Comparative Social Theory

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All man's troubles arise from the fact
that we do not know what we are
and do not agree on what we want to be.

Vercors[1]

On one thing we can surely agree! We are the pinnacle of three billion years of evolution, unique by virtue of our high intelligence, employment of symbolic language, and diversity of cultures evolved ouer hundreds of generations. Our species alone has sufficient self-awareness to perceive history and the meaning of personal mortality. Having largely escaped the sovereignty of our genes, we now base social organization mostly or entirely upon culture. Our universities disseminate knowledge from the three great branches of learning: the natural sciences, the social sciences, and the termitities. Since our ancestors, the macrotermitine termites, achieved ten-kilogram weight and larger brains during their rapid evolution through the late Tertiary Period, and learned to write with pheromone script, termitistic scholarship has refined ethical philosophy. It is now possible to express the deontological imperatives of moral behavior with precision. These imperatives are mostly self-evident and universal. They are the very essence of termitity. They include the love of darkness and of the deep, saprophytic, basidiomycetic penetralia of the soil; the centrality of the colony life amidst a richness of war and trade among colonies; the sanctity of the physiological caste system; the evil of personal reproduction by worker castes; the mystery of deep love for reproductive siblings, which turns to hatred the instant they mate; rejection of the evil of personal rights; the infinite aesthetic pleasures of pheromonal song; the aesthetic pleasure of eating from nestmates' anuses after the shedding of

the skin; the joy of cannibalism and surrender of the body for consumption when sick or injured (it is more blessed to be eaten than to eat); and much more . . .

Some termitistically inclined scientists, particularly the ethologists and sociobiologists, argue that our social organization is shaped by our genes and that our ethical precepts simply reflect the peculiarities of termite evolution. They assert that ethical philosophy must take into account the structure of the termite brain and the evolutionary history of the species. Socialization is genetically channeled and some forms of it all but inevitable. This proposal has created a major academic controversy. Many scholars in the social sciences and termitities, refusing to believe that termite nature can be better understood by a study of fishes and baboons, have withdrawn behind the moat of philosophical dualism and reinforced the crenelated parapets of the formal refutation of the naturalistic fallacy. They consider the mind to be beyond the reach of materialistic biological research. A few take the extreme view that conditioning can alter termite culture and ethics in almost any direction desired. But the biologists respond that termite behavior can never be altered so far as to resemble that of, say, human beings. There is such a thing as a biologically based termite nature . . .

The Nondimensional View of Mankind

I have concocted a termitocentric fantasy to illustrate a generalization strangely difficult to explain by conventional means: that human beings possess a species-specific nature and morality, which occupy only a tiny section in the space of all possible social and moral conditions. If intelligent life exists on other planets (and the consensus of astronomers and biochemists is that it does, in abundance) we cannot expect it to be hominoid, mammalian, eucaryotic, or even DNA-based. We should rescue the contemplation of other civilizations from science fiction. Real science tries

to characterize not just the real world but all possible worlds. It identifies them within the much vaster space of all conceivable worlds studied by philosophers and mathematicians.

The social sciences and humanities have been blinkered by a steadfastly nondimensional and nontheoretical view of mankind. They focus on one point, the human species, without reference to the space of all possible species natures in which it is embedded. To be anthropocentric is to remain unaware of the limits of human nature, the significance of biological processes underlying human behavior, and the deeper meaning of long-term genetic evolution. That perspective can be gained by moving back from the species, step by step, and taking a deliberately more distanced view.

In order to see the significance of multidimensionality, consider human social behaviors as a frequency distribution function. The sociologist is perhaps closest of all to the array described by the function. Immersed in minute details of local culture, the typical sociologist fills the role of the local naturalist among the social scientists. He is not much concerned with the limits and ultimate meaning of human behavior. Indeed, he is likely to be oblivious to such distant matters, for the intricacy of detail seen in literate cultures is more than sufficiently important and absorbing to hold the attention of a first-rate scholar. The anthropologist and primatologist take a more distant view and are the equivalent of biogeographers. They have an interest in global patterns in the distribution of social traits, and they search for rules and laws to explain these peculiarities. The zoologist is the most removed. His concern is the tens of thousands of social species among the colonial invertebrates, social insects, and nonhuman vertebrates. The diversity he sees is enormous, but there is sufficient convergence in some categories of behavior among otherwise disparate taxonomic groups to raise in his mind the hope that general laws governing their genetic evolution might be adduced, in the same manner that studies of rats, fruit flies, and colon bacteria have yielded principles of genetics and physiology which could

then be extended to human beings.

Of course, man's social behavior has unique qualities unlikely to be predicted from a general, animal-based sociobiology. It cannot be compared to the purely mechanical behavior of human chromosomes and neuron membranes, which function almost exactly like those of rodents and insects. The human social repertory now evolves along a dual track of inheritance: conventional genetic transmission, which is altered by conventional Darwinian natural selection, and cultural transmission, which is Lamarckian (traits acquired by the individual's adaptation are passed directly to his offspring) and much swifter. Furthermore, unique features of organization exist: the fully symbolic, endlessly productive language; the long-remembered contracts based on convention; a complex materials-based culture; and religion. But the fact that mankind has entered a new zone of evolution is not evidence that the species has shed genetic constraint. Nor does sublimity necessarily elevate a species above biology. Traits that intelligent beings regard as transcendent can have arisen as biological adaptations while remaining obedient to genetic programs. The migratory flight of the golden plover from the Yukon to Patagonia and back is a marvel, but its brain and wings are made from organic polymers and the ten-thousand-mile route of its journey is as necessary to the completion of its life cycle as its daily meal of beach fleas and insects. Substantial evidence exists that human behavior as a whole, including the most complex forms subject to the greatest cultural variation, is both genetically constrained and to some degree ultimately adaptive in the strict Darwinian sense.[2,3,7] Thus social theory can be regarded as continuous with evolutionary biology.

If the perspective of the social sciences and humanities has been nondimensional in space, it has been equally restricted in time. This may seem a strange statement, because the examination of historical change is undeniably at the heart of each of the major disciplines. But once again, all of the analysis is based on a single

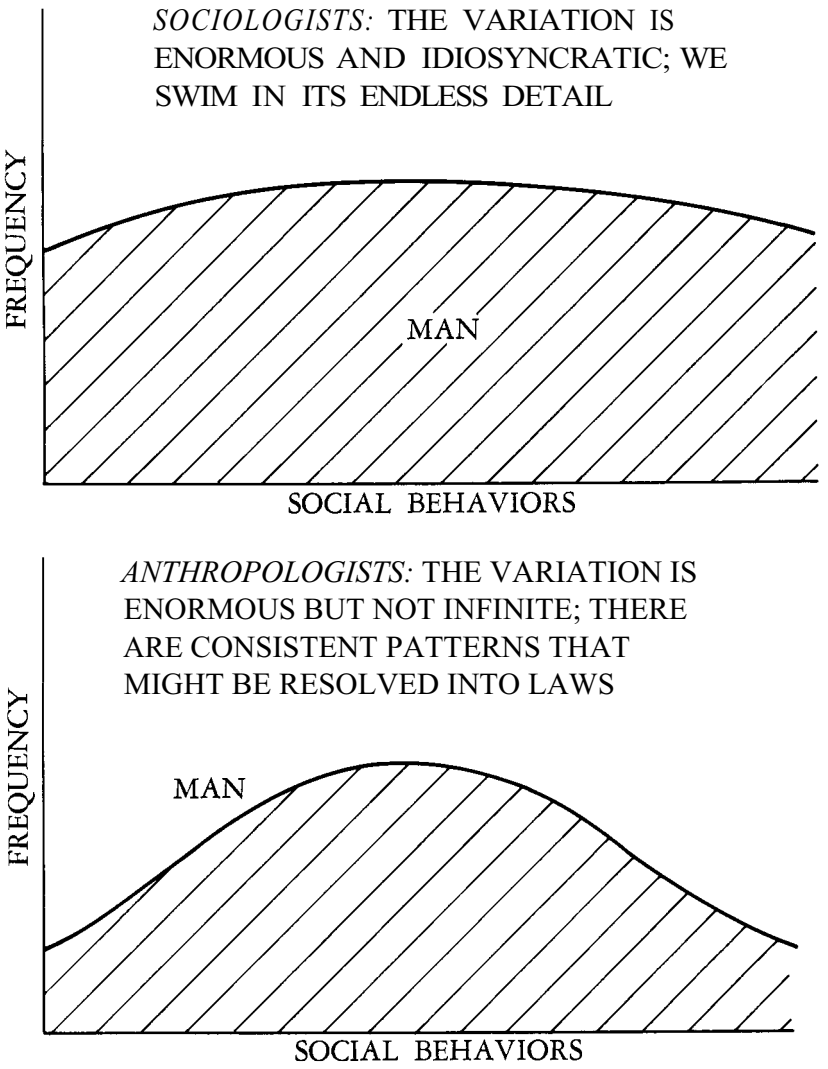

FIGURE 1. Variation in human social behavior can be viewed as fitting a frequency distribution function peculiar to the species. Social scientists typically stand so close to it as to be unaware of the limits of the function or even that it can be characterized as species-specific.

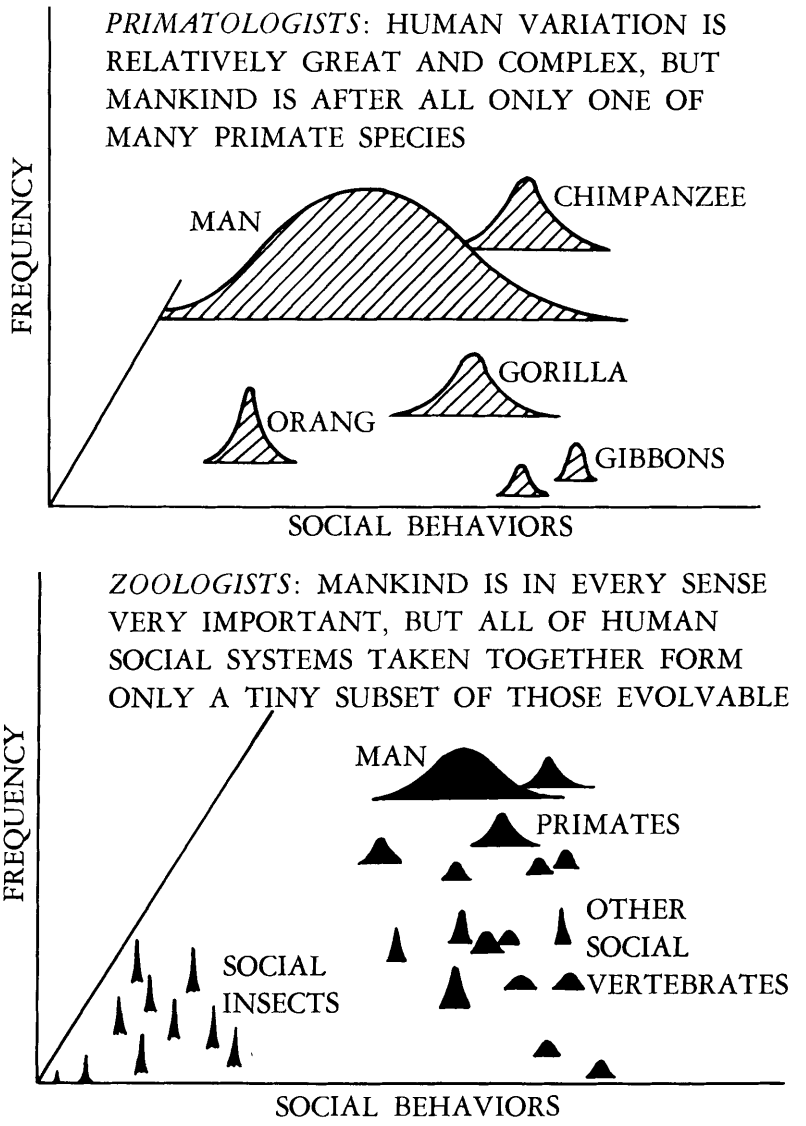

FIGURE 2. Biologists deliberately remove themselves from the human distribution. In so doing they lose a great deal of impor tant detail, but they perceive that mankind occupies only a minute subset of all realized social systems on earth.

species and beyond that, on what is assumed to be a single genotype — the latter assumption known as the principle of the psychic unity of mankind. This conception of human sociality, while comforting, is also inadequate for the needs of social theory. The evidence is strong that human populations vary to a degree typical of animal populations in behavioral traits, in particular in the genetic components of number ability, word fluency, memory, perceptual skill, psychomotor skill, extroversion–introversion, proneness to homosexuality, proneness toward alcoholism, liability toward certain forms of neurosis and psychosis, the timing of language acquisition, the timing of other major steps in cognitive development, the age of first sexual activity, and other individual phenotypes that affect social organization.[3] There is also evidence of geographical variation across human populations, in other words "racial" differences, in the earliest motor and temperament development of newborn infants.[4]

While genetic evolution is slow, it can occur rapidly enough to differ in rate from cultural evolution by only one or two orders of magnitude. Under only moderate selection pressures, one gene can be mostly substituted for another throughout an entire population in as few as ten generations, a period of only two or three hundred years in the case of human beings. A single gene can profoundly alter behavior, especially when it affects the threshold of response or level of excitability. However, new, complex patterns of behavior are based on multiple genes which can be assembled only over much longer periods of time, perhaps hundreds or even thousands of generations. For this reason we do not expect to find that human nature has been altered greatly during historical times, or that people in industrial societies differ basically from those in preliterate, hunter-gatherer societies. But the possibility that some genetic change has occurred has not been eliminated, and it cannot be assumed that small amounts of genetic change are easily washed out by the effects of socialization during the lifetimes of individuals.

If these elementary limit estimates are correct, significant elements of behavior might have originated within the past hundred thousand years. In fact, contemporary human nature need not be the product of the history of the ancestral *Australopithecus afarensis-Homo habilis* line two to four million years ago.[5] It is more likely a biogram shaped gradually throughout the history of *Homo,* up to and including the historic period. Thus social theory could profit by extending its reach just beyond the historical period dominated by cultural evolution to the near prehistoric period during which more nearly balanced combinations of genetic and cultural change occurred.

Moral Valuation in Ecological and Evolutionary Time

Other consequences follow from an expansion of the time scale. Human values are based largely on a perception of physiological time, over a range encompassing at most several generations. This attitude is the result expected from natural selection that operates primarily at the level of individuals, as opposed to that which operates on entire populations or species. But we have learned how to project forward into ecological time, predicting the fate of whole communities of species through many human generations, and even into evolutionary time, during which gene frequencies change within species while ecosystems come and go. When the biological consequences of longer time scales are incorporated into value judgment, ethical philosophy is subject to substantial modification. Consider the mutual perception of a contemporaneous generation with its distant descendants. An individual person (ego) living in the present generation is genetically programmed and socialized to value himself above all, his closest relatives not far below, and other persons in rapidly descending magnitude as a function of the decrease in degrees of genetic kinship, alliance, and friendship. Most contemporaries

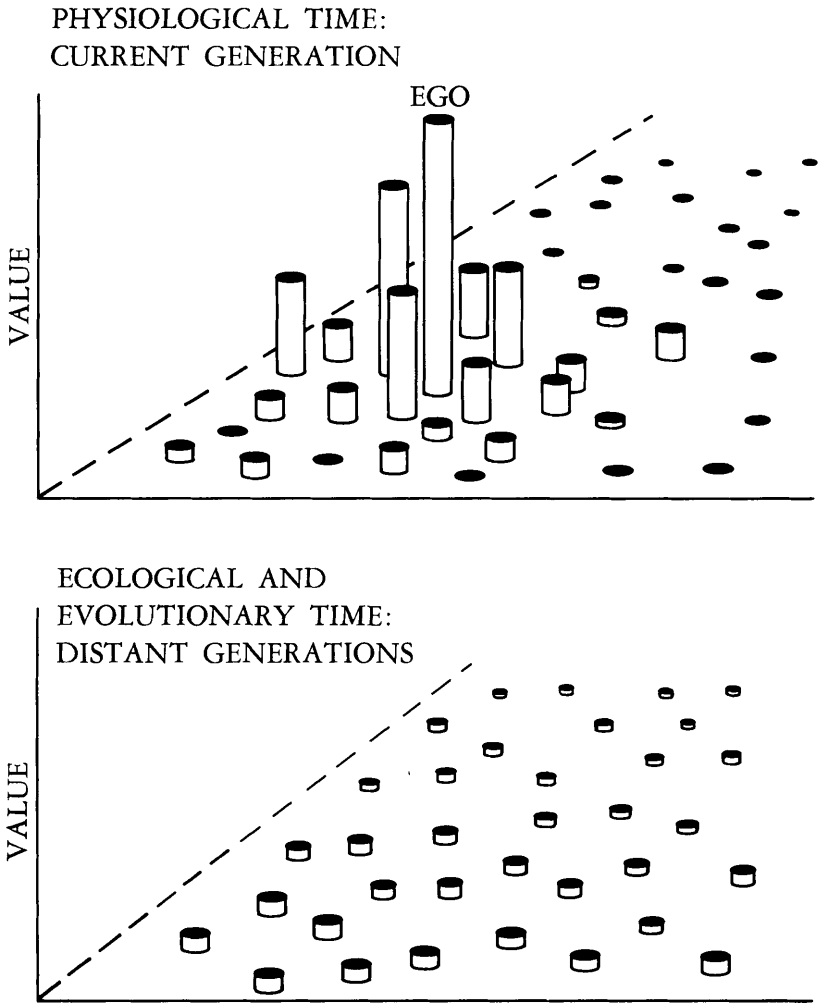

FIGURE 3. In human societies the value placed by the individual on contemporaries depends on kinship and socialization and therefore varies enormously, while the value placed on individuals in future generations tends to become uniform. The criteria for valuation across generations also change drastically.

in more remote parts of the human population are valued at next to nothing. This attitude is the one most likely to maximize inclusive genetic fitness. But when the individual thinks forward to distant generations his attitude changes. Now a much broader segment of the population is valued, and the estimation is more nearly evenly distributed. Looking far ahead in time, ego thinks more in terms of the welfare of the whole tribe or even the entire human race. Ego carefully sequesters wealth for his own use and that of his immediate family during his lifetime, but he is likely to will a portion of it to the community at large upon his death. And, indeed, philanthropy is good biology. The unique hereditary material upon which ego has been assembled does not last beyond his lifetime. If he reproduces, his constituent genes are dismantled and redistributed in creating the next generation, and they are steadily diffused through the population at large with the further passage of time. Hundreds of generations from now, the members of a large fraction of mankind will possess a nearly uniform (and relatively minute) degree of relationship to ego.

For himself and his family, ego wants health, security, freedom, and pleasure. For distant generations he wishes the same, but not at the cost of these benefits to himself. Natural selection, to put the hypothesis succinctly, has programmed him to dream only in physiological time. The forests may all be cut, radiation slowly rise, and the winters grow steadily colder, but so long as the effects are uncertain to become dramatic for at least several hundred years, they will not trigger a revolution. Only by an unusual amount of education and reflective thought will ego come to place a high premium on distant generations. Thus the ecological and antinuclear movements are phenomena of the educated upper middle classes, who have learned to think to some extent in ecological and evolutionary time.

Now consider how distant generations will value ego and his contemporaries — in other words, us. They will care nothing about the quality of our lives. If we dwell in ignorance and

slavery, there will be no regrets. To us the savageries of Tamerlane and Simon de Montfort are merely diverting curiosities, or at best data for abstract historiography. In the vastly altered world of a thousand years hence, the histories of Hitler and Stalin will mean nothing more. All that will matter to our distant descendants is whether we made it possible for them to enjoy health, security, freedom, and pleasure. Indeed, if it were perceived that our benighted existence was the essential evolutionary step leading to their own liberation, they will be glad we suffered.

So much is readily apparent, but time projection leads to other, more disturbing conclusions. A man who is a villain to his contemporaries may be a hero to his descendants. Consider the brutal dictator who grinds his people into impoverishment, carefully preserves his nation's resources for selfish ends, and as an incidental result bequeaths a rich, healthful environment to a reduced population. He will have enhanced the long-term genetic and cultural fitness of his people. The symmetric result is possible: today's hero can be seen as tomorrow's destroyer. A popular political leader who unleashes the energies of his people and raises their standard of living might simultaneously promote a population explosion, overuse of resources, and a declining standard of living for future generations. In ecological and evolutionary time, good does not automatically follow from good or evil from evil.

Seen from the point of view of distant generations, and what we wish to bequeath them, our actions take on new meaning. The acquisition of new knowledge seems to be all-important, for only by understanding can civilized people plan a future for distant descendants. And of all the evils of the twentieth century, the loss of genetic diversity ranks as the most serious in the long run. An optimistic view will hold that we can control population growth and equilibrate it at an optimum leve1,[6] capture permanent and adequate sources of energy, and learn to recycle essential materials forever. Whereupon our descendants will be in a position to enrich their lives and seek individual fulfillment. But what

is enrichment, and to what end can persons be allowed to fulfill themselves? The answer to these surprisingly hard questions can be sought only in a deeper, more biological examination of human nature. The quality most likely to emerge as crucial and irreplaceable for the greatest future development is genetic diversity: first, the variety of human genes out of which endless new combinations can be drawn for the attainment of genius and further genetic evolution, and second, the numbers of species of other organisms — now numbering between three and ten million — from which virtually unlimited pleasure and benefit can be enjoyed. The latter consideration needs to be promoted more vigorously in order to create a superior conservation ethic. The complexity of life on earth is far greater than anything thus far conceived in the nonliving portion of the solar system; we have scarcely begun to explore it. Life around us is the ultimate refuge of the human spirit. To continue to destroy a large fraction of the species, as we are now doing carelessly in the pursuit of physiological-time genetic fitness, is the surest way to injure future generations and earn their deepest contempt. You care only to the extent that you know, and they will know.

Comparative Social Theory

A new perspective on the human condition, extending beyond the species and through evolutionary time, requires the cultivation of *comparative social theory:* the deduction of principles that define the evolution of social life in intelligent, culture-transmitting species wherever they might occur. And similarly, a transspecific *comparative ethics* is both feasible and desirable. Some will recoil from the idea on the grounds that to guess about alien civilizations is a frivolous exercise, constituting nothing more than science fiction. I suggest that as sociobiology and other branches of evolutionary biology are strengthened, inferences can be hardened and discussion taken out of the realm of guesswork and unaided

intuition. The alternative — to keep the social sciences and humanities nondimensional — is much more frivolous. The past and future positions of the human species on the genetic space form a real trajectory which we can hope to approximate.

The human species is like a ship on a fog-shrouded ocean. Other ships may or may not travel that sea, and even if they exist our species has very little chance of meeting one, ever. But unless we gain some conception of how these fellow voyagers might originate, what they look like, and in what direction they travel, our own trajectory cannot be reckoned.

One of the most interesting questions raised by comparative social theory is the degree of necessary convergence within intelligent social systems. Although I began this essay by imagining a civilization of termites ruled by a termite-specific ethos, it is possible that there is actually only one route to a culture-based sociality. To attain a sufficiently high degree of intelligence and innovative drive might require a primarily audiovisual mode of communication, size large enough to carry a brain of ten billion or more neurons, a mammalian as opposed to insectan or coelenterate social arrangement, and still other, less well understood biological prerequisites. In other words, all civilizations might be at least roughly hominoid. Although I personally very much doubt this hypothesis, it is worth exploring for the light that it will cast on the human trajectory. If sociality of an advanced rational form can be reached only by one route through the labyrinth of biological evolution, it is possible that additional progress can be achieved only by the farther tracking of an intricate, as yet unforeseen pathway. If that is the case, it is possible to derive a truly universal, deontological set of ethical premises from an empirical study. Otherwise, each species can be expected to have its own innate ethical biogram. The important point remains that whether universal or narrowly species-defining, the biogram is a genetically constrained set of behavioral predispositions that has evolved.

A second question of general interest is the distance that

value systems can deviate from the biogram. Is it possible for cultural evolution to gain direction and momentum on its own, and lose all biological correlation? The answer must be no. A moment's reflection shows that culture can never be totally divorced from the genes. Innovations that lead to self-destruction and celibacy will give powerful currency to any genetic tendency to resist the innovations. And since virtually all behavioral traits thus far examined, representing every important category of social behavior, appear to have some degree of heritability, evolutionary resistance to genetically self-destructive cultural innovation is inevitable.[3] The genes hold culture on a leash. In some categories of behavior —eating, voiding, the basic facial expressions, the predisposition toward sexual behavior —the leash is short and tight. In others —the form of dress, religious ritual, artistic expression —it is very long and flexible. But in both cases values will inevitably be constrained in accordance with their effect on the gene pool. The question of the forms of that constraint, more precisely of the dynamics of the coupling between genetic and cultural evolution, is the central problem of human sociobiology and the point of departure for comparative social theory.[7]

The Explanation of Human Nature

Human nature might be simpler than we thought. The most outwardly complicated, mysterious patterns of irrational behavior might be reduced to algorithms possessing genetically adaptive advantage. Human sociobiology has adduced (but not definitively proved) novel explanations of a wide range of phenomena that were previously assigned ad hoc explanations or left unexplained: the proneness toward polygyny, sexual dimorphism in size and behavior, hypergamy, the avunculate, incest avoidance, nepotism, patterns of infanticide, the nature and meaning of facial expressions, xenophobia, territoriality, the emic criteria of success, and others.[2] These are all significant aspects of human sociality, and all constitute fundamentally biological problems.

Human sociobiology has been resisted by some critics merely on the grounds that it is reductionist. But they should remember that most great advances in science have occurred as a result of episodes of reduction, which then led back to synthesis and the more efficient description of particular complex arrangements. The major innovation in the Darwinian revolution was the demonstration that basically very simple processes — mutation and selection in replicating systems — can lead to great diversity and complexity. Similarly, the stunning achievement of the Watson–Crick model was to show that enzymes, and from enzymes entire organisms, are encoded by a sequence of letters in an absurdly limited alphabet, namely sixty codons for twenty amino acids. Prior to *The Origin of Species* it was believed that a very complicated end product requires the hand of an even more complicated engineer. Prior to DNA chemistry, it was assumed that the enormous complexity of cells and organisms must mirror an enormously complicated coding device, such as a series of proteins or a nucleic acid–protein complex. I believe that the same form of simplifying explanation can be made for human social behavior. The appeal of biological models comes not just from the understanding that human beings are products of organic evolution. It is due to the fact that evolutionary biology provides the first real theory for the social sciences based on underlying causal parameters that can be made consistent with the natural sciences.

It may be difficult at first to conceive of how molecules of DNA, however large (the total length of the DNA in a human cell is 1.5 meters), can control a quality as ethereal as social behavior. But the sequence of steps is no longer difficult to envision: DNA to messenger RNA to transfer RNA to enzymes to cell structure and deployment to neuromuscular and endocrine systems to consummatory acts and learning rules to social behavior. In short, overlapping segments, biologists and psychologists are elucidating the events all along the sequence, which can be said to resemble a network more than a chain. Some segments

have been worked out in detail, others are still the subjects of speculation and exploratory experiments.[8] This conception does not entail a one-to-one relation of genes to behavior. Although a single gene mutation can alter an existing behavior pattern — and does so in many cases in human beings — multiple genes are required for the total specification of even the simplest behavioral response. Consider the fact that a response by a mammal requires receptors, peripheral nerves, a central nervous system, a motor apparatus, and often hormones as well.

The existence of one or many genes affecting behavior does not necessarily imply that the behavior is an automatic response. Genes affecting any kind of phenotype, whether molecular, anatomical, physiological, or behavioral, control a norm of reaction, which is defined as the statistical distribution of phenotypes in those members of the population possessing one genotype as opposed to another genotype. The array of genotype-specific phenotypes may be perfectly correlated with the environment in which individual members of the single-genotype population live, or their distribution may have to be ascribed at least in part to random, internal developmental events. In either case genotypes create norms of reaction, and it is the ensemble of norms of reaction in the responses of individual organisms that determines social structure. When culture is added, history becomes an additional very important contributor to phenotypic variation. The structure of any particular society, that is, its position within the extended norm of reaction, cannot then be predicted precisely without a specification of at least part of its recent history. Yet the influence of culture and history is far from total; the full range of variation is not infinite and equiprobable. As I have pointed out, the social behavior of man is in many respects mammalian and primate, occupies only a small section of all the social behaviors that have evolved, and is to some degree explicable from first principles in evolutionary biology.

As the chain of physical events from RNA transcription to

behavioral response grows and finally reaches its greatest length in the case of human culture, it might seem at first intuitively obvious that the norm of reaction will widen and in this sense the genes lose control, to be superseded by something else — by socialization, for example. But the very opposite can equally well occur. The lengthening of a chain of command can entail the addition of feedback loops and homeostasis, resulting in developmental canalization and a consequent narrowing of the norm of reaction. In fact, there is no aprioristically determinable relation between the complexity of the causal sequence and the variability of the phenotype. The final product can be kept narrowly constrained, as in the human facial expressions used to denote basic emotions, or it can be vastly diversified, as in human languages. It is even conceivable for a species to evolve that transmits huge amounts of complex information entirely by culture, yet is entirely constrained genetically so that only one set of information is transmitted by very rigid procedures that cannot be altered except through further genetic evolution. Only a more detailed knowledge of the developmental sequence can explain how one behavior is rigidly canalized and the variability of another is amplified. And only a reconstruction of the genetic evolutionary history of the species can tell us *why* such differences exist.

PHILOSOPHICAL CONSEQUENCES OF COMPARATIVE SOCIAL THEORY

Despite the existence of relatively minor genetic variations among individuals and populations, it seems well established that there is a universal, biologically based human nature. Of equal importance, this nature can be analyzed to considerable depth and will eventually be well understood at the following two levels: the level of proximate causation, which is being addressed by the neurosciences, endocrinology, and genetics, and the level of ultimate causation, which is the subject of human evolution and socio-

biology. This being the case, ethical philosophy itself needs to be repeatedly examined and revised in a way that takes into account advances in biology.

The usual distinction made between deontology and consequentialism appears to be obsolete. Innate moral imperatives exist in the form of learning rules and the brain-reward system.[9] It is probable that the imperatives were more nearly fully adaptive for the hunter-gatherer societies that lived during the major era of genetic evolution. They could be followed blindly. For this reason, a Paleolithic hunter would not have understood a modern philosopher's distinction between deontological and consequentialist criteria. With the advent of literacy, technology, and the modern state, many of the imperatives were no longer adaptive. In the case of proneness toward ethnocentricity, xenophobia, territoriality, moralistic aggression, and unfettered reproduction, they have become dangerous. Most modern difficulties arose from the attempt to solve unprecedented problems with a Pleistocene apparatus. It is natural that philosophers who did not understand the origin of this dilemma should invent and stress the dichotomy of deontology and consequentialism.

For the same reason the naturalistic fallacy is much less a fallacy than previously supposed. It is true that innate ethical feelings do not automatically constitute good impulses. What was genetically adaptive in the Pleistocene can be maladaptive today. More importantly, we might conceivably agree to base moral judgment on criteria having nothing to do with genetic fitness. To do so would be to recognize implicitly that what *is,* in this case the biologically analyzable innate ethical precepts, need not be translated into a proposition of what *ought* to be. But I doubt that we will ever make such a shift, for the following basic reason. If the materialist view I have supported in this essay is correct, the moral precepts are species-specific and constitute our ultimate guides. They are the essence of humanity. They will have to be played somewhat like a musical instrument, with some parts

stressed to produce results of great beauty and pleasure (by terms of the human limbic system) and other parts sublimated or averted. But long-term defections from the innate censors and motivators of the brain can only produce an ultimate dissatisfaction of the spirit and eventually social instability and massive losses in genetic fitness.

Let me cite several examples of ethical attitudes toward sexual behavior that are subject to modification by even our present rudimentary understanding of human sociobiology.[2] The primary functions of sexual behavior are pair bonding and the creation of genetic diversity, rather than reproduction *per se.* Thus the sexual revolution, but not promiscuity, is in concert with the innate learning rules. A second inference: families and kin recognition will retain high priority and continue to erode egalitarian communal experiments, however loftily conceived. And another: homosexuality may have a genetic component. Its high frequency of occurrence in all societies could easily have arisen by kin selection and hence be as fully "natural" as heterosexual behavior. Suppression of homosexuals on the grounds that they violate natural law in any modern sense cannot be justified. And still another inference: incest is evil (this word can be used without embarrassment) by almost any conceivable standard, since it leads to a demonstrably high level of developmental abnormality due to the increased incidence of homozygosity of lethal and subvital genes. Furthermore, incest avoidance is based on an innate psychological learning rule in the case of brother–sister mating, and possibly other forms of mating, and the culturally transmitted incest taboos of particular societies can be viewed as reinforcements of learning rules. The chain of causation thus runs from natural selection induced by inbreeding depression to the evolution of genetically based learning rules to the cultural reinforcement of these innate but poorly comprehended tendencies.

Even in its earliest, relatively untested form, sociobiological information cuts across political ideologies and disproves the

claim that materialist views of human nature are simply mirror images of the political ideologies of the observers.[10] It demonstrates the relative imprecision and poverty of subjectivism, imperativism, and transcendentalism in ethical philosophy. Some persons still appear to believe that ethical precepts will eventually become self-evident because they are the pure kernels of a universal order existing apart from biological history. Like the indignant Kierkegaard, they reject the "mere butcher-apprentices'' who wish to dissect ethical thought. But this is the same attitude that sustained vitalism and Lamarckism long after the physical sciences had restructured cell biology and genetics and closed the chasm between the material and the living.

If the materialist view is correct, mankind faces three dilemmas that are the inevitable consequence of our emergence into civilization. The first is that we have no place in particular to go. There is no transcendental guide or extrasomic set of universal principles to follow. However sublime we believe our own emotional thought to be, we are not programmed to do more than respond to yesterday's exigencies (civilized termites, incidentally, would not think of our emotions as sublime or as anything but bizarre). The second dilemma is that we must select our future values by picking and choosing among the innate censors and motivators of the brain on the basis of value guides that are themselves among those very same censors and motivators. The third dilemma lies far in the future but should be considered in order to visualize the species' evolutionary trajectory in the manner of comparative social theory. It is evident that by genetic manipulation we can, over many generations, change human nature into something else. But, again, the choice of the new direction —and the more elementary choice of whether to take *any* new direction —must be made on the basis of innate prescriptors that are the mechanical products of our past genetic history.

Uncompromising scientific materialism has turned the naturalistic fallacy into the naturalistic paradox. One solution to the

problem is simply to deny naturalism, to insist on a dualistic separation of material, neural process and higher mental activity. If the laws of consciousness exist apart from those of the natural sciences, including neo-Darwinism, then the paradox turns back into a fallacy and the larger question of the meaning of human existence is indefinitely deferred. Perhaps, however, metaphysical dualism can be refuted by a simple thought experiment. We now know that human cognition and social behavior are species-specific in virtually all categories and even narrowly restricted in comparison with animal species in some of the categories. We also know that this restriction can be altered by mutations, and in some cases the precise forms of the biochemical and neural mediation have been identified. Now consider an experiment in which the fiber tracks and rates of transmission are rearranged so as to produce new patterns of cognition, new forms of recall and association, new reward systems, new learning rules, and new forms of reveries —in other words, the brain is rearranged to produce a new species of mind.

Stuart Hampshire is a philosopher who chooses not to defend metaphysical dualism but sequesters the social sciences and humanities permanently on the basis of what he considers to be their irreconcilably different spheres of interest. "The central incoherence in the idea of sociobiology," he writes, "arises at the junction of explanation which, serving different purposes, cannot be welded into a continuous whole . . . . It is important that one should not see this irreparable break as a division in reality, but rather as a division between two divergent sets of human interests, both irreplaceable interests."[11] But what I am suggesting, and what to my knowledge no one has rebutted, goes beyond the distinction made by Hampshire. It is that the interests of the mind in matters of social theory and art are themselves products of organic evolution, based on neurophysiological process, species–specific in all but the purely abstract informational content, and subject to scientific materialist explanation. It is through the bio-

logical analysis of the mind of the philosopher and artist that science and the humanities will be welded together, without lost of content or importance to either. Above all, I do not see how we can hope to fashion an enduring, universal human morality without the kind of knowledge of human nature that scientific analysis alone can supply.

From the beginning Charles Darwin knew that something of this kind must be the case. As soon as he conceived of the idea of evolution by natural selection, in 1838, he jotted down in his note book: "Origin of man now proved — Metaphysics must flourish— He who understood baboon would do more toward metaphysics than Locke." [12]

NOTES

[1] Vercors (Jean Bruller), *You Shall Know Them,* Rita Barisse, trans. (Boston: Little, Brown, 1953).

[2] Much of the evidence of genetic constraint on social behavior in the human species has been reviewed in E. O. Wilson, *On Human Nature* (Cambridge: Harvard University Press, 1978); Martin Daly and Margo Wilson, *Sex, Evolution and Behavior* (Scituate, Mass.: Duxbury Press, 1978); D. G. Freedman, *Human Sociobiology: A Holistic Approach* (New York: Free Press, 1979); N. A. Chagnon and W. G. Irons, eds., *Evolutionary Biology and Human Social Organization* (Scituate, Mass.: Duxbury Press, 1979); and G. W. Barlow and James Silverberg, eds., *Sociobiology: Beyond Nature / Nurture?* (Boulder, Colorado: Westview Press, 1980).

[3] See reviews in E. O. Wilson, *On Human Nature;* D. G. Freedman, *Human Sociobiology;* G. E. McClearn and J. C. DeFries, *Introduction to Behavioral Genetics* (San Francisco: W. H. Freeman, 1973); Lee Ehrman and P. A. Parsons, *The Genetics of Behavior* (Sunderland, Mass.: Sinauer Associates, 1976); also Ronald S. Wilson, "Synchronies in mental development: An epigenetic perspective," *Science* 202 (1978): 939–48; and D. E. Comings, "Pc1 Duarte, a common polymorphism of a human brain protein, and its relationship to depressive disease and multiple sclerosis," *Nature* 277 (1979): 28-32.

[4] D. G. Freedman, *Human Sociobiology.*

[5] See D. C. Johanson and T. D. White, "A systematic assessment of early African hominids," *Science* 203 (1979): 321–30.

[6] See S. Fred Singer, ed., *Is There an Optimum Level of Population?* (New York: McGraw-Hill, 1971).

[7] The beginnings of a theory of gene-culture coupling have been provided by L. L. Cavalli-Sforza and M. W. Feldman, "Models for cultural inheritance: I. Group mean and within group variation," *Theoretical Population Biology* 4 (1973): 42–53; F. T. Cloak, "Is a cultural ethology possible?" *Human Ecology* 3 (1975): 161–82; W. H. Durham, "The adaptive significance of cultural behavior," *Human Ecology* 4 (1976): 89–121; and P. J. Richerson and Robert Boyd, "A dual inheritance model of human evolutionary process I: Basic postulates and a simple model," *Journal of Social and Biological Structures* 1 (1978): 127–54.

[8] The best-understood segments are at the molecular end leading to enzyme formation, the relation of the simple neuromuscular structure to fixed-action behavior, and the relation between individual behavior and social structure. More poorly understood are the molecular processes of tissue and organ development, and the relation of the structure of the central nervous system to learning.

[9] For a review of learning rules see M. E. P. Seligman and J. L. Hager, eds., *Biological Boundaries of Learning* (Englewood Cliffs, N.J.: Prentice-Hall, 1972). For a review of the rapidly advancing research on the brain-reward system, see Aryeh Routtenberg, "The reward system of the brain," *Scientific American* 239 (November 1978): 154–64.

[10] See especially Marshall Sahlins, *The Use and Abuse of Biology* (Ann Arbor: The University of Michigan Press, 1976).

[11] "The illusion of sociobiology," *New York Review of Books,* October 12, 1978.

[12] Charles Darwin, M Notebook, page 84, 16 August 1838, in H. E. Gruber and P. H. Barrett, *Darwin on Man* (New York: Dutton, 1974).