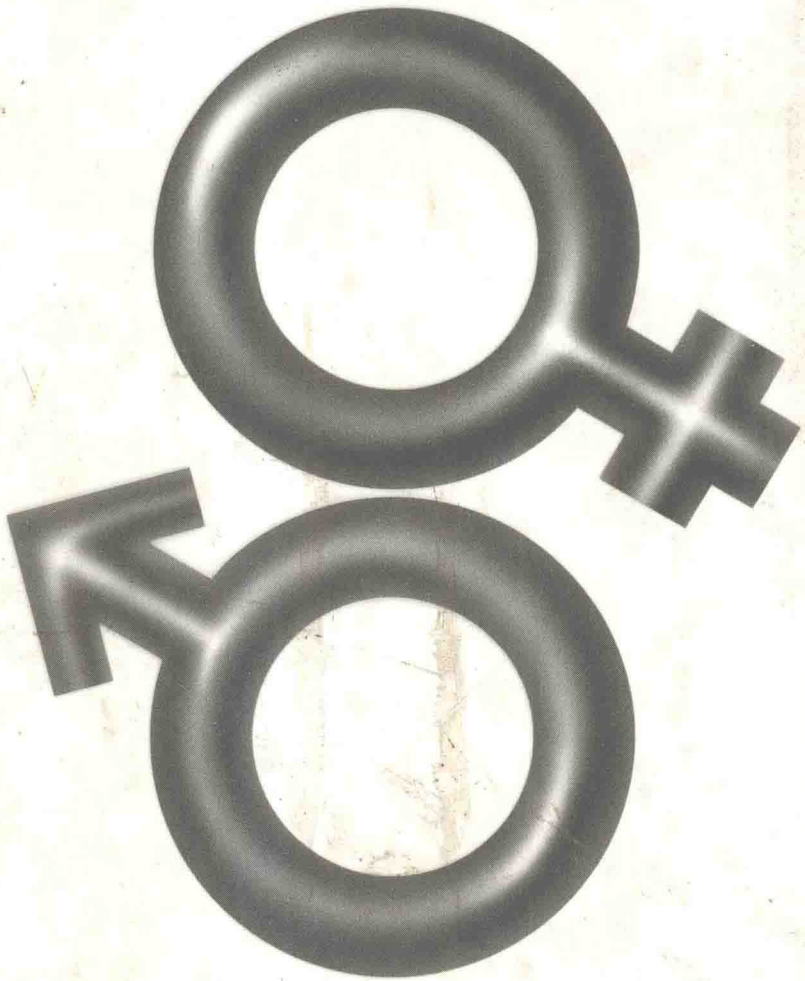
HUMAN SEX DIFFERENCES

A PRIMATOLOGIST'S PERSPECTIVE



G. MITCHELL, Ph.D.

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G. Mitchell, Ph.D.
Department of Psychology
University of California, Davis
Davis, California

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A Primatologist's Perspective

To My Brothers

Bruce Gordon Mitchell (Buzz)
John Philip Mitchell (Jack)
Roland Earl Mitchell (Rollie)
Mark Scott Mitchell (Mark)

Preface

I wrote this book in the Fall Quarter of 1979 while teaching a course entitled "The Psychology of Sex Differences." My intention was to develop a book which presented a broad and unbiased view of primate behavioral research as it applied to the subject of sex differences. This book has a companion volume by the same publishers entitled "Behavioral Sex Differences in Nonhuman Primates" which I also wrote. Both books are inventories or registers more than they are *integrative* reviews.

I wish to thank the many people who were of help throughout my academic development and the development of this book. George M. Haslerud and Harry F. Harlow, my academic advisors, have always been encouraging. William A. Mason, Donald G. Lindburg, and Robert Sommer have enlightened me concerning methodology in laboratory research, primate field studies, and human social behavior respectively. Joe Erwin, Nancy Caine, John Copp, Jody Gomber, Terry Maple, Bill Redican, and Barbara Sommer, all former graduate students under my supervision, have influenced my thinking on the current topic significantly. Terry Maple, in particular, has been focal in initiating the present project and in encouraging me to complete it.

Finally, I would like to thank my children and Patricia A. Jones who are always patient and helpful when I'm in the midst of a relatively long-term project. I would also like to thank Jacci Leger for an excellent and prompt typing service.

G. MITCHELL

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Contents

1
Biological Perspectives

A biological perspective on sex or gender differences means different things to different people. To some it implies resorting to the use of instinct as an explanatory principle. To others it may mean an emphasis upon hormones and/or upon suggestions regarding neurological differences. To still others it may imply an inordinate reliance upon evolutionary mechanisms as explanations for differences between males and females. Many feminists respond with horror at the mention of the word sociobiology (Wilson, 1975). The tack of the current deliberation does not depend on any single one of these, and, in fact, decries the inclination to espouse biology alone (of whatever ilk).

We, as a species, are characterized, even by some sociobiologists, as being organisms which have escaped from the control of the selfish gene. An understanding of biological principles, even of sociobiological principles, is necessary for a well-rounded explanation of what we know (or think we know) about human gender differences. We should know something about sociobiology if only to defend ourselves against its *possible* use in explaining away cultural determinants. There is more to our need than this, however.

SOCIOBIOLOGY AND GENDER

One of the best texts concerning sociobiology and gender is one by Daly and Wilson (1978). These authors explain sociobiological principles without making unwarranted claims concerning its use for

Homo sapiens. They point out, quite simply, that sexual reproduction is extremely important in evolution and that evolution has produced many different kinds of sexual behavior. Because sexual behavior is necessary for our own evolution to have occurred, it would seem that any understanding of the two sexes *must* include an understanding of natural selection. But a knowledge of natural selection alone is not enough. Knowledge of the ultimate adaptive significance of behavior and of evolutionary history must be supplemented by knowledge of physiology, developmental processes, self-awareness, culture, and other more proximate information.

Natural selection is a phenomenon involving gradual changes leading to more successful ("fit") genes. By success we mean reproductive success. Individuals differ in reproductive success and different *behaviors* differ in reproductive success. According to sociobiological theory, evolution, through natural selection, is a continuing process of producing organisms with "strategies" which serve to ensure or increase reproductive success.

Sexual reproduction itself is a result of evolution. Compared with asexual reproduction, it has advantages and disadvantages. Its main advantage over asexual reproduction is in the fact that it produces offspring (individuals) with greater interindividual genetic variability. Ultimately it produced *Homo sapiens,* a species which shows marked interindividual genetic variability *and* a degree of self-awareness or consciousness that changes the differences between individuals in ways which sociobiology has yet to explain. Each and every one of us is unique genetically, but then so are monkeys. Each and every one of us, however, has a unique self of which we are aware. Monkeys do not (although apes have the rudiments of self) (see Gallup, 1977). On the other hand, we are all easily classified, sometimes unjustly, into either the male or the female category. How are such categories defined?

Hampson and Hampson (1961) have listed seven different ways to define sex or gender. They are as follows:

1. sex of assignment
2. chromosomal sex
3. gonadal sex
4. hormonal sex
5. sex of internal accessory organs

6. sex of external genitalia
7. psychological sex (gender role)

Psychological sex may differ from assigned sex in individuals who are designated and reared as one sex but are psychologically inclined to be of the other sex (as in transexualism). It is obvious that the gender dichotomy is not a simple one. It is perhaps better defined as a continuum.

In sexual reproduction, more is involved than sexual behavior itself. In order to reproduce a new generation successfully, that new generation has to mature and reproduce itself. Sociobiologists deal with the whole process of replication through the use of several concepts. One of these is the concept of *parental investment.*

Among many mammals females generally invest far more time and energy in the rearing of each individual offspring than do males. Males, on the other hand, fight and die in order to inseminate females who are hardworking. Males, in most cases, are not as selective as are females in regards to a choice of a mate. There are, as always, exceptions to this general principle, both at the species level and at the individual level. Our purpose here is to simply define the sociobiological concept of *investment.*

In some cases males invest nearly as much or even more than do females. They are as selective as are their mates and/or they invest as much time and energy into each offspring. Often, in these cases, monogamous mating systems have evolved. Mating systems (e.g., monogamy, polygyny, polyandry) are the products of differing ecological variables, preadaptation, taxonomic constraints, and mating strategies.

Parental strategies differ just as do mating strategies. Each parent behaves to maximize reproductive success. To do this, he or she must raise offspring that also reproduce themselves. In some species, males do not participate in infant care, in others they do. In a few, the male is the primary caretaker because it is the best strategy for him in terms of improving his chance of getting his genes into the next generations. The mother, the father, and the offspring each have a strategy and frequently these strategies are not in agreement.

Sociobiological research on reproduction, including sexual behavior and infant care or parenting, has seldom included investigations of physiological or proximate developmental processes. Male

and female physiologies differ in ways which often mesh with what one might expect on the basis of sociobiological theory, however. Physiology differs most when mating strategies and mating systems differ most. Anatomy has a similar correlation with mating strategy. Sexual dimorphism in size is often minimal in monogamous species.

Sociobiology deals with the ultimate (as opposed to proximate) causation of behavior. That is, sociobiology is more interested in the adaptive significance of behavior through evolution. We know, however, that more proximate developmental processes also influence behavior. The body, brain, and behavior of mammals develop in a masculine form, for example, if androgens are present in the individual's bloodstream early in life. If androgens are not present, female development results. Hence, physiological and early proximate developmental processes have organizing effects on body, brain, and behavior. In addition, children develop sexual identities and acquire sex roles through cultural processes often slighted in sociobiological treatises.

Even though sociobiology does *overemphasize* genetic determinants, many human behaviors and attitudes seem to be consistent with sociobiological predictions that we behave to maximize our genetic fitness. The concept of *inclusive fitness* has been particularly intriguing in analyses of human behavior. Inclusive fitness is . . . "the sum of an individual's fitness as a result of personal reproductive success and that of relatives weighted according to their coefficients of relatedness to the focal individual" (Daly and Wilson, 1978). From the point of view of the genes themselves, it is as important to help one's sibling as it is to help one's child. Inclusive fitness is a concept that improves upon personal reproductive success in explaining behavior genetically. What is being selected for is the gene's effect on its own numerical increase. Clearly then, assistance to kin can be adaptive. The more genes the focal individual and the relative have in common, the greater the selective advantage.

Marriage patterns, love and jealousy, birth spacing, birth control, infanticide, incest avoidance, and sexual behavior itself are often at least superficially consistent with sociobiology's investment and inclusive fitness predictions. Adult human males try to control women in order to prevent cuckoldry. Women select mates who command resources. The point made by sociobiology is that people have evolved in much the same ways as have other animals, at least up until we became more self-aware, linguistic, and culture-dependent.

Evolutionary biology should therefore have something to offer the sciences of human behavior. As Daly and Wilson (1978) suggest:

> . . . emphases upon the reproductive consequences of behavior should be essential to an understanding of the specializations and adaptations of any species, including our own (p. 330).

Many sociobiologists go beyond this to affirm that morality and justice (and other distinctly human traits) evolved from our animal past and are rooted in our genes. They insist that without a consideration of evolutionary biology, concepts of morality and justice cannot be understood. It is at this juncture that some sociobiologists have implied that political science, law, economics, psychology, psychiatry, and anthropology will all become mere branches of sociobiology (Wilson, 1975).

The sociobiologists believe that it is not the *individual's* fitness that matters, it's the fitness of the genes themselves. The DNA sequences exist to protect themselves. This theory helps explain human altruism. According to the sociobiological approach, altruism is genetic selfishness, totaling up the genetic costs or benefits of helping out relatives who have many of the same genes. Organisms appear to behave as though they understood the underlying genetics. In evolutionary terms, sex is the focal point in life. The aim of all individuals is to get as many genes as possible into the next generations at the lowest cost.

Antisociobiological comment has come from Marxists, feminists, psychologists, and primatologists, among others. It is true that the discipline is long in theory and short on real proof. (Also, political misuse of genetic theories is dangerous.) The best arguments against sociobiology, however, concentrate on its failure to recognize the importance of the emergence of the human brain, consciousness, and culture.

BIOLOGICAL SEX DIFFERENCES

Few people doubt that there are at least *some* biological sex differences. However, the search for them has often been rooted in myth and prejudice. The search for evidence for a biological role in sex differences in general intellectual ability is an example of this. There is no good evidence for differences of this type. On the other hand

there *is* reasonable evidence that sex differences in aggression are in part biologically influenced, as are differences in visual-spatial ability. However, experience can and *does* modify the genetic components of these traits and *drastically* alters their form (Deaux, 1976).

OUR PRIMATE HERITAGE

People are primates. Primates have, surprisingly, retained many of the generalized or primitive characteristics of the first mammals, particularly in regards to aspects of the skeletal structure and limbs. Primates, for example, have a mobile set of five grasping digits on the hands and feet, the digits having sensitive tactile pads and flattened nails rather than claws. Most primate forms have a reduced muzzle length, binocular vision, and a decreased sense of smell relative to other mammals. In correlation with the reduced muzzle they have fewer teeth.

Most important, however, primates have undergone a remarkable elaboration of the brain, particularly of the cerebral cortex. Associated with this change is a trend toward longer gestation, fewer infants per birth, greater nutrition for the fetus prenatally, and a prolonged dependency of the infant following birth. Bipedalism developed in the hominid line and, in conjunction with changes in the brain, language, consciousness, and culture evolved (Napier, 1967).

The living primates include 200 or so different species categorized into genera, families, and suborders, etc. Their diversity in terms of structure, size, behavior, ecology, and mating systems is truly incredible. We will refer to eight major types of living primates in our coverage of gender and behavior:

1. Prosimians (literally, premonkeys)
   A primitive suborder of primates showing extreme variability from species to species.
2. New World marmosets and tamarins
   Relatively primitive monkeys which live in monogamous family groups in which the father is the primary caretaker of infants. These species often show few if any sex differences in behavior.
3. New World cebids
   Monkeys which show great variability in social structure, in physical dimorphism and in sex differences.

4. Old World arboreals
   These are monkeys which are primarily leaf-eaters who live in the trees (e.g., langur). Sex differences vary.
5. Old World terrestrials
   These include the well-known macaques and baboons among others. Sex differences are pronounced.
6. Lesser apes
   These are not monkeys but retain monkeylike characteristics. They are monogamous and locomote by swinging through the trees via brachiation. They show few sex differences.
7. Great apes
   There are four species of great apes: the common chimpanzee, the pygmy chimpanzee, the gorilla, and the orangutan. There are sex differences here.
8. *Homo sapiens*

As we progress through the material on gender and behavior we will refer to members of each of these major primate groups. There is species variability within each group and each species, but some generalizations can be made at each level concerning sex differences (cf. Mitchell, 1979). We will start with sex differences in size and bodily structure and proceed toward differences in ability, achievement, and even consciousness. This comparative primate perspective may help us to see what kind of biological perspective might be most useful in our understanding of ourselves.

REFERENCES

Daly, Martin and Wilson, Margo. *Sex, Evolution and Behavior.* North Scituate, Mass: Duxbury Press, 1978.

Deaux, K. *The Behavior of Men and Women.* Monterey, CA: Brooks/Cole, 1976.

Gallup, G.G. Self-recognition in primates: A comparative approach to the bidirectional properties of consciousness. *American Psychologist,* 1977, 32, 329-338.

Hampson, J.L. and Hampson, J.G. Ontogenesis of sexual behavior in man. In Young, W.C. (Ed.) *Sex and Internal Secretions,* 3rd ed. Vol. II Baltimore MD: Williams and Wilkins, 1961.

Mitchell, G. *Behavioral Sex Differences in Nonhuman Primates.* New York: Van Nostrand Reinhold, 1979.

Napier, J.R. and Napier, P.H. *A Handbook of Living Primates.* New York: Academic Press, 1967.

Wilson, E.O. *Sociobiology: The New Synthesis.* Cambridge, MA: Harvard University Press, 1975.

2
Sexual Dimorphism: Phylogenesis and Ontogenesis

PHYLOGENESIS

Sexual reproduction, as opposed to asexual reproduction, produces diversity. Because of this diversity, sexually reproducing organisms have an advantage over those which do not sexually reproduce. If two sexes convey an advantage over one, why not three or more? Some fungi, in fact, have hundreds of sexes, but the two-sex system is the most prevalent because it is the most efficient (cf. Wilson, 1978).

In the two-sex system, the female manufactures the egg, the male makes the sperm. When the egg and sperm unite, a newly assembled mixture of genes results.

Anatomical differences between the male and female sex cells can be extreme. For example, the human egg is 85,000 times larger than the human sperm. A woman can produce only 400 eggs in her lifetime, with only about 20 of these resulting in infants. A man produces 100 million sperm with each ejaculation. It is little wonder that the woman has been assumed to have a greater investment in each of her sex cells. According to sociobiologists, conflict of interest between the sexes results directly from this primary sexual dimorphism (Wilson, 1978).

> It pays males to be assertive, hasty, fickle and undiscriminating. In theory it is more profitable for females to be coy, to hold back

until they can identify males with the best genes. In species that rear young, it is also important for the females to select males who are more likely to stay with them after insemination (Wilson, 1978, p. 125).

Before we can discuss behavioral differences we must examine anatomy. Anatomy has developed in accord with sociobiological principles in the primates, including humans. Sexual dimorphism in size has developed in most nonhuman primates. Reasons given by primatologists for this development have included: (1) A need for an optimal distribution of biomass (physical size); (2) Adaptation to the hazards of terrestrial life; (3) Tendencies toward larger species size and fewer offspring per litter; (4) Selection for fighting ability and strength in males to make them better adapted in competition with other males of their own species; (5) Selection for increased fighting ability and strength in males for group protection regardless of environment (terrestrial or arboreal); and, (6) Selection for increased attractiveness to females in males. Probably no one single factor can account for the size differences seen in all species.

Among the nonhuman primates, the most primitive show some sexual dimorphism in the expected direction. In the tree shrews, lemurs, bushbabies, and other prosimians, males are usually only slightly larger than the females.

Among primitive monkeys, like marmosets and tamarins, there is little or no sexual dimorphism. Females and males are, on the average, the same size. This is also true of some cebids (titi monkeys and night monkeys). However, in these two groups (marmosets and tamarins; titi monkeys and night monkeys) there is monogamy and the male invests as much in parental behavior as does the female.

The other groups of nonhuman primates to show minimal sexual dimorphism in size are the lesser apes—the gibbons and the siamangs. While the males of these two lesser apes do not display the quantity of parental investment displayed by the primitive marmoset and tamarin males, they *do* live in monogamous families in which they protect one female and her young (also his young).

All of the rest of the diverse species of nonhuman primates show physical sexual dimorphism in size to some degree. Among the rest of the South American monkeys, spider monkey and squirrel monkey males are only slightly larger than their female counterparts, but howler monkey males are substantially larger and heavier. All of the South American monkeys are arboreal. Living in the trees does