statement that "all direct causality lies in the struggle among individuals" applied from Darwin's perspective as well, according to Gould (qtd. in *Dinosaur* 329). It is more difficult to be proud of one's group's "superior" qualities when the individual's possession of those qualities is acknowledged as accidental rather than pre-ordained by group membership.

As for unilinearity, Gould's essays frequently remind us that the fossil record (especially fossils found in zones such as Canada's Burgess Shale region) consistently supports the hypothesis that evolution has not been a "ladder" or "straight line." It has been, rather, a series of bush-like branchings and sub-branchings, many occurring concurrently in geological time, with contemporary species such as *Homo sapiens* representing merely the surviving twigs on more fully foliated ancestral branches that have now gone almost completely extinct. Gould's evolution is not a linear and progressive "path," but a fractal and contingent "bush."

Attendant with the idea of evolutionary progress is the corollary concept of unilinear ranking and worth. In his personal writings, Darwin frequently reminded himself to eschew the notion of "higher and lower" animals (*Ever Since* 36). He viewed

the amoeba's ability to adapt to its environment, for example, as no less notable than the human being's ability to adapt to its own. Darwin wrote in *The Descent of Man* (1871) that his theories of evolution

have given to man a pedigree of prodigious length, but not, it may be said, of noble quality. The world, it has often been remarked, appears as if it had long been preparing for the advent of man: and this, in one senses strictly true, for he owes his birth to a long line of progenitors. If any single link in this chain had never existed, man would not have been exactly what he now is. Unless we wilfully close our eyes, we may, with our present knowledge, approximately recognise our parentage; nor need we feel ashamed of it. The most humble organism is something much higher than the inorganic dust under our feet; and no one with an unbiassed mind can study any living creature, however humble, without being struck with enthusiasm at its marvellous structure and properties. (165)

Gould states that Darwin even preferred the phrase "descent with modification" over "evolution" because the latter term possessed connotations of progress (and its attendant comparative ranking between and within species). Gould cites our predilection for ranking human groups according to presumed evolutionary attainment, which, he says, "remains a primary component of our global arrogance, our belief in dominion over rather than fellowship with, more than a million other species that inhabit our planet" (*Ever Since* 37).

In the latter half of the twentieth century, the discipline of "sociobiology" has become an important torch-bearer for biological determinism. Its chief proponent has been Edward O. Wilson, Gould's colleague at the Harvard Museum of Comparative Zoology. His 1975 work, *Sociobiology*, impressed Gould for its extensive treatment of animal social behavior, but not for its closing chapter on the development of human social traits. The core tenet of sociobiology is the contention that virtually all human social behavior—be it aggression, spite, deception, xenophobia, conformity, genderspecific social behavior, homosexuality, and even altruism—is determined by genetic influences:

The hypothalamic-limbic complex of a highly social species, such as man, "knows," or more precisely it has been programmed to perform as if it knows, that its underlying genes will be proliferated maximally only if it orchestrates behavioral responses that bring into play an efficient mixture of personal survival, reproduction, and altruism. Consequently, the centers of the complex tax the conscious mind with ambivalences whenever the organisms encounter stressful situations. Love joins hate; aggression, fear; expansiveness, withdrawal; and so on; in blends designed not to promote the happiness and survival of the individual, but to favor the maximum transmission of the controlling genes. (4)

Development and persistence of behaviors through history, according to the theory,

depend largely upon their adaptive or maladaptive character. Since adaptive behaviors

allow an individual's genes to survive, sociobiology argues, the capacity to execute

adaptive social behaviors may be largely inherited.

Gould sees in sociobiology another tool to help rationalize oppressive social systems. In an article in *The New York Times Magazine* on October 12, 1975, Wilson attributed gender-based social differences to genetic determinants:

In hunter-gatherer societies, men hunt and women stay at home. This strong bias persists in most agricultural and industrial societies and, on that ground alone, appears to have a genetic origin. . . . My own guess is that the genetic bias is intense enough to cause a substantial division of labor even in the most free and most egalitarian societies. . . Even with identical education and equal access to all professions, men are likely to continue to play a disproportionate role in political life, business and science. (qtd. in Gould, *Urchin* 29)

In Gould's view, such sociobiological claims fall apart when one perceives, embedded within them, the a priori assumptions that 1) the trait in question was genetically determined, and 2) the trait was "naturally selected" for its adaptive value. Again, Gould sounds the penalty buzzer against "thumb-on-the-scale" science casting the social status quo as proper, adaptive, inevitable, and unchangeable—and therefore a definite waste of energy to attempt to change. To Gould, Wilson uses a "cart before the horse" logic

(analogous to that found in Paul Broca's brain weight studies) in assuming his own hypothesis was correct before adequate proof had been demonstrated.

To Gould, Sociobiology's persistent application of Darwinian adaptationism to the historical development of human behavior is not good science, but rather an elaborate and unsupported metaphorical extrapolation—a "cardboard Darwinism." Gould's key criticism of sociobiology is that it ignores non-genetic means of cultural transmission. Believing that cultural change is often mistaken for biological evolution, Gould frequently reiterates in his essays that little evidence exists for the human brain having evolved any functional improvement over the last 100,000 years (re-enter our Cro-Magnon, perhaps doing calculus or successfully programming a video cassette recorder).

In criticizing the ideas of sociobiology, Gould forwards his own favored belief in biological *potentialism*: He contends that although genetic influences are indeed very important factors in human behavior and social systems, it is a combination of culture, the environment, and the Lamarckian accumulation of learning—all acting upon a biologically determined substrate of human *potential*—that ultimately shapes individual and societal behaviors. Gould decries our search for distinct "Nature vs. Nurture" categorizations, which to him are illusory oversimplifications of a complex interrelationship. As phraseology more representative of this complexity, he prefers the terms "Determinism" and "Potentialism": "The statement that humans are animals does not imply that our specific patterns of behaviors and social arrangements are in any way directly determined by our genes. Potentiality and determination are different concepts" (*Ever Since* 251). Human consciousness, a function of the brain's functional complexity, is at the heart of the issue. Whereas sociobiology might assert that social norms and institutions are a direct result of naturally selected, genetically inherited neuro-hormonal functions, Gould views the cultural consequences of our large brains as secondary and incidental side-benefits of biological capabilities much more directly and practically linked to human survival (such as the cognitive and physiological endowments needed for improved hunting and evasion skills, or for the ability to act cooperatively). To Gould the neurological, anatomical, and physiological complexity necessary to effect these critical skills could also have permitted "side-effect" or "co-opted epiphenomenal" behavior to arise—behavior that can be irrelevant or even detrimental to species adaptation and survival.

For example, one could argue that the more undesirable manifestations of human aggression are merely side-effects of the vitally important "fight or flight" neurohormonal response that evolved earlier in our evolutionary past and protected our species from legitimate and formidable predators. Although contemporary human life is in no way free from predatory dangers demanding aggressive responses, the newspaper can usually be counted on to provide daily examples of destructive aggression (often in the form of murder, spousal abuse, road rage, or other antisocial behavior). While in the heat of the moment such behavior may seem "only natural" to its perpetrators, few would argue that such behavior is at all adaptive toward the perpetuation of our species.

The Achilles' heel of sociobiology, according to Gould, is the fact that a true proof of its tenets is logistically impossible: The "experiment" necessary to prove genetic causation of social traits would involve multigenerational studies controlling for both breeding and environment. And since we are a slow-breeding species not generally amenable to the vocation of lab rat, the supporting evidence for sociobiological theory is sparse, in Gould's view. Even if it were true that social skills and institutions are genetically determined, Gould uses the analogy of corrective eyeglasses to counter the contention that the consequences of one's "social genes" are unimprovable. If eyeglasses can correct an inherited vision defect (as they do for millions), why should it be fruitless to consider mass efforts to improve even "genetically inferior" social capacities.

One sociobiological concept that Gould finds both intriguing and plausible is the idea of adaptive altruism. Darwin considered both "Gladiator" and "Altruist" perspectives in his view of animal evolution. However, the Gladiator theory, promulgated by Darwin's ardent disciple, Thomas Henry Huxley, was much more widely disseminated and accepted. It interpreted "survival of the fittest" from a decidedly amoral perspective that emphasized constant struggle and belligerent combat among individuals and groups, and having the goal of gaining reproductive advantage through transmission of genes to the next generation.

The Altruism theory posited that reproductive advantage might, at least on some occasions, issue from mutual aid and cooperative behavior among individuals. For example, if an individual animal gives its life in a mismatched confrontation that nonetheless succeeds in allowing that individual's kin to flee and survive, then a quantifiable percentage of the victim's genes will live on in the surviving kin. Gould suggests that, of the two theories, the Gladiator theory has garnered more support chiefly because it extrapolates more synergistically onto Adam Smith's laissez faire capitalist economic system. According to Gould, Darwin intended the term "struggle" in a metaphorical

sense, sometimes meaning physical combat and sometimes meaning cooperation. Darwin's first "struggle for existence" reference was to the plight of a *plant* in harsh, arid growing conditions.

In summary, Gould opposes sociobiology for what he sees as its tacit and unprovable assumption that prevalent social behavior has become prevalent by virtue of genetic transmission and environment-driven natural selection. In its claims that the origins of human thought and behavior are largely inherited, sociobiology denies due consideration of the influence of learning and culture on behavior. Yet Gould does not deny that biology bears an important influence upon behavior and culture:

I am supposed to be a "nurturist" in the great "nature-nurture" debate, but I find nothing upsetting in this notion of biological influence upon human behavior. . . . Every scientist, indeed every intelligent person knows that human social behavior is a complex and indivisible mix of biological and social influences. The issue is not whether nature or nurture determines human behavior, for these factors are truly inextricable, but the degree, intensity, and nature of the constraint exerted by biology upon the possible forms of social organization. (*Urchin* 112-113)

Gould demonstrates an admirable ability to admit points of *concurrence* with the arguments of his rhetorical opponents, eschewing absolute rhetorical dichotomies and oversimplifications. To Gould, nature is above all a flexible and wonderfully complex phenomenon: "I rejoice in the multifariousness of nature and leave the chimera of certainty to politicians and preachers" (*Ever Since* 271).

As always, Gould's sensitive nose for the a priori conclusion makes him wary of oversimplification: "To substitute biology for history in the absence of evidence requires an a priori faith that genetic explanations are, in some ultimate sense, preferable" (*Urchin* 118). This preference Gould attributes to Wilson's "old fashioned reductionism," a mind-frame engendered by Wilson's awareness that "hard science" can afford more credibility to his field than can history. Just as he did with Robert Yerkes, the Harvard

psychologist who struggled hard with the "Army IQ Test" to bolster scientific credibility for the "soft science" of psychology, Gould ascribes a sort of "science envy" to Wilson (*Urchin* 118). Wilson's strict adaptationist perspective dismisses with presumed scientific objectivity Gould's more flexible view of the social / biological interrelationship.

Darwin undeniably recognized the role of amoral physical violence in the struggle of individuals to survive, but Gould insists that Darwin specifically avoided the extrapolation of this phenomenon into the societal plain. Gould cites the following as his favorite moral statement by Darwin: "If the misery of the poor be caused not by the laws of nature, but by our institutions, great is our sin" (qtd. in *Dinosaur* 62).

## 4.3 Fighting "Science" with Science

By most practitioners' definition (including Gould's), a shining attribute of robust, well-executed science is its openness to disproof by new data. But how can Gould reconcile such a deference to objectivity with his assertion that science is influenced by the sociocultural assumptions of its practitioners? Gould describes scientific breakthroughs as being neither the exclusive product of ivory tower Baconian Logical Positivism (inductive inference made exclusively from observable facts) nor the exclusive product of "Eureka! moments" of intuitive, learning-dependent, and culturally conditioned personal epiphany.

Instead, he recognizes *both* these influences upon the "context of discovery," the creative realm within which important scientific ideas originate. But while the context of discovery permits both personal bias and objective observation to percolate unimpeded, Gould asserts that the *validation* phase of the scientific process, the "context of

justification," must shed its subjectivity and rely upon objective, agreed-upon standards of proof.

Gould believes that, in the name of scientific honesty, scientists must acknowledge their own prejudices openly rather than obscure them:

We scientists are no different from anyone else. We are passionate human beings, enmeshed in a web of personal and social circumstances. Our field does recognize canons of procedure designed to give nature the long shot of asserting herself in the face of such biases, but unless scientists understand their hopes and engage in vigorous self-scrutiny, they will not be able to sort unacknowledged preference from nature's weak and imperfect message. (*Urchin* 150)

To Gould, the cultural context of scientific discovery is something to acknowledge and even embrace; the danger lay in its concealment. It is with this in mind that Gould revisits the work of biological determinist scientists—combing their data, notes, and conclusions for indications of concealed subjective bias.

As mentioned earlier, Gould applied just such scrutiny to the work of nineteenthcentury Philadelphia physician and polygenist, Samuel Morton. Morton, again, had attempted to prove that skull capacity was linearly rankable according to race, with White European races ranking highest and Native Americans and Negroes ranking lowest. Gould actually obtained access to Morton's skull collection, and measured Morton's skulls' volumes for himself. Gould's data clearly exposed Morton's method and conclusions as the decidedly unscientific product of Morton's a priori conclusion about what the final ranking order must be ("Morton's Ranking").

Paul Broca's conclusions regarding brain size and weight measurements also described a unilinear ranking system for sexes and races. Again, Gould uses as his chief debunking tool the demonstration that a priori bias had penetrated into the researcher's context of justification. As described earlier, this penetration was patently evident in Broca's circular reasoning—his confusion of his own hypothesis with indisputable fact. He also failed to normalize for the body size, age, weight, sex, and health status of the individuals whose brains he measured.

Darwinism laid the foundation for recapitulationism, the theory that the human development cycle reenacts the path of evolution from ancestral species. Recapitulationists like Ernst Haeckel, Carl Voigt, Louis Agassiz, Cesare Lombroso, and Herbert Spencer believed that different races (again, race, the fulcrum of biological determinism) represented different levels of advancement along a unilinear continuum culminating in White northeastern European males. While considering their argument discreditable based on its a priori premise alone, Gould is quick to write that the advance of science itself is responsible for recapitulationism's demise, which began near the beginning of the twentieth century.

Recall Haeckel's central theory of "terminal addition," the concept that as more and more advanced traits were added to the end of the hypothesized human developmental sequence, the amount of time spent by individuals reenacting the earlier phases would "condense." Terminal addition and condensation assumed that advanced, "final stage" traits could be appended simply—like cars on freight train— onto an existing set of traits, and forever perpetuated thereafter. But the close of the nineteenth century brought the rise of Mendelian genetics. Genetic characters, present at conception, were now known to be the currency of heredity. The mechanism of genetic change, mutational substitution, had been shown as affecting any point in the developmental process—not solely the end. Gould writes that "as long as the mechanism of heredity lay shrouded in mystery, recapitulationists could always postulate a convenient and purely hypothetical set of laws [as they did in terminal addition and condensation] to yield the preferred results" (*Ontogeny* 202).

As mentioned earlier, the developmental theory that supplanted recapitulation by 1909 was paedomorphism (neoteny). Again, neoteny hypothesized that the human developmental sequence from embryo and fetus through infant and juvenile to adult actually represents a *retarding* and *truncating* of a longer developmental sequence followed by our ancestral species.

Rather than retreat into submission at the deflation of recapitulation, determinists such as the Amsterdam anatomist Louis Bolk simply shifted their argument 180° to harness the flow of the strongly prevailing new theory, neoteny. To Bolk, "lower races" of humans had advanced too far past primate fetal form to distinguish themselves from the "lower" species adults from which humans evolved. "Higher races" retain key traits of primate fetuses, according to Bolk.

In Ontogeny and Phylogeny, Gould refutes as overly simplistic Bolk's argument that modern humans (especially "higher races" of modern humans) are simply primate fetuses that become sexually mature. True, as demonstrated in Figure 2-1, physical similarities do exist between human adults and primate juveniles, including:

- Flat facial shape.
- Centrally located foramen magnum at the base of the skull (consistent with upright rather than "all fours" posture).
- High relative brain weight.
- Absence of brow ridges.
- Forward-oriented birth canal.

Gould strongly supports the central tenet of neoteny, which is that the superior function of the human brain over the primate brain is the result of our species' period of prolonged infantile and juvenile dependency—an extended growth phase during which cranial sutures and concomitant brain growth persist to an extent far beyond that seen in primates. But Gould contends that Bolk ascribed to "higher" humans an overly simplistic "absolute fetalization" in form, downplaying multiple subtle timing retardations that distinguish us from primates and subordinating the action of natural selection upon individual traits to a secondary role (*Ontogeny* 365). To Gould, individual human traits probably evolved separately, not as a "package deal." Gould considers Bolk to have produced good data, but contends that Bolk's conclusions were too imbued with race-framed philosophical baggage to afford a credible "context of justification."

As support for his (and Darwin's) contention that human vs. primate differences are more a matter of degree than of kind, Gould cites a 1975 study by M. King and C. Wilson comparing chimp and human polypeptides (*Ontogeny* 405). This protein comparison demonstrated over 99 percent inter-species homology, adding support to Gould's favored belief that we differ developmentally from chimps, gorillas, and other primates mainly through the action of developmental regulation and timing genes rather than "structural blueprint" genes. And as for genetic differences among *races*, he cites an analogous study carried out by Lewontin, demonstrating negligible genetic differences between human races (*Flamingo* 196).

As mentioned earlier, at the start of the twentieth century the defrocking of physical measurement (such as Morton's craniometry) and appearance (such as Lombroso's "stigmata") as valid criteria for racial, ethnic, and gender ranking necessitated a redirection of biological determinist energies. The more abstract (and therefore more

intangible, elusive, and impenetrable) field of intelligence testing became the perfect new vehicle for determinist efforts.

Again, in Gould's view, Alfred Binet's initial humanitarian intention that intelligence testing be used for "special educational triage" purposes was subverted by psychologists such as Goddard, Yerkes, Brigham, and Terman, who commandeered the concept to combat the common, pejorative perception of their discipline as a "soft science." Central to achieving professional credibility for psychology was the identification of a discrete, *measurable* entity called "intelligence," an entity that—like mass, velocity, or voltage in the "hard" sciences of physics and chemistry—could be quantifiably demonstrated. But to Gould, herein lies the first of several major fallacies of intelligence testing: the fallacy of reification.

Reification is the reductionistic attribution of concrete existence to an abstraction. A good example of reification is embodied in the famous statue of the blindfolded figure at the "scale of justice." How much more efficiently the criminal justice system would operate were Justice such a physically palpable, measurable commodity. Instead, of course, Justice is a complex, multifaceted abstraction requiring some of our society's most highly skilled (and remunerated) professionals to navigate. To Gould and likeminded colleagues, intelligence is equally complex, equally abstract, and equally absurd to represent as a single, palpable, and easily measurable entity. The oversimplification that results from Western society's decision to do so has pigeonholed countless individuals into what are often tragically and unnecessarily limiting social categories (witness Goddard's "morons," forced sterilization, and immigration restriction law). Establishing credibility for intelligence as a discrete and measurable variable (and for intelligence testing as a useful and productive contribution from the "not-so-soft-aseverybody-seems-to-think" science of psychology) would require a method of validation readily accepted within the "hard" sciences—namely statistical mathematics. And if the statistics to be used were sometimes too abstruse for the average lay person to comprehend, all the better: popular resistance to the theory would be minimized if the aweinspiring "mystery" of science and mathematics could be enlisted as a shield against popular scrutiny.

The statistical framework undergirding intelligence testing is factor analysis, a technique originally applied to mental testing in 1904 by the preeminent British psychologist, Charles Spearman. Factor analysis is a method of quantifying the magnitude and direction of correlation (synchronous change) among *multiple* variables.

Correlation is best understood by first limiting the explanation to *two* variables: Consider the variables of human arm length and leg length. If arm and leg length were measured on a group of subjects from birth through adulthood, the results would show that these two variables increase in close synchrony throughout life. If a common quantification method for two-variable correlation, the Pearson Correlation Coefficient, "r," were applied to this example, an r value approximating +1 (representing the strongest directly proportional correlation) would be achieved. In this case the actual *cause* of the correlation, the physiological process of bone growth, can be easily surmised.

By this same method, two measurements varying in opposite directions (average winter temperature and average deaths from hypothermia, for example) would produce a negative r value. A value of -1 would represent a perfect inverse correlation. Two

measurements varying entirely at random (say shoe size and cholesterol level) would show a correlation at or near zero. Real-life correlation strengths are often ambiguous, as would be demonstrated by a correlation of 0.5 between human height and human weight. Tall people are often heavier than average, but not always; short people are often lighter than average, but not always.

Gould is quick to emphasize that demonstration of *correlation* does not demonstrate *causation*. It would be a mistake to infer that increased arm length is actually *causing* increased leg length (or vice versa) when both of these variables may actually be caused by an independent factor (in this case, the human growth process) or even multiple independent factors. The inclination to infer causation of one positively correlated variable by another becomes even more attractive when the actual cause(s) influencing the variables is (are) not as apparent. Gould jokes that his age and the price of gasoline during the 1970s would have demonstrated a correlation coefficient very close to 1.0, but it would be quite ludicrous to conclude that either of these variables had any causative effect upon the other. The correlation coefficient is best interpreted as a statement of the percentage of one variable's variation that may be associated with (though not necessarily caused by) variation in another variable.

Correlation between two variables may be visually demonstrated by graphing one variable on the X-axis and the other on the Y-axis, and then plotting one point for each test subject's measurement pair (e.g., arm length and leg length). Correlation is then interpreted visually by evaluating the conformity of the test group's (usually) elliptical cluster of points to the 45° diagonal line representing perfect positive correlation.



NOTE: Strength of correlation as a function of the shape of an ellipse of points. The more elongate the ellipse, the higher the correlation.

Figure 4-1. Correlation Between Two Variables. (Gould, Mismeasure 241)



Figure 4-2. Correlation Among Three Variables. (Gould, Mismeasure 244)

Figure 4-1 illustrates typical cluster patterns for different correlation magnitudes of positive correlation between two variables.

But nature is not so simple as to manifest itself only in pairs of two correlatable variables. Scientists are often concerned with complex interrelationships involving a larger number of variables. For three variables we can visualize three-dimensional extensions of the scattergraphs pictured in Figure 4-1, with that figure's two-dimensional ellipsoid shapes now becoming cigar and football-shaped, as shown in Figure 4-2.

But for more than three variables, the visual metaphor of Cartesian spatial projection fails us, and multivariate factor analysis becomes necessary for clarity. Factor analysis attempts to simplify such complex systems of interrelationship into fewer, more easily interpretable "axes" or "components," each representing a manageable and elucidating distillation of some aspect of the original variables' interrelationship. The "first principal component" is the axis that best resolves the overall interrelationship. Some information must necessarily be lost in this simplification process, so the sign of a useful and appropriately applied factor analysis, according to Gould, is that a high percentage of original information remains recognizable within the simplified result. Computed from a factored matrix of individual correlation coefficients, factor analysis to this day has been important and widely used in a broad array of statistical applications. It was first harnessed by Charles Spearman for application in intelligence testing theory.

How are multivariate correlation statistics relevant to intelligence testing? Spearman observed that an individual's performance levels on tests of different, specialized aspects of mental performance (e.g., numerical computation, logical reasoning, spatial problem solving, memory skills, et al.) are often highly correlated. In other words, people who scored well on one type of test often scored well on other types; those scoring poorly on one type often scored poorly on others. Gould contends that Spearman invented factor analysis in 1904 essentially as a method of inferring the existence of a unifying and quantifiable mental capacity that was responsible for these frequently observed positive correlations in mental tests:

Since most correlation coefficients in the matrix are positive, factor analysis must yield a reasonably strong first principal component. Spearman calculated such a component indirectly in 1904 and then made the cardinal invalid inference that has plagued factor analysis ever since. He reified it as an "entity" and tried to give it an unambiguous causal interpretation. He called it g, or general intelligence and imagined that he had identified a unitary quality underlying all cognitive mental activity—a quality that could be expressed as a single number and used to rank people on a unilinear scale of intellectual worth. (*Mismeasure* 251)

Rather than addressing the possibility that parallel performance in different skill areas could be the result of more generalized motivational tendencies, diversified training, opportunity, or environment, Spearman distilled all possible mental performance contributors into one discrete internal factor, g.

To Gould, Spearman's g is indefensible for several reasons: First, the decision of whether a causal physical meaning may be ascribed to a group of correlations with a strong first principal component cannot be made based on numbers alone. In our example of the strong positive correlation between arm length and leg length, only our *independent* knowledge of the human physiological process of bone growth allowed us to infer a cause for the parallel changes observed in these two variables. Without this knowledge, arm length and leg length could conceivably have been attributed to two entirely different causes.

Second, Gould believes that the factor analytical method used by Spearman to calculate g is only moderately robust, resolving only 50 to 60 percent of original mental

test information—too little to justify reification of all mental capacities into a single entity (*Mismeasure* 251).

Third, the "first principal component" method is, according to Gould, only one of several equally valid "vector-based" methods for defining axes (components) in multivariable relationships. For example, Spearman might just as well have chosen to designate two or three different component axes representing simplified "skill clusters" (such as Math and Verbal related skills); Gould suggests he avoided these alternatives because only the first principal component method permitted the reification of g.

Gould sees in factor analysis a valid tool for simplifying complex interrelationships, but not one for the reification of abstractions or the assignment of causality:

The temptation to reify is powerful. The idea that we have detected something "underlying" the external realities of a large set of correlation coefficients, something perhaps more real than the superficial measurements themselves, can be intoxicating. It is Plato's essence, the abstract, eternal reality underlying superficial appearances. But it is a temptation that we must resist, for it reflects an ancient prejudice of thought, not a truth of nature. (*Mismeasure* 252)

To Gould, factor analysis harnessed for reification is yet another example of Western civilization's dangerously reductionistic predilections. Life and human thought are to him very complex, wondrous, and multifarious processes, and our species' presumption that these may be somehow distilled into quantifiable essences is more a testament to our own cognitive limits and frailties than to our analytical prowess.

But the reification of g became essential to twentieth-century hereditarianism. A testament to its importance, in Gould's view, was that it motivated Cyril Burt— Spearman's successor as psychology chair at London's University College from 1932 to 1950—to claim the title "originator of factor analysis" for himself despite strong evidence of Spearman's just entitlement (*Mismeasure* 237). An ardent proponent of factor analysis and the presumed general intelligence factor, g, Burt injected into the crucible what is to Gould the second major fallacy of intelligence testing—the idea that IQ scores are primarily innate and unchangeable.

Burt held close to his heart the responsibility for disproving environmental influence in intelligence development. In this 1909 quote from the *British Journal of Psychology*, Burt cuts to the crux of twentieth-century biological determinism:

... the growing belief that innate characters of the family are more potent in evolution than the acquired characters of the individual, the gradual apprehension that unsupplemented humanitarianism and philanthropy may be suspending the natural elimination of the unfit stocks—these features of contemporary sociology make the question whether ability is inherited one of the fundamental moment. (qtd. in Gould, *Mismeasure* 275)

As can be predicted, Burt's anti-environmentalist advocacy became the rationale for class / race-based sociopolitical advocacy. For what could be more welcome among privileged classes than "scientific proof" that the sacrifice-obliging inclination to assist those worse off than oneself was unfounded and even *dangerous* to society as a whole? The advised inaction would be beneficial for society and pocketbook both—a veritable slam dunk.

As support for his claim that intelligence is primarily inherited, Burt reported on the most appropriate—and, to Burt's credit, perhaps the *only* appropriate—class of experiment for any so-called test of "nature" vs. "nurture": studies of identical twins raised apart. Throughout the 1950s and 1960s, Burt produced several reports supporting the contention that the IQs of identical twins raised apart (in different environments) showed very high correlation—thus disproving the contention that parental upbringing and environment are significant influences on intelligence. In a 1966 article in the *British Journal of Psychology*, Burt states that "the correlation of monozygotic twins reared in separate environments amounts to as much as 0.88," and even increases above this value if the twins are reared together (Burt 151). Burt's study was impressive because it seemed to encompass more pairs of twins than any previous study. It would also figure strongly as a buttressing citation in Arthur Jensen's 1969 article, "How Much Can We Boost IQ and Scholastic Achievement?"

Regarding the use of intelligence testing in primary and secondary education, it is apparent that Burt epitomizes for Gould the very "brutal pessimism" that Alfred Binet feared so much. In a 1959 journal article, Burt contended that low test performance among the poor was an ineluctable consequence of inferior heredity:

Any recent attempt to base our educational policy for the future on the assumption that there are no real differences, or at any rate no important differences, between the average intelligence of the different social classes, is not only bound to fail; it is likely to be fraught with disastrous consequences for the welfare of the nation as a whole, and at the same time to result in needless disappointments for the pupils concerned. The facts of genetic inequality, whether or not they conform to our personal wishes and ideals, are something that we cannot escape. (qtd. in Gould, *Mismeasure* 285)

Just as the intelligence testing movement in the United States became politically manifest in the form of immigration restriction and forced-sterilization laws, in Britain the educational system was drastically reformed by the "Examination at 11+." From 1944 to the mid 1960s, due in large part to the advocacy of hereditarian theorists like Burt, Britain enacted this rigid IQ screening system in which the "lower-scoring 80 percent" of tenyear-old examinees were essentially diverted into "Trades" paths and way from future university opportunities. Gould bemoans the countless talented youth subjected by this system to the "pain of hopes dashed by biological proclamation" (*Mismeasure 296*).

Unfortunately for Burt's cause, however, by the 1970s most of his studies would be discredited as fraudulent by the observations of then Princeton psychologist Leon Kamin

and the investigative reporting of Oliver Gillie, medical correspondent for the *London Times*. Among other statistical anomalies, Kamin noted with puzzlement that as the number of twin pairs studied by Burt grew from about twenty to over fifty between 1955 and 1966, Burt claimed that average IQ correlation between twins remained unchanged at "0.771"—a highly unlikely phenomenon statistically (Dorfman 1177). Gillie suggested that the reported roles for two of Burt's research assistants may have been falsified (Gould *Mismeasure* 235). Similar statistical fabrications and methodological aberrations surfaced in other Burt studies correlating IQ between parents and children and between close relatives (Dorfman 1177).

Reacting to L. S. Hearnshaw's corroboratingly incriminating biography of Burt (commissioned originally by Burt's sister), Gould writes that

the very enormity and bizarreness of Burt's fakery forces us to view it not as the "rational" program of a devious person trying to salvage his hereditarian dogma when he knew the game was up (my original suspicion, I confess), but as the actions of sick and tortured man. (All this, of course, does not touch the deeper issue of why such patently manufactured data went unchallenged for so long, and what this will to believe implies about the basis of our hereditarian presuppositions). (*Mismeasure* 236)

To be caught perpetrating a bare-faced falsification of data is the ultimate incrimination of a priori bias. Clutching for the almost deifying sanction that scientific proof would have afforded his hereditarian ideas, Burt violated the basic tenets of scientific integrity. To Gould, Burt's career exemplified the danger of shared dogma masquerading as objectivity (*Mismeasure* 279). In Gould's depiction of Cyril Burt I am reminded of *The Importance of Being Earnest* (1896), in which Oscar Wilde suggests that the loudest and best articulated claims to honesty often originate from those with ulterior motives. Appearance is all, sadly, for far too many people—deceivers and deceived alike. But even theories that are subsequently disproved do matter, in their time, for the contingent theories and political consequences they engender. We have previously discussed the perpetuation of Cyril Burt's error by Arthur Jensen, whose conclusion that intelligence is 80 percent heritable was based on Burt's fraudulent data. The "chain of misinformation" originating from Cyril Burt upsets Gould, from the Singapore Prime Minister's desire to combat reproductive gains among his less intelligent citizens to the persistence of Burt's discredited twin studies within introductory genetics textbooks as late as 1984 (Gould, *Bully* 156).

Despite what Gould considers a continuing lack of supporting data, hereditarian IQ theory is alive and well in the final decade of the twentieth century. Herrnstein and Murray's *The Bell Curve* embodies all the key determinist tenets in its assumptions and assertions that the reified g has been validated as a true and preeminent entity, that IQ tests measure g well, and that group IQ differences reflect—and, in fact, justify—socio-economic stratification within society.

Gould, Harvard psychologist Howard Gardner, Northeastern University psychologist Leon Kamin, and other scientists have found major flaws in *The Bell Curve*. To Gould, the book's argument collapses if any one of the following four premises about intelligence is false ("Ghosts" 16-17):

- 1) it is a single, discrete mental entity,
- 2) it is abstractable to a single, rankable number, "g,"
- 3) it is highly genetic in transmission, and
- 4) it is effectively immutable throughout the life of an individual.

Gould disputes the validity of all these premises.

Herrnstein and Murray state early on that the rankable "g" is a well respected concept among intelligence scholars, and base their entire thesis on its validity. The problem from Gould's perspective is that "g" is in fact a *contested* issue among intelligence researchers, and competing theories have garnered considerable support in the field. As mentioned earlier, Gould contends that factor analysis—the statistical method used to define "g" by simplifying performance data from diverse skill areas into one variable—is flawed due to the inherently subjective assumptions made by its developer, Charles Spearman, about the nature of intelligence (Gould, "Mismeasure By Any" 8-9).

One "Non-g" theory emerges from Jean Piaget's Cognitive Psychology school. Piaget focuses on the dynamic functional mechanisms of thought processes themselves, and questions whether there is any palpable and measurable intellectual entity at all. Another competing theory is that of Multiple Intelligences. Two variations of this theory have been proposed, one by Howard Gardner and the other by Yale psychologist Robert Sternberg (Neisser 79). Gardner argues that, in addition to the verbal, mathematical, logical, and spatial capabilities tested by standard IQ tests, there also exist other elemental abilities representative of social / interpersonal, musical, and body-kinesthetic aptitudes, among others. Sternberg proposes a tripartite intelligence composed of Analytic (Academic), Creative, and Practical elements. While considering the case for multivariate intellectual capacities, Sternberg explores differences between "book knowledge" and the ability to solve real-life problems through "thinking on one's feet." Sternberg writes:

Of course, a tester can always average over multiple scores. But are such averages revealing, or do they camouflage more than they reveal? If a person is a wonderful visualizer but can barely compose a sentence, and another person can write glowing prose but cannot begin to visualize the simplest spatial images, what do you really learn about these two people if they are reported to have the same IQ? (qtd. in Herrnstein & Murray 16)

Some of Sternberg's own tests of practical knowledge demonstrated better predictive value of job performance than IQ tests (Carey 55).

As for intelligence being highly inheritable, Gould considers this to be the central fallacy of the entire hereditarian theory ("Mismeasure By Any" 5). He admits, as all *Bell Curve* critics do, that there truly does exist a 15 point (one standard deviation) difference between the average IQ scores of Caucasian Americans and that of African Americans. Gould will even grant that variation of intelligence *within* racial groups may very well be significantly heritable, but he is adamant that we are unable to infer causative reasons for IQ differences *between* racial groups.

Gould draws a compelling analogy in asking us to imagine a historically undernourished South American tribe whose average height is 4 inches shorter than the average North American Caucasian height. Within the tribe, there will be a variation of tall, medium, and short people that is significantly hereditary (parents *do* tend to beget offspring of similar stature to their own). However, Gould contends that, because the nutritional and environmental effects are so widely different between the North American and tribal cultures hypothesized, we cannot draw any inferences about whether genes make North American Caucasians taller than the tribal group.

Other scientists have posed similar analogies, including an intriguingly more complex scenario of giraffe height described by Harvard astrophysicist, David Layzer, in his 1972 article, "Science or Superstition." Writing in opposition to Jensen and Herrnstein publications of that time, Layzer argued that genetic factors and environmental factors are so dynamically interrelated that they cannot be considered statistically independent contributors to IQ score (Layzer 662-663). He asks us to consider how giraffe height is determined not only by genetics, but also by local conditions influencing food availability. True, the genetically taller giraffe may be able to reach more "upper branches" in its search for food, but if that same giraffe were reared undernourished, it might never have achieved its genetically determined height advantage.

Regarding *The Bell Curve*'s strong assertion that intelligence is essentially unchangeable throughout the life of the individual, critics have raised numerous counterexamples. For example, both sides of the debate acknowledge that worldwide average IQ scores in all racial groups have been *gradually rising* since testing began in the early twentieth century (Flynn, "Massive" and "Mean"; Herrnstein & Murray 307-309). The difference, fifteen points over the past fifty years, is known as the "Flynn Effect." Since World War II, some developing nations have demonstrated average IQ increases of fifteen points, a change equal to the current gap between American Blacks and Whites ("Mismeasure By Any" 7). Hereditarians argue that, because these rises are universal, they do not necessarily refute the existence of underlying group differences.

Notwithstanding Brigham's inference that immigrants in his time were less intelligent than past immigrants, Brigham's own data begged the interpretation that increasing exposure to American culture increased immigrant test scores. Yerkes's Army study observation that Blacks from some northern states scored higher averages than Whites from some southern states was reexamined by researcher Otto Klineberg in 1935. Klineberg concluded that these higher northern Black IQ values were related to the length of time they had spent taking advantage of better schools and living conditions in the north (Frumkin 76). There has been evidence of strong IQ scores in poor Black children adopted into affluent and intellectual homes ("Mismeasure By Any" 7). After controlling for IQ, blacks and Latinos have substantially higher probabilities than whites of being in a high-IQ occupation



Figure 4-3. Probability of Being in a High-IQ Occupation. (Herrnstein and Murray 322)

To Gould, the *Bell Curve* argument is also unsound from a statistical perspective. Several critics observed that the book seems to capitalize on many lay people's inability to distinguish "correlation" from "causation," portraying low IQ as the *cause* rather than the effect of a wide array of social problems from poverty and crime to overpopulation. Buried deep in the ample appendices of this eight-hundred page work are the details of the correlation and regression analyses used by the authors to create numerous striking graphs throughout the book. The graphs ostensibly demonstrate that IQ variation closely correlates with variations in income, job prestige, work performance, income, criminal tendencies, and social problems. The graphs also attempt to demonstrate that the degree of correlation between family socioeconomic status and these same factors is often lower.

Causation aside, Gould finds these correlations alone to be much weaker than the authors claim ("Mismeasure By Any" 11). He accuses the authors of allotting themselves subjective "benefits of the doubt" in calculating "goodness-of-fit" relationships from ambiguous or highly variable NLSY data. For example, Gould's compatriot Leon Kamin calls attention to a *Bell Curve* graphic (see Figure 4-3) seeming to indicate that, with IQ held constant, Blacks and Latinos have an unfair advantage in obtaining jobs requiring high IQ levels. The chart first lists the probabilities of *any* White, *any* Black, and *any* Latino (of the same age) obtaining a high-paying job that requires an IQ of 117. It then lists the probabilities among *candidates having an IQ of 117*.

Kamin checked the math on the actual NLSY sample data. He determined that the Black and Latino numbers were estimated from a very subjectively extrapolated curve, and that the seemingly woefully unfair Black value of 26 percent represented only 0.72 actual Black people—out of the entire population of 12,500 people studied (Kamin, "Lies" 94). So much for unfair advantage.

The scholars cited heavily by Herrnstein and Murray are strong proponents of g-based intelligence as a reified, measurable structure. While the Multiple Intelligence and Cognitive psychology theories of intelligence are introduced early on in *The Bell Curve*, it is clear that the authors reject these alternative views while embracing those of a cadre of race-concerned psychologists that has emerged since the 1960s. This cadre's members have sometimes focussed so sharply on racial differences that it seems fair for Gould to question the objectivity and intended purpose of their research.

For example, J.P. Rushton has devoted considerable energy to the resurrection of nineteenth-century topics of scientific racism, including cranial capacity, brain weight, and penis size differences between Blacks and Whites (Reed 267). Richard Lynn, another cadre member, has edited the openly racist and pro-Nazi journal, *Mankind Quarterly*, and receives funding from The Pioneer Fund, a nativist organization with a eugenic orientation. According to Leon Kamin, he committed gross miscalculations, distortions, and misrepresentations in a 1991 report which set the average African Black IQ at 69 (Kamin, "Lies" 83-84). Arthur Jensen, as the group's elder statesman and stalwart defender of "g," has done much to emphasize what he perceives to be the undesirable consequences of lower Black IQ scores: higher levels of retardation, crime, and social ills. He also has ties to the Pioneer Fund and to *Mankind Quarterly*.

In this chapter we have discussed Stephen Jay Gould's self-appointed role as interpreter of evolutionary science's "cognitive filter"—the conditioning process or "spin" that scientific knowledge (valid or invalid) undergoes prior to popular assimilation. After exploring manifestations of this filter specifically pertinent to Darwinian evolutionary science, we examined the work of prominent biological determinist scientists and authors for adherence to principles of "good science" and to scrutinize the accuracy of their presentations to the general public.

As a highly skilled writer, Gould embeds within his essays not only a user-friendly pedagogy of technical theory, but also a keen appreciation for (and wonderment at) the surrounding context and consequences of scientific knowledge and of human existence itself. Social consciousness and a respect for the humanities often permeate even Gould's most technical material. Gould harbors sobering yet paradoxically uplifting convictions about the role of humankind on this planet, in this universe, at this point in geological time. In the next chapter, we will examine Gould's *humanistic* arguments against biological determinism.

## CHAPTER 5 WHO DO WE THINK WE ARE?

Far from denying his own liberal disposition, Gould avows it, believing that—in the name of scientific honesty—scientists must acknowledge their own prejudices. Gould grants freely that culture, socialization, upbringing, personal experience, intuitions, and predispositions play a seminal role in the formation of his own (and any scientist's) world view. It is the *denial* of one's own such prejudices (and the denial that they may be transcended) that Gould considers potentially insidious.

Central to his own world view are the interpretations Gould draws about the "status" or "role" of our species, *Homo sapiens*, within the larger picture of the universe's "time-space continuum." Asserting that a chief danger of biological determinism lies in its presumptions concerning human importance, morality, and ethics, Gould's essays persistently confront these assumptions at multiple levels.

## 5.1 King of the Perspective Shift

The question "Who are we?" seems important to Gould, perhaps because he considers it a question that science should not even pretend to answer. Gould considers entirely outside the purview of science such "ultimate" questions as "What is the meaning / purpose of life?" or "What, if any, are human responsibilities toward other humans and toward other species of life?" To him, these questions are best deliberated within a separate domain of authority or "magisterium" encompassing ethics, philosophy, and religion. Within this realm the factual input generated by science must be respected, but scientists cannot be charged with the responsibility for ethical decision-making. To Gould, intrinsic to

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biological determinism—and to the utilitarian sociopolitical ideology it helps to support—is the transgression of science (or its interpreters) across this border into the proper realm of ethics, philosophy, and religion. For example, recall how in National Socialist Germany the perception of a scientifically validated "ladder of progress" toward a higher race effectively abnegated ethical responsibility among the ruling elite.

It is seemingly to combat such encroachment of science into matters of ethics that Gould's essays repeatedly reinforce his own stark view of *Homo sapiens* as a random accident of nature—a product of geological and evolutionary contingency and happenstance that might just as randomly have left the dinosaurs dominating earth, or precluded life's development here in the first place. Failing to understand or acknowledge what in his view is the truly random nature of our own evolution, we have in many ways become what he refers to as "earth's most arrogant species." The myopic overconfidence of human despots and egotists seems tacitly to presume biological sanction and preordination for anything from interpersonal slights to genocide. But the recognition, for example, that our species might not even exist were it not for the unscathed emergence of *Pikaia*, the first-known chordate genus, from the Cambrian Explosion, can elicit a sort of primeval humility immiscible with arrogance and inhumanity.

Gould agrees with Sigmund Freud's assertion that scientific revolutions necessitate a re-ordering of our own view of ourselves—a shattering of the pedestals of human arrogance. Freud cited the perspective shifts attendant with Copernicus's rejection of terracentrism (which had hitherto declared the earth to be the center of the universe), with Darwin's discovery that humans are descended from animals (not specially created), and (immodestly) with the advent of his own theories on the nature of the human "subconscious." To this list Gould would add geology's discovery of the vastness of time. Gould asserts that while heliocentrism and psychoanalytic theory were readily welcomed as popular schemata, Darwinian evolution remains—even to this day—a theory whose ramifications many educated humans are hesitant to acknowledge *fully*. The reason? We find it difficult and deflating to accept our genealogical closeness to monkeys.

Despite fossil evidence and other proof of the mechanisms of evolution, Gould writes, "public perception of evolution has been so spin doctored that we have managed to retain an interpretation of human importance scarcely different, in many crucial respects, from the exalted state we occupied as the supposed products of direct creation in God's image" (*Dinosaur* 326). Gould writes that it is still too painful for many of us to acknowledge to ourselves that humans are truly not the crowning culmination of unilinearly directed progress:

I like to summarize what I regard as the pedestal-smashing messages of Darwin's revolution in the following statement, which might be chanted several times a day, like a Hare Krishna mantra, to encourage penetration into the soul: Humans are not the end result of predictable evolutionary progress, but rather a fortuitous cosmic afterthought, a tiny little twig on the enormously arborescent bush of life, which, if replanted from seed, would almost surely not grow this twig again, or perhaps any twig with any property that we would care to call consciousness....

All the classic forms of evolutionary spin doctoring are designed to avoid the radical and unwanted consequences of this mantra. (*Dinosaur* 327)

To Gould, evolution has not been a "path." It has been a fractal, chaotic, and unpredictable dynamic, the conception of which is both liberating and "pedestal smashing" for us. It is liberating in an almost Zen-like way in that while it eschews the necessity to ascribe any "meaning" or "direction" at all to the evolutionary process, it paradoxically can still evoke a sense of wonder and dignity in the history and complexity of human existence.

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**Table 5-1.** Geological Time Scale for the Evolution of Life on Earth.Compiled from Gould (*Panda* and *Wonderful*).

EVENT	DATE (YEARS x 10 <sup>6</sup> )	COMMENTS
Earth's Origin	-4500	By our best geological estimate.
Earliest Life	-3500	Blue-green algal mats of simple, single-celled prokaryotes. <i>Five sixths</i> of all life occurring since has been single-celled.
First Eukaryotes	-1400	The first complex (nucleated) single-celled life.
"Cambrian Explosion"	-570	Origin of most complex multi-cellular animals. Most major phyla of invertebrate animals appear within a brief period of only a few million years.
Burgess Shale Fossil Era	-500	Fossil deposits prove that almost all radical evolution of life forms occurred in the Cambrian era, and that the magnitude of Cambrian change has not been rivaled since.
Permian Extinction	-225	Eliminated 50 percent of all marine invertebrate families.
Cretaceous Extinction	-70	Eliminated 25 percent of all animal families on earth, including dinosaurs, which had dominated for 100 million years. This permitted mammalian ascendancy.
Australopithecine human ancestors	-5	
<i>Homo sapiens</i> splits from most recent ancestor	-0.27	
<i>Homo sapiens</i> spreads among continents	-0.1	
<i>Homo sapiens</i> a dominant species on earth	-0.05	
Today	0	
Sun to explode	+5000	Astronomers predict that the sun will explode in approximately 5 billion years.

In Gould's view, parallel to the average person's incomplete understanding of Darwinian evolution is an analogous misapprehension of the breadth of geological time. As a master of the pedagogical analogy, Gould presents this information in his essays with jaw-dropping clarity. Table 5-1, "Geological Time Scale for the Evolution of Life," summarizes key geological and evolutionary events cited by Gould throughout his popular essays. His key points are that:

- 1. Human existence composes an astonishingly small and recent proportion of the *4.5 billion* years that have passed since the earth's astrophysical origin.
- 2. The overwhelming majority of all life forms that have ever existed on this planet have been single-celled prokaryotic organisms such as bacteria and blue-green algae. Prokaryotes lived alone on our planet for 3 billion years.
- 3. Few individual vertebrate species have survived longer than 10 million years; extinction seems to be the common fate of all animals.

To convey the awe-inspiring sense of scale involved here, Gould employs two metaphors. The first, called the "cosmic clock," compresses the earth's existence proportionally into a single 24-hour period. Under this model, the *final few seconds* of that proportional day represent all human existence, and the final few *microseconds* represent the contemporary span of our own lives. Another compelling analogy (though less mathematically accurate) was coined by Mark Twain, who equated earth's age to the height of the Eiffel Tower (300 meters) and man's existence on the planet to the thickness of the paint at its pinnacle (Gould, *Wonderful* 45).

Despite his view of the vastness of nature, Gould does not perceive our cosmic belittlement as dispiriting; he celebrates human uniqueness and power in having produced such a far-reaching impact on our world in our brief stay here. Gould stresses scale, perspective, and the contingent randomness of evolution to remind us that, in his view, "progress" is a mental construct fabricated without a realistic grasp of the true breadth of nature itself—and potentially dangerous to the extent that it is misused as a call to action. "Humans are here by luck of the draw, not the inevitability of life's direction or evolution's mechanism" (*Full House* 175).

# 5.2 The Most Arrogant Species

To Gould, the most insidious aspect of biological determinism lies in its complementarity with flaws in the human psyche. Theorists and their ideas have meager impact unless their ideas can percolate resonantly among the motivations and interests of lay people. Unfortunately, it is often to our less ennobling human motivations that determinist theories lend strongest support.

Gould decries the human proclivity for self delusion, especially as contained in our frequent, hard-driving desire to crown our own groups as biologically superior to others. Whether due to nature or nurture, the human mind can be quick to dichotomize others into Us's and Them's relative to our family, our ethnic group, our football team, our company, etc. We often seem to project alienating expectations upon others based on their most superficial attributes, and then mistake their reflexive indignation for confirmation. To the extent that it motivates lay people to mentally segregate one another based on race and class, Herrnstein and Murray's *The Bell Curve* might be said to reflect and reinforce this common xenophobic trait in the human psyche.

As is evident to anyone who as a child (or adult) has been derided with an epithet such as "stupid," names can act as incisive weapons. The very act of naming, categorization, or quantification—so critical to the reification precept of biological determinism—is one of the strongest rhetorical weapons. Its attendant power of suggestion can be destructive in itself. Gould quotes the utilitarian philosopher, John Stuart Mill: The tendency has always been strong to believe that whatever received a name must be an entity or being, having an independent existence of its own. And if no real entity answering to the name could be found, men did not for that reason suppose that none existed, but imagined that it was something peculiarly abstruse and mysterious. (qtd. in Gould, *Mismeasure* 320)

Again, as rhetorician Kenneth Burke would no doubt agree, naming can communicate a subtext of identity, power, and mystery that has proven highly effective in compelling others toward the utterer's way of thinking. Through the power of suggestion, negative branding can seriously impair individuals' and even groups' self esteem and drive-to-succeed—sometimes tragically fulfilling the label's initially incorrect classification. Some Native American traditions, for example, attribute to naming a dignity-draining capability that can demean and exert power over others. Successful athletes recognize the utility of "psyching out" their opponents verbally before a contest. To Gould, the classifying nomenclature of determinist theory offers a psychological moat, built around a fortress inhabited by privileged classes, and intended to psych out those who would attempt entry.

Our comforting and identity-building predilection for classifying each other into cubbyholes can become ingrained within cherished (but erroneous) belief systems. Gould suggests that time often exposes the foolishness of such cherished beliefs, and he quotes as an example the British physician and biologist Charles White (from his 1799 treatise supporting a static and hierarchical "chain of being"):

Ascending the line of gradation, we come at last to the white European; who being most removed from the brute creation, may on that account, be considered as the most beautiful of the human race. No one will doubt his superiority of intellectual powers; and I believe it will be found that his capacity is naturally superior also to that of every other man. (qtd. in Gould, *Flamingo* 289)

White proceeds to describe European women as the "emblems of modesty, of delicate feelings, and of sense," whose "plump and snowy white hemispheres, tipt in vermillion"

set them above all other women (qtd. in Gould, *Flamingo* 290). Gould describes White as blinded to his own culturally anchored bias, but also as a writer who was indeed merely expressing and reinforcing common opinion within his own society.

To be fair, Gould has himself been accused (recall Frank Schmidt's opening quotation) of pandering to common opinion among liberal egalitarian-oriented scientists and lay people. Perhaps, since bias appears to be a multilateral phenomenon, more credence should be given to the those whose perspective seems more aware of its own prejudices, and more willing to transcend them where need be.

And who is not immune to the temptation of "believing what one wants to believe"? Evolutionary theory refuted notions of a "static chain of being." But to Gould, White's blindness to his own biases betrays a perennial blind spot to which *all* humans are susceptible:

But how many of our own cherished beliefs, the ones that we never doubt because we think that they map nature in an obvious way, will seem centuries hence just as foolish and ideologically bound as the static chain of being? Should we not examine the logic and verisimilitude of our own deepest convictions? (*Flamingo* 290)

To Gould, the danger is a complacent disinterest in obtaining and scrutinizing corroborating evidence: "No intellectual tyrannies can be more recalcitrant than the truths that everybody knows and nearly no one can defend with any decent data (for who needs proof of anything so obvious)" (*Full House* 212).

Status consciousness seems to play a strong role in garnering biological determinist adherents. "It's not what you *are* that counts," Wall Street tycoon and political patriarch, Joseph Kennedy, once said. "It's what people *think* you are" ("The Kennedy's"). This captures an ethos that seems to pervade much of modern, competitive society from schoolyards to board rooms to legislative houses. Perhaps it is in this "status consciousness" context that the sanctifying effect of biological determinism—of science as deity—helps us so often to rationalize and condone as natural and inevitable those socioeconomic inequalities we may perceive around us.

To Gould, the tragic consequence of such "natural and inevitable" logic is the surrender of moral responsibility and autonomy to the monolithic abstraction called "nature." With the facility of a literary scholar, Gould the Renaissance-Man polymath conveys the tragedy of such moral abnegation in his essay, "The Monster's Human Nature," an analysis of Mary Shelley's novel, *Frankenstein* (1818). Perhaps the most egregiously misinterpreted masterpiece of English literature (due largely to its bastardization by the Hollywood film industry), Shelley's *Frankenstein* strikes to the heart of universal human morality and pathos. To Gould the novel is a keenly honed depiction of the moral danger that the average person's continuing misapprehension of "nature" and "nurture" can foster.

Readers of Shelley's book (as opposed to viewers of the 1931 film version with Boris Karloff) are touched by this story of an unattractive creature thrust against his will into a world unwilling to welcome him. Wanting, at first, nothing more than the chance to live, earn his own sustenance, and contribute to the welfare of his newfound community, he is shunned and ultimately degraded to the point of violently indignant vengeance against all that is human.

Gould sees in Shelley's creature a metaphor for human behavioral complexity: "Shelley tells us that all humans reject and even loathe the monster for a visceral reason of literal superficiality: his truly terrifying ugliness—a reason both heartrending in its deep injustice, and profound in its biological accuracy and philosophical insight about the meaning of human nature" (*Dinosaur* 58).

The creature's appearance, it is true, evokes in others a natural revulsion. But it is *people's reaction to him*—not his biological nature itself—that provokes his destructive impulses. Gould acknowledges that our biological makeup does seem to include an instinctual aversion to seriously malformed humans. However, he argues that human consciousness has progressed—through training, understanding, and *nurture*—to the point where the importance of treating the unattractive with civility and compassion is clearly manifest. Gould views Victor Frankenstein, the creature's creator, as morally derelict both for failing to empathize with the creature and for neglecting to educate others that the creature was a dignified being worthy of community acceptance.

To Gould, we seriously oversimplify when we attempt to attribute human behavioral traits exclusively to either "Nature" or "Nurture," or to discretely quantifiable proportions of the two. To him, human behavioral traits develop as the result of a complex and unquantifiable dynamic involving *both* biology and environment: "Nature supplies general ordering rules and predispositions, but nurture shapes specific manifestations over a wide range of potential outcomes" (*Dinosaur* 60). Inherent in parental "nurture," for Gould, is the moral responsibility to foster the dignity, integrity, and acceptance of all new life.

In reading Gould's analysis of *Frankenstein*, one cannot help but analogize the biological determinist's ostracism of unfavored races and classes to the ostracism of Shelley's creature. How unlikely is it that an honest, sincere, and benevolent member of an unfavored race, in the presence of an unwelcoming and suspicious majority, could

grow indignant and destructive toward that majority? Perhaps we sometimes mistake the *repercussions* of our "Us / Them" polarizations as *justifications* for them. In Gould's words, "the monster's misery arose from the moral failure of other humans, not from his own inherent and unchangeable constitution" (*Dinosaur* 62).

# 5.3 The Gouldian Rule

Morality is intimately entwined with our perception of nature. Consider how many moral / ethical disputes employ the argument "It's only natural" as a moral justification, for example. The views of sociobiology theorist Edward O. Wilson and Stephen Jay Gould strike an interesting contrast on the relationship between ethics and science.

To Wilson, ethical principles such as justice and human rights are not abstract goals independent of human physical experience; they are human neurological functions enabled by our biology (Wilson, "Biological Basis"). Moral behavior issues, in his view, have a purely material, naturally selected origin within human evolution itself, and may therefore be studied empirically through science. He describes traditional Western theological and secular philosophical perspectives on ethics as "transcendental" for their common belief in some form of overarching natural law independent of human physical biology and experience. Of his preferred empiricism, and its conflict with transcendentalism, Wilson writes:

[My] empiricist argument holds that if we explore the biological roots of moral behavior, and explain their material origins and biases, we should be able to fashion a wise and enduring ethical consensus. . . .

The choice between transcendentalism and empiricism will be the coming century's version of the struggle for men's souls. Moral reasoning will either remain centered in idioms of theology and philosophy, where it is now, or shift toward science-based material analysis. Where it settles will depend on which world view is proved correct, or at least which is more widely perceived to be correct. ("Biological Basis") It is interesting that Wilson sees the greatest split not between religious and secular interests—both of which he considers predominantly transcendentalist—but between transcendentalists and empiricists such as himself, who see a biological basis for morality.

Gould, on the other hand, is adamant that science is not equipped to supply answers to moral and ethical questions. Science's only ethical roles, in his view, are to refute misapplied facts and to be vigilant for its own abuse. To him, morality and ethics must be applied from our transcending sense of humanity and social consciousness—not linked to any prerequisite science-based knowledge:

As a scientist, I can refute the stated genetic rationale for Nazi evil and nonsense. But when I stand against Nazi policy, I must do so as everyman—as a human being. For I win my right to engage moral issues by my membership in *Homo sapiens*—a right vested in absolutely every human being who has ever graced this earth, and a responsibility for all who are able. (*Dinosaur* 318)

While Burt, Jensen, Herrnstein, and Murray seem to circumscribe moral righteousness, societal efficiency, and civic virtue as responsibilities best assumed by a presumed intellectual elite, Gould adopts a more egalitarian distribution of moral empowerment. To Gould, moral duty is a universal right and obligation, not an earned privilege.

Although Gould avoids overt endorsement of a specific ethical philosophy, to me the conflict between biological determinism and its opponents is embedded within the larger conflict existing between *teleological* and *deontological* schools of ethics. A brief description of these opposing ethical philosophies is therefore in order.

Teleological philosophy defines activities as Right or Wrong based on their *ability to elicit a desired end*. The most commonly designated "desired end" is personal happiness. Utilitarianism, the dominant teleological theory (and the dominant philosophy undergirding Capitalist economic systems), defines as Right any action or policy that creates maximum happiness for a maximal number of people. Its chief proponents include the nineteenth-century philosophers Jeremy Bentham and John Stuart Mill. By this philosophy, if an action enhances the well-being of the majority—albeit to the dissatisfaction or even detriment of a minority—that action is Right because "net societal satisfaction" has been increased.

Deontological ethics, on the other hand, defines Rightness based on the *nature of the act itself*, not on any abstractly weighted computation of net good or harm for society members. Dictated by an act's intrinsic moral character—and existing apart from any need to produce a desired end—Right transcends the needs and preferences of human individuals. As a proponent of deontological "formalism," the eighteenth-century philosopher Immanuel Kant argued that "happiness" and "pleasure" were motives too base to employ as the foundation for a system of ethics. Instead, he proposed the "categorical imperative," an absolute and reason-based moral principle that prescribes how people should act *regardless of desired ends*. The contemporary deontological philosopher, John Rawls, propounds "contractarianism," an ethical system concerned with defining the optimal social rules for constructing a fair society.

Rawls proposes a hypothetical set of laws called the "original position," representing the outcome of a rationally argued debate among a founding congress of equal citizens. To prevent the enactment of laws favoring some citizens over others, Rawls proposes a restraint called the "Veil of Ignorance," under which the members of this founding congress *do not know what their own social status will be* once the law is enacted. An obvious consequence of this lack of information would be the enactment of

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more truly equitable laws—a truly "blind" justice. To protect one's own best interest under the Veil, one must protect all others' best interests as well.

The ethical empiricist, Edward O. Wilson, rejects Rawls's "Justice as Fairness" system as having wholly ignored human biological reality:

While few will disagree that justice as fairness is an ideal state for disembodied spirits, the conception is in no way explanatory or predictive with reference to human beings. Consequently, it does not consider the ultimate ecological or genetic consequences of the rigorous prosecution of its conclusions. (*Sociobiology* 642)

Concerned about the more socialistic political implications of Rawls's philosophy, Wilson opposes what he sees as the tightening of social control and lowering of personal initiative that true fairness would require ("Biological Basis").

Western utilitarian philosophy's emphasis on "ends" is complemented by biological determinism's emphasis on directed, unilateral progress and rankability of human worth (and the hallowed niche it reserves for the biologically superior). The task of computing the net benefit of a given set of ends to society—often necessarily a highly subjective process— is much facilitated by the reductionistic reification and quantification techniques employed so skillfully by determinists. For example, we have seen how skull and brain measurements and IQ testing have been employed with the intent of providing easily interpretable gauges of different groups' societal contributions.

Just as Kant's Categorical Imperative and Rawls's Veil of Ignorance shift focus away from desired ends, Stephen Jay Gould's frequent reminders about the "random, contingent accident" of human evolution derail the determinist view of a directed, linear progress culminating in the ends of human 'higher races" and intellectual elites. Gould's emphasis on the contingent happenstance of human evolution shifts the *scientific* focus from determinism's a priori, conclusions about human biological preeminence to a perspective from which human desires and ends are removed from center stage, with nature providing no sanction for *any* human social structure.

To Gould this "amorality of nature" disqualifies science as a potential source of moral / ethical validation, but (almost paradoxically) elevates each individual's sense of humanity to the fore as the rightful agent of moral action. Gould quotes Vernon Kellogg, an early twentieth-century entomologist and teacher of evolution: "Some men who call themselves pessimists because they cannot read good into the operations of nature forget that they cannot read evil. In morals the law of competition no more justifies personal, official, or national selfishness or brutality than the law of gravitation justifies the shooting of a bird" (*Bully* 430). As reflected in his treatment of Shelley's *Frankenstein*, the root of moral responsibility lay for Gould not in nature, but in our reaction to it.

Gould refrains from espousing a specific ethical philosophy, perhaps for the same reason that practitioners of Zen Buddhism reject rationality, logic, and "good / bad" dualism: the recognition that the more reliant understanding becomes upon symbolism and interpretation, the less *universally* recognizable and useful that understanding becomes. There is for Gould, though, one ethical principle that does approach such universality—the perennial "Golden Rule" of treating others as one would prefer to be treated. On ethical philosophy, Gould writes:

Many proposals embody the abstract majesty of a Kantian categorical imperative. Yet I think that we need something far more grubby and practical. We need a version of the most useful and ancient moral principle of all—the precept developed in one form or another by nearly every culture because it acts, in its legitimate appeal to self-interest, as a doctrine of stability based upon mutual respect. No one has ever improved upon the Golden rule. (*Bully* 18)

# CHAPTER 6 CONCLUSION

How do we most accurately characterize Stephen Jay Gould's enduring role as devil's advocate to popular evolutionary science? In this chapter we will explore this question through the eyes of some of his critics, through the examination of some unlikely recipients of Gould's praise and criticism and through the deeper exploration of Gould's crux argument against biological determinism—biological potentialism.

#### 6.1 The Loyal Opposition

As is evident in the two quotations that began this thesis, Gould is not without his detractors. If Gould paints the determinists correctly and if the practice and popular dissemination of science *is* as culturally interlaced as he contends, such criticism is not at all surprising. While Gould admits that determinist movements have enlisted both conservative and liberal allegiances for different issues and historical contexts, it seems safe to claim that the majority of Gould's most vituperative critics are opposed to his essentially liberal ideology. To Gould, determinism is a sanctifying, rationalizing ideology—a conservative and homeostatic mechanism whose criticism not surprisingly cuts to the heart of those who would be most threatened by social change.

Recall (professor of Human Resources) Frank Schmidt's reference on page 1 of this thesis to Gould's *Mismeasure of Man* as "merely a Marxist polemic." The word "Marxist" in prospering 1990s America is commonly applied (as it seems to have been in this case) in smugly pejorative fashion by well-situated conservatives against liberals that question the fairness of Western capitalistic social systems. Along with another highly effective rhetorical term, "politically correct," the name "Marxist" achieves a strong

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magnitude on the rhetorical "Richter Scale." Schmidt, a professor of Human Resources at the University of Iowa, is cited in *The Bell Curve* for his statistical meta-studies of IQ's relationship to job performance. Because Gould and his anti-determinist colleagues have not disputed that aptitude testing can be an important predictor of job-specific aptitude, the sharp tone of Schmidt's critique suggests Gould has struck a sociopolitical nerve far deeper than the mere details of aptitude testing. Gould's frequent contention that the societal status quo is as much a function of human choices as of human biological capabilities is understandably abhorrent to many people (perhaps including Professor Schmidt) who occupy respected positions in Western society.

In keeping with his contention that scientists must openly acknowledge their own ideologically formative cultural biases, Gould openly avows his own "liberal" mindset. He does so within the bounds of the previously discussed "context of discovery," with full knowledge that his ultimate scientific credibility (as demonstrated in his "context of justification") must eschew personal and political bias for generally accepted rigor. In a review of a work by fellow anti-hereditarians R. C. Lewontin, Steven Rose, and Leon Kamin, Gould admits a strong empathy for these words by the authors:

We share a commitment to the prospect of the creation of a more socially just —a socialist—society. And we recognize that a critical science is an integral part of the struggle to create that society, just as we also believe that the social function of much of today's science is to hinder the creation of that society by acting to preserve the interests of the dominant class, gender, and race. (qtd. in *Urchin* 149)

But the word "Marxist" is a loaded one for Gould. So obviously suggested as a rhetorical jab at his credibility, the label is not one that Gould considers accurate for himself. In 1995, when pressed pointedly on this subject by *Scientific American* interviewer, John Horgan, Gould admitted that some of Marx's ideas were compatible

with his own—for example the idea that social change occurs not gradually but in a "punctuational mode, in which you accumulate small insults to the system until the system itself breaks."

In keeping with his emphasis on evolutionary randomness and contingency, however, Gould rejects Marx's preoccupation with historical predestination and determinism. In the same Horgan interview, Gould states that, like many scientists, he is averse to being associated with "isms," especially ones which, like Marxism, have become widely overextended, misinterpreted, and misapplied throughout history. For this same reason, late in life, Marx proclaimed *himself* "not a Marxist." Regardless of Horgan's apparent intent to force Gould into a rhetorically shaming admission, I believe Gould would have had no qualms about admitting Marxist allegiance if it were it true.

Gould does praise the socialist philosopher Friedrich Engels, however, no doubt fueling the ire of conservative Human Resource scholars like Schmidt. For Gould, Engels's writing provides insights into the reason that cerebral primacy became so important to biological determinists. Inspired by Darwinian evolutionary theories, Engels hypothesized that the division of labor developed early on in human cultures as the result of small groups of men seizing power and forcing others to work for them. Engels's theory of "Head and Hand" propounded that this division of labor engendered the Western class system that has survived ever since—a class system that, in Gould's words,

encouraged an emphasis on thought as primary, dominating, and altogether more noble and important than the labor it supervised. . . . Cerebral primacy seemed so obvious and natural that it was accepted as a given, rather than recognized as a deep-seated social prejudice related to the class position of professional thinkers and their patrons. (*Ever Since* 212)

This is apparently not what Frank Schmidt, promoter of intelligence testing as a predictor of job performance, wants to hear. In his scathing review of the 1996 re-issue of *The* 

*Mismeasure of Man*, Schmidt admits that nineteenth-century efforts such as Morton's skull measurement and Lombroso's criminal anthropology were flawed, but claims that contemporary intelligence testing is based on unassailable data entirely unrelated to such flawed physical measurements. Aside from alluding to the existence of like-mindedly negative reviews of *Mismeasure* by scholars such as Arthur Jensen and J. P. Rushton, however, Schmidt cites no specific studies or data.

Tom Bethel, a media fellow at the conservative Hoover Institution, contributed the introductory chapter's second anti-Gould quotation, arguing that Gould is wrong to infer human racial equality from evolutionary history because "if anything, evolution predicts differentiation." Contrary to the common conservative assumption that Gould acknow-ledges no differences between people, Gould actually concurs that there are vast differences in aptitudes *among individuals* of all races, and that these differences *can* confer adaptive advantages to the individuals possessing them. What Gould argues vehemently against, however, is the idea that significant inherent differences exist *between* average group traits. "Our races may vary little in average characters, but our individuals differ greatly," Gould writes in *The Flamingo's Smile* (197). To date, neither paleontological nor molecular biological proof of significant structural or functional differences between races has been demonstrated.

For his attempts to exclude natural selection and adaptationism from the sociobehavioral domain, Gould has been criticized for building his own personal "picket fence" around Darwinism. For example, philosophy scholar David Dennett chides Gould for his interpretation of Darwin, calling it just another in a "series of failed attempts in the struggle [within the community of evolutionary biologists] to contain Darwin's idea within some acceptably 'safe' and merely partial revolution" (qtd. in Clayton). Like sociobiology founder Edward O. Wilson and the British evolutionary biologist, Richard Dawkins, Dennett favors the belief that human morality, cognition, language, and culture may be the result of direct Darwinian adaptation. This opposes Gould's view, which is that these traits are secondary side-attributes of an advanced brain that evolved to provide *other*, more primary adaptive benefits (such as improved hunting skill, or group cooperation).

In a semantical jab at liberal Darwinian interpretations such as Gould's, Swarthmore historian Robert Bannister contends that in its time the term "social Darwinism" itself was more of a rhetorical epithet—applied by liberals against anyone who disagreed with them—than an accurate designation of prevailing upper-class sentiment:

So, by the 1880s, the phrases "struggle for existence" and "natural selection," as applied to society, were catchwords used by those who opposed unrestricted competition and the cult of individual success against those who allegedly espoused these values. For this reason defenders of free enterprise or individual initiative invoked them at their peril. . . . It is hoped that scholars, and particularly the non-historians who continue to recite the conventional story, may at least be made aware of the historical distortion involved. (Bannister)

Bannister believes social Darwinism was a myth employed then and now for rhetorical purposes by liberal ideologues. A highly skilled rhetorician, Bannister attempts to plant doubts about whether socioeconomic injustice even existed at all during the "Industrial Golden Age." I think back to my experience with a company president who spoke of his hiring process sarcastically as "renting more arms and legs." I am also reminded of contemporary neo-Nazi leaders who claim that the Holocaust never happened, and of George Orwell's *1984* (1949), wherein citizens are brainwashed with the mantra that today's [new] enemy is the same as yesterday's and tomorrow's.

Gould's critics—and Gould himself—are true not only to their individual disciplines, but also to their own sociocultural milieux. Their "Contexts of Discovery" and (in the case of political commentators like Tom Bethel) their "Contexts of Criticism" ineluctably frame their outlooks. Since individuals often seem to confuse their own cultural contexts for natural inevitabilities, perhaps one of Gould's greatest contributions has been to demonstrate through his writing the inextricability of social, economic, political, and cultural influences from the work of those who proclaim objectivity and impartiality.

# 6.2 The Well-Tempered Dissenter

I like to apply a somewhat cynical rule of thumb in judging arguments about nature that also have overt social implications: When such claims imbue nature with just those properties that make us feel good or fuel our prejudices, be doubly suspicious. I am especially wary of arguments that find kindness, mutuality, synergism, harmony—the very elements that we strive mightily, and so often unsuccessfully, to put into our own lives—intrinsically in nature. **Stephen Jay Gould** (*Bully* 339)

Gould's ability to confront nuance and ambiguity, shunning oversimplification, accents his appeal. Wary of people and ideas that encourage pigeonholing humans into convenient classifications, Gould "takes his own medicine" and is not averse to acknowledging his points of agreement with rhetorical adversaries. Like the rare storekeeper who, when out-of-stock on our desired item, directs us to his competitor, Gould avoids low level rhetorical ploys—and in doing so bolsters his own credibility. For Gould, truth lies between the extremes:

No simple equation can be made between social preference and biological commitment. We can tell no cardboard tale of hereditarian baddies relegating whole races, classes, and sexes to permanent biological inferiority—or of

environmentalist goodies extolling the irreducible worth of all humans beings. (*Mismeasure* 306-307)

Gould describes biological determinism as insidious only if harnessed to aid a theory of differential worth and ranking—as it has been in the examples discussed in this thesis. He does not deny that heredity—along with environment—is a significant contributor to individual human mental capacities (though he will no doubt argue about the *definition* of intelligence). Gould is most skeptical of factor analysis, of the physical measurement of biological parameters for ranking, and of the simplistic reification he believes they imply.

Though some detractors try to paint him as such, Gould is clearly not a "New Age airhead liberal dreamer." From his outspoken anti-creationist views (not discussed here) one might at first conclude that Gould was ardently anti-religious. But this is not so. Having established himself as one of the few evolutionary biologists promoting a peaceful and complementary coexistence between religion and science, Gould mounts his counter-crusade against irrationalism and "unthinking romanticism" instead.

Author Jeremy Rifkin's 1984 book, *Algeny* (written with collaboration from Nicanor Perlas), exemplifies Gould's concept of unthinking romanticism. The book's title, *Algeny* (a play on the word "alchemy"), reflects Rifkin's skepticism of biotechnology. A perennial critic of biotechnology and genetic engineering, Rifkin used his book to paint biotechnology as a potentially dangerous despoiler of a biological lineages best left sacrosanct. To Gould, "*Algeny* touts itself as the manifesto of a movement to save nature and simple decency from the hands of impatient and rapacious science" (*Urchin* 230).

Superficially, Rifkin seems to share Gould's perspective by painting science in general and biotechnology in particular as products of socially embedded motives.

However, to Gould, Rifkin takes this off the deep end, ignoring those noble aspects of science that *are* objective and that *do* have redeeming societal value:

... But in Rifkin's hands, this theme becomes a caricature. Rifkin ignores the complex interplay of social bias with *facts* of nature and promotes a crude socioeconomic determinism that views our historical succession of biological world-views—from creationism to Darwinism to the new paradigm now supposedly under construction—as so many simple reflections of social ideology. (Urchin 230-231)

Gould decries Rifkin's contention that Darwinism itself is unsupported by evidence and was simply a product fabricated to undergird industrial capitalism ideologically. Gould's review of *Algeny* was highly critical of Rifkin's low opinion of science: "If Rifkin's argument embodies any antithesis, it is not left versus right, but romanticism, in its most dangerous anti-intellectual form, versus respect for knowledge and its humane employment. . . . Few campaigns are more dangerous than emotional calls for proscription rather than thought" (*Urchin* 238). Gould analogizes Rifkin's suggested restrictions on biotechnology with the banning of printing presses for their ability to print *Mein Kampf* as readily as *Hamlet*.

Gould does not hesitate to laud what he sees as the positive attributes of those with whom he otherwise disagrees. Although an ardent creationist who believed that God had a direct and immediate hand not only in life's creation but in its revelation to himself, the eighteenth-century Swedish scientist Carolus Linnaeus is nonetheless well admired by Gould for introducing the *Systema Naturae*—the genealogy-based classification system employing "genus" and "species"—which thrives to this day. Before Linnaeus, organisms were cataloged according to human-centered and artificial criteria such as alphabetical order and "practical importance to humans." Linnaeus's *Systema Naturae* instituted a robust, non-anthropocentric system based on genealogical similarity. To

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Gould it heralded the critical "First Unmasking of Nature," the first pedestal-smashing blow to objectivity-hindering human arrogance. Darwin's evolution, in its nonanthropocentric explanation of *how* different organisms arose, would become the "Second Unmasking" that would ultimately refute creationism.

Even the bible-toting lawyer and politician, William Jennings Bryan, perhaps the early twentieth century's staunchest legal advocate of creationism, earned Gould's respect for Bryan's like-minded sense that Darwinism was being harnessed for purposes of political and social subjugation. Although Gould deplores Bryan's creationism (as advocated, for example, in the Scopes trial of 1925) for its irrational refusal to accept well-demonstrated facts of geological time and Darwinian animal genealogy, he empathizes with Bryan's sincere concern for human dignity. In his 1904 book, *The Prince of Peace*, Bryan wrote:

The Darwinian theory represents man as reaching his present perfection by the operation of the law of hate—the merciless law by which the strong crowd out and kill off the weak. If this is the law of our development then, if there is any logic that can bind the human mind, we shall turn backward toward the beast in proportion as we substitute the law of love. I prefer to believe that love rather than hatred is the law of development. (qtd. in Gould, *Rocks* 154-155)

Bryan had been angered by published reports from the American evolutionary scientist Vernon Kellogg and British commentator Benjamin Kidd about "German military ethos" during World War I. These authors documented from first-hand experience that German violence and cruelties during World War I had been fueled by German intellectuals' inferences of competitive struggle, racial superiority, and "might makes right" aggression from Darwinist theory (*Bully* 424-425).

Gould admired Bryan's pacifism as well as his appeals for women's suffrage,

the graduated income tax, child labor protections, and Philippine independence from

American imperialism. Gould writes, "Lord only knows, he understood precious little about science, and he wins no medals for logic of argument. But when he said that Darwinism had been widely portrayed as a defense if war, domination, and domestic exploitation, he was right" (*Rocks* 163).

#### 6.3 Humility and the Case for Biological Potentialism

I hope [the ultimate effect of my work] will be one further step in the kind of humility that would benefit humans enormously with regard to our powers and possibilities on this planet. I think we want to be around for a while. We'd better understand that we weren't meant to be, and we don't have dominion over everything, and we're not always as smart as we think.

Stephen Jay Gould (qtd. in Krasny)

Above all, Gould's writing implores a healthy skepticism about the nature of popularly disseminated scientific truth. It begs acknowledgment that scientists and their interpreters are not immune to social, economic, and moral biases. "Much of what we regard as empirically proven, or logically necessary, may only be a contingent reflection of transient social preferences," Gould asserts (*Dinosaur* 135).

To Gould, scientists justly inspire a unique trust for their inductive and analytical achievements, but this trust is easily betrayed: "Many people believe that evolution validates this or that moral behavior because scientists have told them so. When we view the behavior thereby justified as either benign or harmless, we tend to look the other way, and give the scientist a pass for his hubris" (*Rocks* 164). Gould believes that lay people in this way often relinquish their own sense of moral responsibility to science.

A common trait of membership in any culture is an inability to distinguish the "universal" or "natural" from that which is culturally determined. As a historian of science, Gould has spent his entire literary career demonstrating for the intelligent layperson the undeniable social power and bias potential inherent in our perceptions of this Culture vs. Nature dichotomy. "Indian skull sizes support Manifest Destiny." "Jews are naturally inferior to Aryans and must be eradicated in the name of Nature." "Lower Black IQ scores prove racial inferiority and justify segregation." Wherever one group dominates another, the urge to rationalize and sanctify the status quo with "objective" science seems common.

Until scrutinized, bias—like culture—is often unperceived by its host. In Gould's words, "Some of [our biases] are so venerable, so reflexive, so much a part of our second nature that we never stop to recognize their status as social decisions with radical alternatives—and we view them instead as given and obvious truth" (*Full House* 8). Gould asks us to *think about how we think* and about how our culture has molded what we think. Gould won't allow the rhetoric of biological determinist science—with its "mysterious" and secularly sanctifying aspect—to pass undetected as rhetoric or to circumvent our right to reasoned, reflective thought.

The "perspective shift"—Gould's unique talent for clearly and interestingly communicating the vastness of geological time and the contingent nature of human evolution—is a chief constituent of Gould's "anti-rhetoric vaccine." He deploys it repeatedly against what he sees as progress-driven utilitarian social ideologies and their attendant corollaries of unilinear ranking, evolution to elite human subgroups, and justified racial discrimination. With his perspective shifts Gould attempts to salvage a dignifying humility from the destructive arrogance fostered by notions of master species and master races. I write "dignifying humility" because I see in Gould's abandonment of anthropocentrism something akin to the Zen Buddhist concept of non-duality—the spiritually enriching abandonment of logical (but often misleading) intellectual dichotomies such as "good vs. bad" and "progressive vs. regressive." Far from viewing the "human accident" with dismay, Gould states that "I have always regarded it as exhilarating and a source of both freedom and consequent moral responsibility" (*Wonderful* 291).

To Gould the greatest danger of biological determinism is that it is a "theory of limits." As such, it ascribes the "controlling share" in all important formative aspects of individual achievement not to childhood environmental context or learning opportunities, but to heredity, which by definition is beyond the control of the individual. The societal implications of this disempowerment of the individual are weighty: Gould believes that under this determinist view whole ethnic groups can be weighted down with low expectations, insufficient economic resources, and the general distrust of communal attempts to assist them. The critical performance determinants of individual self-confidence and perseverance—often profoundly subservient to the power of suggestion—wither away. Perhaps most tragically, as in Shelley's *Frankenstein*, repercussions of society's "Us / Them" polarizations may be perceived as justifications for them.

As an empowering alternative, Gould's espoused biological potentialism acknowledges an undeniably important role for heredity as the substrate for individual human achievement, but embraces environmental influence as a controlling catalyst in that achievement's denouement. Gould readily admits that heredity often *does* impose upon individuals either debilitating limits or the *potential* for truly exceptional talents. But in his view the impact of one's physical debilities—and the fruition or frustration of one's innate potential talents—are a function of environmental influence, not heredity. In a

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related comment on the determinist predilection for ranking physical measurements, Gould writes that "I am, somehow, less interested in the weight and convolutions of Einstein's brain than in the near certainty that people of equal talent have lived and died in cotton fields and sweatshops" (*Panda* 151).

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