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Towards a More Dynamic Model For The
Origins of Human Sex-Roles

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Abstract

This paper analyzes human sex-role differences from an interdisciplinary perspective. The nature vs. nurture and functions vs. conflict debates are reexamined in light of cross-cultural regularities in sex-roles. Recent research into the biological causes and functions of behavioral sexual dimorphism is critically surveyed. The nature-function and nurture-conflict perspectives are combined, and a more dynamic model of the evolution of sex-roles is proposed. The model attributes the evolution of sex-roles from nonhuman primates societies to human hunter-gatherers to extensions of basic sex-role differences explained in turn by biological considerations. The subsequent evolution of sex-roles and deterioration in the status of women are explained from a conflict theoretic perspective. Some implications of the model for questions of current interest in social policy are also discussed.
Preface

This paper aims to synthesize several approaches to the study of sex-roles. Its coverage is broad, but (I hope) integrated. It does not attempt a comprehensive survey of the various literatures drawn upon, but tries to outline the basic arguments of each and to discuss how they contribute to our understanding of sex roles. Whenever possible, I have given references to more comprehensive surveys of the relevant literature.

The paper cites both original papers and surveys or expositions of these papers that I have found particularly useful. In some cases I have referred the reader to a secondary source to find the exact reference to primary sources. This reflects mostly the constraints on my time and ability to dig out all the original contributions. But it also reflects the fact that in some cases, particularly when reading outside the areas with which I had reasonable prior familiarity, I have found the expository, less technical, materials more informative.

In my efforts to understand, criticize and integrate the various literatures I have incurred a lot of intellectual debt. My greatest debt is to three of my professors, Carol Barnes, Thomas Ramsbey, and Hugh Gilmore, who have guided my research on this subject at one point or another.

I am grateful to Carol Barnes for guiding me through the initial phase of this paper, and for excellent comments on an earlier draft—one of which gave the paper an entirely new direction. But my debt to Carol goes beyond this paper. She, and Richard Fidler, converted me to anthropology with their fascinating "introductions to anthropology" course which I had taken "just to get rid of the social science requirement." Their support understanding and warmth have sustained me through a difficult period of adjustment, and turned them into role models that define the word "anthropologist" for me.
If it were not for professor Ramsbey, I would have banished all hope of ever understanding role theory upon my first attempt to read Parsons. In addition to teaching me Sociology Dr. Ramsbey has closely supervised my reading of the studies of sex-differences in temperament and abilities by biologists and psychologists. I am grateful to him for giving so generously of his time and insights while advising on preparing an earlier version of this paper presented at the Eighth New England Undergraduate Research conference in Sociology. I am also indebted to the conference coordinator, Professor Josephine Ruggiero and her colleagues at Providence College, for giving a big boost to my confidence and encouraging me to continue with the project.

Hugh Gilmore has been my advisor for preparing the current version of the paper as an honors thesis submitted to the department of anthropology. He has supervised a complete revision of everything I had written before, and has guided me adding new material on primate social behavior. His advice has also been invaluable in integrating the different approaches discussed in the paper. But, I have an even greater debt to Hugh (and one that relates to his contribution to this and, I hope, my future papers) for teaching me how to write. I hope his patients and persistence in showing me how to argue points and how to link them to each other are reflected in the final product.

I am also grateful to George Epple and Ellen Ginsburg for their encouragement and advice. Ellen Ginsbury, Patricia Hays and members of honors committee, professors Lindquist, Murray, and Morenon, made many useful comments on earlier drafts of this paper for which I am most grateful.

Needless to say, my advisors and professors do not share the blame for
remaining errors and short commings.

Finally, I would like to thank my husband, Behzad. He has graciously taken charge of all "domestic production" and performed both the "instrumental" and "expressive" roles in our family while I was concentrating on this paper. His sense of humor, understanding, and support have been more valuable than ever to me during this period. No woman who has seen the cross-cultural evidence on sex-roles could fail to appreciate him.
**Introduction**

With the emergence of the Women's Movement in the past two decades has come a renewed examination of the origins of sex-differences in temperament, abilities, roles and status. Scholars, scientists, politicians, and legislators have begun anew to debate the relative contributions of the socialization process and the heredity endowments which affect the lives of all higher animals. Contributions to the scholarly literature have come from many fields. Anthropologists, sociologists, psychologists, embryologists, physiologists and zoologists have each contributed their distinctive insights to a better understanding of the issues involved. Many old confusions have been cleared as a result of these endeavors, and many new questions have arisen.

Cross-cultural comparisons of sex-differences in roles and tasks seem to reveal a remarkable stability (Stephens, 1963). Regularities in the division of tasks within the family are not confined to obvious sex-differences in biological capabilities and limitations (ibid.:281). Nor are the cross-cultural regularities restricted to the division of labor; in most known cultures, women are "dominated" by men according to various measures of status and power (ibid.:288-296).

Existing theories of the origins of sex-differences in roles, temperament, abilities and status can be characterized according to the position they take on two controversial issues: namely, the nature vs.
nurture controversy and the function vs. conflict debate. The former centers on the relative significance of biological (e.g. Tiger, 1969) and sociocultural (e.g. Mead, 1949) factors in the determination of sex-differences in temperaments and roles. The function-conflict debate concerns the extent to which sex-role differences reflect the mutual interests of men and women as members of the family unit (e.g. Parsons and Bales, 1953) or their conflicting interests as adversaries in a power struggle (e.g. Collins, 1971; Firestone, 1971).

Although the nature-nurture and function-conflict debates may be considered independently, they are intertwined when it comes to explaining the observed cross-cultural regularities in sex-differences in temperament, status, roles and abilities. In particular, a solely functionalist explanation of these cross-cultural regularities would be inadequate for explaining why a particular sex-role pattern should be functional in societies with diverse ecologies and cultural heritages. Additionally, if some behavioral sex-differences were to be explained solely from a nurture perspective, we would still need an explanation of why they exhibit so little variability across cultures. For example, if women are not "naturally" inferior to men, why are the latter consistently observed to dominate the former?

During the last two decades, two major research areas, originating in biology and directly relevant to the nature-nurture debate, have developed. One area consists of studies which link male and female sex hormones to some traditionally "masculine" or "feminine" traits of character in both animals (e.g. Bronson and Desjardins, 1968; Goy and Phoenix, 1971; Keverne, et al., 1982), and human beings (e.g. Ehrhardt, et al., 1968; Kreuz and
Rose, 1972; Money, 1976; Diamond, 1976; Imperato-McGinley, et al., 1979; Danchin, 1983). The other area consists of theoretical and empirical research on the functions of sexual dimorphism (both behavioral and physical) and dominance hierarchies (e.g. DeVore and Washburn, 1963, Trivers, 1972; Goss-Custard, et al., 1972; Wilson, 1975).

The purpose of the present paper is to re-examine the nature-nurture and function-conflict debates in the light of this recent biological research into the causes and functions of behavioral sexual dimorphism. The analysis is intended to be dynamic: the proposed model will trace the evolution of sex-role patterns, and the discussion will emphasize interactions between nature and nurture. Although most social scientists would probably agree that both biological and sociocultural factors affect sex-role patterns, the nature of the interactions between these two sets of factors has received relatively little attention. The major attraction of a dynamic approach is that it discriminates between those sex-role patterns which are responses to environmental pressures and those which reflect discrimination against women.

The following discussion is presented in four sections. Section one gives a brief overview of observed behavioral sex-differences and their cross-cultural regularities. It also briefly describes the basic elements of the nature-nurture and function-conflict debates. Section two surveys the recent research into the biological causes and functions of behavioral sexual dimorphism. Section three reexamines the nurture-conflict perspective in light of the findings discussed in section two. Finally, section four combines nature-function and nurture-conflict perspectives, proposes a more dynamic model of the evolution of sex-role differences,
considers the implications of these ideas for some current problems of social policy, and concludes the paper.

1. The Issues

In contemporary American society, "women are characterized as passive, dependent and emotional in contrast to men, who are considered aggressive, active and instrumental. How can these differences be explained? Are women 'naturally' more passive, or are they taught to be more passive? Are men inherently more aggressive, or does our society socialize men into more aggressive roles?" (Weitzman, 1979:153)

The relative significance of biological and sociocultural determinants of observed sex-differences in temperament and abilities has long been debated by many social scientists. Before discussing this question, it would be useful to review briefly some of the sex-differences which have actually been documented by researchers.

Some evidence (e.g. Maccoby and Jacklin, 1974) suggests that sex-differences can already be detected in infancy and early childhood. In particular, boys are characterized as more aggressive, more active, more peer-oriented, and less social, than girls. But, contrary to what is traditionally alleged, there is no consistent evidence that female children are more nurturant, more dependent, more timid, more emotional, or less selfish than males. In older children, and adults, sex-differences in verbal and spatial-mathematical abilities are observed. Females appear to be "field dependent"; they score lower than males on tests that require abstraction from the given context (such as identifying geometric figures hidden in a picture). They score better than males on tests of verbal ability. Adult males perform better than females in all tests involving
mathematics, but there is some evidence (Weitzman, 1979:180) that girls do better than boys in mathematics courses until they reach high school.

Proponents of the nurture position attribute sex-differences in temperament and abilities to sociocultural factors, and emphasize the plasticity of human nature. They maintain that innate (biological) differences in the abilities of the sexes are of little significance for most existing sex-role patterns.

Among anthropologists, advocates of this position have documented the existence of cultures where traditional Western sex-roles, or beliefs about sex-differences in abilities and temperament, are reversed. Perhaps, the best known study in this category is Margaret Mead's (1935) ethnography of three neighboring tribes in New Guinea (discussed further in section four below).

In it, Mead argues that "the potentialities which different societies label as either masculine or feminine are really potentialities of some members of each sex, and not sex-linked at all... (and proposes that we)...abandon the kind of artificial standardization of sex-differences that have been so long characteristic of European society, and admit that they are social fictions for which we have no longer any use." (Mead, 1935:313)

In sociology, proponents of the nurture position have documented differential socialization of males and females by parents, schools, and institutions. (For an excellent survey of this literature, see Weitzman, 1979.) These studies suggest that sex-role socialization, in the form of differential treatment by the mother, is already present and affects infants' behavior at the age of six months. This socialization intensifies during early cognitive years and leads to the expression of sex-role preferences consistent with gender as early as the age of five.
The evidence referred to above, that some sex-differences can be detected at an early age, does not, however, necessarily imply that these differences have biological origins. Furthermore, advocates of the nurture position argue, some of the evidence on sex-differences is based on studies whose designs are subjective and "sexist" to begin with. (See Schaffer, 1981:46-70, for further discussion and references.) For example, it is argued (e.g. Tobias, 1982) that women in the U.S. are socialized to associate mathematics with the male role and not to excel in hard science areas. Therefore, tests of intellectual ability which involve mathematical reasoning are biased and favor the male perception of the world. In this connection Weitzman (1979:180-181) refers to evidence that women’s performance on standardized intelligence tests is significantly improved when problems requiring primarily mathematical or geometric reasoning are replaced by problems (involving identical steps and computations) which deal with "feminine" subjects like cooking and gardening.

The literature on sex-role socialization clearly indicates strong associations between sociocultural factors and observed sex-differences in abilities and temperaments. However, this evidence by itself does not prove that sex-role differences are artificial social constructs or reflect useless "social fictions" about differences between males and females. A basic contribution of functionalists to role theory is their argument that the value systems and status-role patterns that underlie socialization cannot be treated as independent variables in macro-sociological analysis. Rather, the role expectations which result from internalized norms and values should be viewed as channels of control, through which the social system coordinates and "integrates the (potentially conflicting) actions
and motivations of its members (Parsons, 1951). So, from a functionalist point of view, it is not sufficient to point to evidence of differential treatment of the sexes in existing patterns of socialization. We should instead try to understand the basic forces which have led to these patterns themselves. The observed association between patterns of socialization and behavior does not necessarily imply a direction of causation running from the former to the latter.

The extreme functionalist position (Parsons and Bales, 1953) views the nuclear family as a "social system" which requires both an "instrumental" orientation in dealing with the outside world and an "expressive" orientation for "tension management" within the system. The two orientations complement each other and are both crucial to the stability of the family, but impose contradictory requirements on behavior. The instrumental orientation requires goal seeking, problem solving, aggressiveness and dominance. The expressive orientation requires subtlety, compliance, flexibility, expression of emotional support, and ability to reconcile the conflicting motivations of different family members. These conflicting requirements make it functional for one parent to specialize in expressive roles and the other in instrumental roles. Parsons and Bales do not advance a universally compelling reason for assigning expressive roles to the mother and instrumental roles to the father. They claim, however, that this is the usual pattern of sex-role division in the contemporary American family.

The Parsons and Bales theory has been attacked on many fronts (see Hochschild, 1973, for references). Its most controversial implication is that career women acting as part-time mother-homemakers will face "role
conflict" due to the conflicting orientation requirements of their instrumental and expressive roles, and create a dysfunction for the family.

Turning from contemporary American society to cross-cultural evidence, a new source of challenge to the extreme nurture position seems to arise. Namely, if sex-role assignments were reflections of social fictions about sex-differences in abilities and temperament, we should expect to observe random variability in sex-role patterns prevailing in different societies. In fact, the existing cross-cultural evidence does suggest that there is nothing universal about Western sex-role patterns. However, the evidence also points to some remarkable "regularities" (i.e. patterns, which though not necessarily universal, recur too frequently to be attributed to chance) across cultures. It is interesting (Stephens, 1963:281) to note that regularities in the division of tasks within the family are by no means confined to what can be attributed to obvious sex-differences in biological capabilities and limitations.

For example, not only do women bear and raise the children (as their biology would dictate) but they also do almost all of the grain grinding, water carrying, and cooking performed around the globe, tasks which men are equally capable of performing. In 119 out of 138 cultures included in Murdock's sample (see, for example, Stephens, 1963:283), women always carry the water, in another 7 cultures they usually do. Similarly, in addition to metal working, weapon making, and hunting, men have an almost exclusive cross-cultural monopoly in the manufacture of musical instruments. They always do it in 45, and usually do it in 2, cultures of the 48 included in Murdock's sample (ibid.:282).
Cross-cultural regularities are not restricted to division of labor within the family. Women are often excluded from public gatherings (ibid.:271) and honorific jobs and offices (ibid.:288). They are usually subject to more severe sex and restrictions than men (ibid.:290). Wife-to-husband deference customs are practiced in many societies. Husband-to-wife deference customs, on the other hand, are quite rare (ibid.:292). Finally, in most societies women are generally dominated by men in making collective decisions about settling disagreements, and are usually expected to "obey" men (ibid.:296).

In a survey of cross-cultural regularities in sex-differences in temperament, at least one item stands out: men are more aggressive and violent than women. Institutionalized aggression is almost exclusively associated with men. With the possible exception of a group in Dahomey women do not seem to have an actual fighting role in any documented past or present culture (Weitz, 1977:11-12). John and Beatrice Whiting and their colleagues have conducted perhaps the most extensive and rigorous cross-cultural studies to date. They have studied six cultures in Mexico, Kenya, India, Japan, and the Philippines (see, for example, Konner, 1982a:112-113, 1982b:57). Their results suggest that the girls in one culture may be more aggressive than the boys in another. But within each culture, boys show greater egoism and greater aggressiveness than do girls.

The amazing empirical regularities, across cultures that for the most part have not been in contact with each other, obviously invite theoretical speculation about their common cause. The kind of speculation which would seem to go well with a functionalist view of sex role socialization is one emphasizing biological determinants of sex-differences in abilities and
temperament. The kind of speculation which would seem consistent with the nurture position is one that emphasizes systematic discrimination against women. These two lines of theoretical speculation will now be briefly discussed.

Perhaps the most outspoken advocate of biological determinism in the study of sex-roles is Lionel Tiger (1969). He claims that certain sex-role differences had been crucial for the survival of our ancestors during the "hunter" stage of human social history. These differences evolved in response to selective environmental pressures and were genetically transmitted from generation to generation. Since females in early societies would normally be pregnant or nursing their infants most of the time, they could not typically participate in the hunt. This unavoidable biological fact has resulted in a basic sex-division of labor, with women becoming involved in child care and men specializing in hunting and/or fighting. Other sex-role differences claims Tiger, are extensions of this basic sex-division of labor. In particular, he believes, that men found it necessary to "bond" together for the purposes of hunting and defense. Selection favored groups whose males were strongly attached to each other emotionally because bonding increased the group's chances of survival in case of danger. Once the males were bonded in this way, according to Tiger, it was natural that they stick together and exclude females not only from defense and hunting but also from making collective decisions and government. As a result, selection has favored men who were self-confident, lead effectively, and had high goal orientation and problem solving abilities. Women, who have not been subject to similar selective pressures, have not developed these masculine traits of character. Tiger also presents some
empirical evidence on how men continue to bond together and exclude women 
from major societal decisions even in the most egalitarian contemporary 
societies. He concludes that, although societal factors may play a small 
part in establishing sex-role differences, bonding is the primary reason 
for the high status of men and the low status of women.

Theories based on systematic discrimination against women rely on a 
"conflict" perspective. They begin by observing that the struggle for 
power is a "zero-sum" game (Collins, 1971) - i.e. more power for one sex 
directly implies less power for the other sex. So, in pursuing their self-
interest, individuals are always led to attempt to dominate and exploit 
other individuals. Men are in a better position to gain both access to and 
control over strategic resources for two reasons. First, in any power 
struggle they have the option of resorting to force. Second, women's 
energy, more so than men's, is channeled into reproductive activities 
(Firestone, 1971).

Systematic discrimination and exploitation can be institutionalized 
only if the group with a disadvantage in a power struggle can be clearly 
defined according to its role. This is precisely the case with women 
because they specialize (for historical reasons and because of child-care) 
in "domestic production." Their exploitation is reflected in the fact that 
although they contribute to "social value" through the reproduction and 
maintenance of male labor power, they are not rewarded directly for their 
services (which therefore have "use value" but no "exchange value"). This 
fact makes women dependent on men economically and leads to male supremacy. 
(See, for example, the introduction to Hunt, 1980, for references.)

Prevailing sex-role patterns and differential socialization of women,
according to this view, emerge to perpetuate the economic dependence of women on men and to maximize "surplus value" (i.e. the difference between women's contribution to social value and the exchange value of their output) by preventing the transfer of female labor from domestic production to industrial production.

The empirical evidence pertinent to the "exploited female hypothesis" will be discussed in section three after a more careful examination of the biological determinants of sexual dimorphism is presented in the next section.

2. Biology and Behavior

Biological determinants of individual and social behavior, in human beings and other animals, have been studied extensively during the past two decades. The research in this area can be divided into two major categories. First, there are studies of the "proximate causes" of specific behavior patterns (e.g. aggressive or nurturant behavior) or abilities (e.g. verbal or spatial abilities) at the stimulus-response level. Second, there are studies of the "ultimate causes", referred to as "functions" by ethologists (Daly and Wilson, 1978:9), of certain patterns of individual or social behavior at the level of adaptive significance. The studies in these two categories will be reviewed in turn.

Proximate Causes of Sex-Differences in Aggression, Nurturance and Intellectual Abilities

A rapidly growing number of recent studies have reported strong links between male and female sex hormones and some aspects of behavior and
temperament. For example, Gieszejekiewicz (1979) reports a mood cycle, including regular periodic changes in behavior in the form of general excitability, in a female grey capuchin monkey which could be attributed to the animal's ovulation cycle. There is also evidence (see, for example, Konner, 1982a:118) that the menstrual cycle leads to a mood cycle in human females.

By far the most frequently studied link in the literature is the link between male sex hormones and aggression. For example, Michael and Zumpe (1978) have reported an annual cycle of aggression in captive male rhesus monkeys, which coincides with both the cycle of aggression exhibited by the animal in the wild and with the annual cycle in the release of plasma testosterone (a male sex hormone) in his body. Further evidence confirming some relationship between testosterone and aggressive behavior is provided both by laboratory experiments on animals and by "natural experiments" based on observing human psychosexual defects.

Recent studies of some animals indicate that during a certain "critical period" the presence of androgens (male sex hormones) in the blood permanently affects the brain. These sex hormones and brain differences seem to cause aggression in laboratory experiments.

In rats, the "critical period" occurs within the first four days after birth (see, for example, Daly and Wilson, 1978: 231-236). During this period the presence of testosterone in the blood seems to have a "masculinizing" effect on the hypothalamus (part of the upper portion of the brain stem which plays a major role in regulating the interaction between the brain and the body). The effect is called "masculinizing" because male rats castrated early in this period will not copulate as adults even if
they receive injections of testosterone later, while males castrated after the end of this period will copulate in adulthood in response to injections of testosterone. Aggression is therefore linked to masculinity by evidence that the presence of testosterone in the blood during this critical period also seems to regulate aggressive behavior. (see, for example, Bronson and Desjardins, 1968; Hinde, 1974:281-282; Kinner, 1982a:121-122.) Unlike normal males, or males castrated after the end of the critical period, male rats castrated in this period do not respond to later injections of androgens by increased fighting (nor do female rats). Moreover, female rats injected with testosterone early in the critical period exhibit aggressive behavior (e.g. increased fighting in response to later injections) and sexual posturing usually associated with males.

Among primates, the critical period is prenatal, but the irreversibility of the effects of sex on the brain have been questioned by some researchers (e.g. Levasseur and Allais, 1981). Nevertheless, experimental studies do suggest that prenatal exposure to androgens has behavioral effects. For example, Goy and Phoenix (1971) have found that prenatal administration of testosterone to female rhesus monkeys results in behavior patterns (e.g. rough play) commonly observed in males but not in normal females.

In another study referred to by Konner (1982a:120-121) rhesus monkeys raised in total isolation until the age of three were individually placed in a room with an infant monkey (of randomly selected sex). Female three year olds were found to take care of the infant more often, while males were found to hit the infant more. These observed sex-differences in nurturant and aggressive behavior cannot be attributed to any kind of
learning (because the animals had been raised in isolation). Also, the level of sex hormones in circulation at the age of three is insignificant. The only remaining explanation of the observed sex-differences in behavior would seem to be in terms of the prenatal effects of sex hormones on the brain.

In human beings, it is suspected that prenatal exposure to testosterone has a masculinizing effect on the hypothalamus, but this is more a scientific conjecture than an established fact (Tanner, 1978:57). Sex hormones also play a key role during a second stage of sexual differentiation at puberty. In particular, it seems probable that sex-differences in muscle size and physical strength after puberty are related to sex hormones (ibid.:75). Male sex hormones are believed to induce biochemical and structural changes in the muscle cells which lead to greater strength per gram of muscle in males.

The possible link between biological factors and aggression in humans has been studied in a number of projects based on "natural experiment" — i.e. observation of individuals with genetic defects.

One such study used data on prison inmates, asking whether pathological violence may sometimes be attributable to the "super-male" (XYY) syndrome — a genetic disorder whose victim has an extra male (Y) chromosome. (See Weitz, 1977:19-21, for references.) Some studies suggest that victims of XYY syndrome constitute a significantly larger fraction of the male population among inmates than in society at large. Other studies seem to indicate that the fraction of XYY inmates convicted of violent crimes is higher than the same fraction for normal male inmates.
Some inmate studies have concluded from the above evidence that the "super male" syndrome causes violent behavior. However, this conclusion remains controversial (Boelkins and Heiser, 1970; Weitz, 1977). For one thing, there is evidence that the fraction of males with an extra female (X) chromosome, the XXY cases, is also higher in prisons and mental institutions than it is in society at large. So, a more appropriate interpretation of the evidence might be that "genetic abnormalities may lead to deviant behavior" instead of "masculinity leads to violence." Moreover, the designs and executions of many inmate studies have been attacked in subsequent research for not being sufficiently rigorous.

Nevertheless, there are a number of carefully designed and executed studies which seem to link androgens to aggressive behavior. For example, the research of Kreuz and Rose (1972) finds a negative correlation between testosterone level and the age of the first arrest among male inmates (i.e. those with a higher testosterone level had been arrested younger). Overall, on the basis of a few careful studies and the volume (if not quality) of other studies all pointing in the same direction, the prison studies are considered at least suggestive that aggressive behavior is somehow related to androgens (Konner, 1982a:119, 1982b:59; Weitz, 1977:21).

Another category of "natural-experiment" studies the behavior and character traits of girls who have been exposed to male sex hormones prenatally either because of genetic defects or because their mothers were taking special medications during pregnancy. For example, a genetic defect known as the adrenogenital syndrome (AGS) results in defective adrenal glands which release excessive amounts of an androgen. (See, for example, the introduction to Beach, 1976; Daly and Wilson, 1978:243-246; Weitz,
In females suffering from AGS, there is a masculinizing effect on the external genitalia at birth. In some cases their biological sex is not correctly diagnosed and they are assigned the masculine gender. Some of these girls have been presumed to be boys until puberty when their femininity became evident. In some cases, if sex is correctly diagnosed at birth the abnormal external genitals can be surgically corrected and hormone therapy can be used to correct for the excessive presence of androgen. However, the androgen received prenatally may have had a masculinizing effect on the brain.

The effects of this prenatal exposure to androgens on behavior have been studied by Ehrhardt et al. (1968). Their subjects were females suffering from AGS whose biological sex had been correctly diagnosed and appropriate treatment (i.e. hormone therapy, surgery, etc.) started at an early stage. These girls were found to have a high chance of being "tomboys." Compared to normal girls, they showed higher preference for playing with boys' toys, less interest in caring for babies and in future marriage, more interest in outdoor activities, and more definite plans for a future career. These results are confirmed in several other studies. (For references, see Daly and Wilson, 1978:243-246; Weitz, 1977:47-48). To control for possible effects of family upbringing, some studies have compared girls with AGS to their normal sisters. To examine the possible spuriousness of the association between androgens and behavior, some studies have concentrated on girls who are genetically normal, but have been prenatally exposed to androgens because of medications taken by their mothers during pregnancy. All of these studies strongly support the hypothesis that females exposed prenatally to androgens exhibit some of the
behavior and character traits which are traditionally attributed to males, in American culture.

Of course, as Money (1976:75) points out, it is difficult, if not impossible, to ascertain that the observed behavior patterns are "caused" directly by androgens and not by ambivalent sex-role socialization or lack of identification with female gender - attributed, in turn, to the conscious or subconscious effects of the abnormality of genitals at birth.

The evidence linking androgens to "masculine" behavior would be much more convincing if it could be based on males affected by AGS. The disorder does not result in abnormality of the external genitals in males, however. Therefore, the above questions regarding differential socialization or lack of gender identification do not arise. Actually, there is no evidence that males suffering from AGS are more aggressive than their normal brothers, though there is evidence that they are more active and show higher interest in sports. (For reference, see Weitz, 1977:48.)

One research area of particular interest concentrates on cases where biology and socialization contradict each other - i.e. individuals whose biological sex and assigned gender differ for some reason. The existing evidence comes mostly from observation of human hermaphrodites. Hermaphroditism is a condition of prenatal origin in which a baby is born with the sexual anatomy improperly differentiated (e.g. females suffering from AGS). In the cases where the external genitals are involved, the baby may be assigned a gender which is opposite its biological sex and may be socialized accordingly.

Money's (1976) case studies (discussed in section four below) document cases where the socially imposed gender identity has successfully dominated
the individuals' biological sex. There are, however, also well documented cases (Diamond, 1976; Imperato-McGinley, et al., 1979) where the opposite has happened.

One case (Imperato-McGinley, et al., 1979) involves a genetic defect, recently discovered in the Dominican Republic, where male infants were born as pseudohermaphrodites with female-appearing external genitals. Some were assigned the female gender and raised as girls. However, these subjects had testosterone levels in the normal range both at birth and at puberty and are, therefore, considered "unique models for evaluating the effect of testosterone, as compared with a female upbringing, in determining gender identity" (ibid.:1233). Out of 38 affected males, 18 were unambiguously raised as girls. Of these, 17 successfully readjusted to the reassignment of gender - which was called for by their physical changes during puberty - with no apparent lasting psychological problem except certain insecurities attributed to the abnormal appearance of their genitalia. Of the 18 subjects, 16 showed satisfactory performance in a variety of male-roles and seemed to enjoy their male status. The authors emphasize that successful reassignment of gender occurred without any intervention by a physician. They conclude that the effect of testosterone on determination of gender identity overrides the effect of their having been reared as girls.

The evidence discussed so far in this section seems to suggest that some alleged masculine traits of character - especially aggressiveness - are to some extent related to the prenatal effects of male sex hormones on the hypothalamus. There have also been hints in this evidence that nurturance may be a feminine trait. The effects of estrogens and progestins (female sex hormones) on the hypothalamus and nerve cells are only beginning to be
understood (Pfaff and McEwen, 1983). But experimental results seem to indicate that these hormones play a role in triggering maternal behavior.

For example, about 50 percent of nonpregnant ewes injected with these hormones have been found to show maternal behavior toward alien newborn lambs (Keverne et al., 1982). If in addition, the ewes are stimulated vaginally for a few minutes, fostering increases to 80 percent of the attempted cases. Finally, immediately after giving birth, ewes, as well as other female animals, have been observed to adopt alien newborns without any need for hormone injections. So, immediately after giving birth, the biological factors that trigger nurturance seem to be naturally present.

As to other alleged sex-differences in temperament or abilities, there is so far little evidence of biological determinism. Some recent research, however, seems to suggest that observed sex-differences in verbal and spatial abilities may be related to sex differences in hemispheric asymmetry of the brain (Danchin, 1983). It is suggested that the low levels of testosterone in females permit greater asymmetry in the brain in favor of the left hemisphere - which is suspected to govern verbal abilities - at the expense of the right hemisphere - which is thought to play a major role in perception of space. On the other hand, the high levels of testosterone found in males slow down the asymmetric growth of the left hemisphere and lead to poorer verbal ability combined with a better perception of space.

There is some controversial evidence that females exposed prenatally to excessive androgens have higher than average IQ levels, thus apparently linking intelligence to androgens (see Weitz, 1977:47-49, for references). But there is also evidence that they do not have significantly higher IQ
levels than their normal siblings and parents. That is, for some unexplained reason, these normal siblings and parents also have higher than average IQ levels.

At any rate, even if it is found that girls exposed to excessive androgens are more intelligent than average, one could conclude that intelligence is related to "cross-sex typing" rather than to masculinity. There is, in fact, some evidence that analytic thinking, creativity, and high general intelligence are linked to cross-sex typing, that is, boys with 'feminine' interests and girls with 'masculine' ones." (Hochschild, 1973:1015).

Overall the evidence on biological origins of sex-differences in any intellectual abilities seems inconclusive. The major findings of the literature surveyed in this subsection seem to be that males are biologically predisposed to more aggressive and females to more nurturant behavior.

Functions of Male Aggression, Female Nurturance, and Dominance Hierarchies.

Sociobiologists have studied the adaptive significance of patterns of social behavior among nonhuman primates and other animals. Their research is of interest for understanding the biological origins of human social behavior because it seems likely that our ancestors have faced the same environmental pressures as other terrestrial primates. The social behavior of modern humans may, in many ways, be linked to our ancestors' adaptive responses to these environmental pressures. But these links are difficult to study directly because they are blurred by our culture and socialization, and because our advanced survival technology enables us to
break the links, contradicting our environmental pressures and our biology in many ways. By contrast, other species of terrestrial primates in existence today provide an opportunity for direct observation of optimal social strategies for a particular environment. Understanding these optimal strategies may give us clues about the evolution of sex-roles in human societies.

For example, terrestrial primates spend much time in open country, away from trees. Unlike arboreal primates, their young and their females (particularly pregnant ones or the ones with infants) cannot immediately take refuge in the trees. They may often find themselves too far from the nearest tree and may have to rely on the adult males for protection. Multi-male groups may have evolved in open country habitats in response to this need for protection, because they have better chances of survival (DeVore, 1963). Similarly, groups with big aggressive males would seem to have an advantage (i.e., a better chance of survival) over those without.

The emergence of males, rather than females, in the role of protectors might seem advantageous for at least two reasons. First, females would have been inefficient and unreliable protectors because their physical strength and aggressiveness would have been diminished during pregnancy and early child care. Female protectors would expose the group to considerable risk, because the group's defensive force would change unpredictably through time due to pregnancies. Second, the typical group would probably require a relatively small number of protectors. It would also require a relatively small number of male members to fertilize the females, while also requiring many females for fast reproduction. The protected females would not be under environmental pressures to grow stronger or more
aggressive. Rather, group advantage would lie in having smaller female members capable of moving about quickly and with low ratios of food intake to reproductive potential.

It might also be advantageous for the group if there were dominance hierarchies among males on the basis of their strength. The dominant males would take precedence over females and lower ranking males when food is limited, and would, therefore, be the most likely to survive a famine. They would also have special mating privileges. For example, they might frequently act as consorts to the females at the height of estrus, the period when the females are sexually receptive. Such patterns of social behavior would ensure that the strongest males have better chances of surviving and contributing to the gene pool of future generations. It seems also possible that in the process of acquiring these functional privileges, the dominant males would acquire other privileges (in selection of sleeping sites, grooming and being groomed, etc.) which may or may not have direct functional significance for group advantage.

The theory outlined above is quite similar to Tiger's (1969) theory about the environmental pressures that have led to bonding among males in early hunting societies. Strictly speaking, neither theory is based on a satisfactory evolutionary foundation, because they are both formulated in terms of the "advantages" of certain patterns of behavior for the group rather than for individuals. That is, they are based on a "group selection" argument (Wynne-Edwards, 1962) postulating that natural selection operates not only through differential survival of individuals, but also through differential survival of groups. It will be argued below that the theories of male aggression and dominance hierarchy outlined above
can, in fact, be restated in terms of a more satisfactory evolutionary hypothesis, namely, "kin selection," while Tiger's bonding theory cannot. But before turning to this argument a short digression into sociobiology seems in order.

The logical possibility of Wynne-Edwards' "group selection" hypothesis is acceptable to many sociobiologists (e.g., Wilson, 1975). It is conceivable that certain groups of animals have better survival chances than other groups because their members perform "altruistic" acts like protecting other group members. But the empirical relevance of group selection is seriously questioned (e.g., Maynard-Smith, 1976). First, evolution by group selection requires differential survival of groups with different characteristics, and inevitably the extinction of the least fit groups. But group extinction is not actually observed frequently enough in nature to qualify group selection as a viable explanation of observed evolution. Secondly, unless entire groups become extinct due to selfish behavior of some members, selection operating within each group would work to eliminate the altruistic individuals because they, by definition, would behave to the detriment of their own survival chances more often than the selfish individuals.

According to the currently accepted formulation of Darwin's theory, selection favors characteristics that maximize an individual's contribution to the gene pool of succeeding generations (Williams, 1966). One implication of this formulation is to shift the focus of the analysis from the survival of individuals or groups to the reproductive success of individuals and to the "gene selection" hypothesis (i.e., the differential fitness of different genes represented by their ability to replicate
themselves). An extension of the gene selection hypothesis is what Dawkins (1976) calls "the selfish gene" principle. According to this principle, both individual selfishness and individual altruism should be explained by gene selfishness. That is, altruism can make no sense at the level of genes because altruistic genes cannot replicate themselves as successfully as selfish ones. But certain selfish genes may replicate themselves successfully by causing the individual to behave altruistically. Such altruistic behavior may be to the individual's detriment but to the genes' advantage because, for example, it may increase the survival chances of other individuals who carry the same genes.

So, altruistic behavior towards offspring and kin may be selected as being worth the loss of the altruist's fitness from the genes perspective. This is the principle underlying Hamilton's (1963) argument that selection favors behavior patterns that increase the individual's "inclusive fitness." The principle has been extended by others (e.g., Wilson, 1975) and is commonly referred to as "kin selection." In species where individuals cannot recognize their kin, and group members are on average closely related (i.e., share a significant fraction of the same genes) kin selection may favor indiscriminate altruism toward all group members.

Returning to our theory about the evolution of the male protection role, aggression and dominance hierarchies, it is not difficult to restate the main arguments in terms of the "kin selection" hypothesis. Males will protect the group, not because they have the group's advantage "in mind," but because of the gain in inclusive fitness that results from protecting their kin. Aggressive males are likely to be more successful in protecting their kin. Therefore, aggression is a selected trait in males. However,
females, too, have an inclusive fitness interest in protecting their kin. (The explanation of sex-differences in aggression cannot be based on kin selection alone without invoking sex-differences in reproductive strategies discussed later in this subsection.) Dominance hierarchies can be explained by the potential costs of contesting access to food, females, sleeping sites, etc. (Clutton-Brock and Harvey, 1976). Low ranking individuals "accept" their low rank because the potential gains from contests with high ranking individuals do not justify the costs of time, energy, and risks of interactions.

But male bonding seems difficult to explain in terms of inclusive fitness. Selection within male groups will favor those who have selfish genes and protect their offspring and prospective mating partners rather than those who are merely competitors in the contest for access to females and reproductive success. This, of course, does not necessarily refute Tiger's (1969) empirical observation that human males bond. However, if such bonding exists, it should be explained by factors other than evolution and adaptive significance. This scepticism about Tiger's theory seems to be reinforced by the apparent lack of evidence that males of other species of terrestrial primates exhibit bonding. In fact, for any species, the commonly observed pattern is one of intense competition among males over access to females, aggressive interference with the copulations of other males, and in some cases killing the infants (born and in the womb) of other males after having successfully ejected the father from a dominant position in the troop. (Tutin, 1979b, Clutton-Brock and Harvey, 1976, 1978).
In fact, even for the theoretically acceptable formulation of the "male protection role," formulated above, the supportive empirical evidence is far from conclusive. In some baboon troops, a particular progression pattern has been observed and interpreted as a deterrent to predation (DeVore and Washburn, 1963; Popp, 1978). Upon hearing a predator alarm these baboons have been reported to assume a nearly straight line single-file with the alpha (i.e., most dominant) male located near the center together with females (particularly pregnant ones), infants, and perhaps other high ranking males. Low ranking individuals, particularly males, take places at the two extremes of the troop's line of travel. This progression pattern has been interpreted as evidence that the males at the two extremes are protecting the rest of the troop. The empirical validity of the progression hypothesis has been questioned by other researchers (e.g. Altmann, 1979; Harding, 1979) who have tested its assumptions in a field setting and have found no evidence in its support.

However, even if the empirical validity of the progression hypothesis were accepted, its interpretation as a deterrent to predation would seem to make little sense in terms of the kin selection hypothesis. First of all, the low ranking adult and subadult males who are hypothesized to protect the troop may have in fact little inclusive fitness interest in the individuals they are supposed to protect. This is obvious for the younger males, but also true for older males in many cases, because almost all of the adult males are immigrants and are likely to have few offspring in the troop. Second, the low ranking males would certainly have no inclusive fitness interest in protecting the alpha, and other high ranking, males who are also observed to travel toward the center of the line of travel.
Finally, neither the alpha male himself, nor the high ranking males as a group, who should theoretically have the greatest inclusive fitness interest in the troop, are in fact observed to take the alleged protective posts. To the contrary, they seem to seek the safety of the center.

The progression pattern of baboons can perhaps be best explained in terms of an extension of the standard selfish theory of dominance hierarchies (Clutton-Brock and Harvey, 1976). That theory would seem to predict that all individuals would benefit from gaining access to the safety of the center. However, low ranking individuals find it to their advantage to save time and energy by not risking encounters with the alpha male, or the high ranking males as a group, over access to central positions. Females with infants, on the other hand, would seem to have low costs of contesting access to central positions, because the alpha male has an inclusive fitness interest to support them in encounters with other individuals. This proposed explanation can be interpreted either at the genetic level or as "learned" behavior.

If the above explanation of the progression pattern is accepted we seem to be left with no evidence that males as a group protect females as a group. However, there is, evidence from several species that certain individuals, often, though not always, males, respond differentially to predators and defend the infants vigorously. They also defend other group members and interfere in prolonged and violent fights within the troop (see Bernstein, 1976:465). To establish the evolutionary significance of such behaviors we need to show that the protective individuals, usually the alpha male and other high ranking group members, have higher than average reproductive success. The evidence on this point is extensive but
inconclusive. (See Bernstein's 1976 survey; see also Tutin, 1979a; Packer, 1979.)

Protection and kin selection are not the only theoretically defensible frameworks for analyzing the functions of sexual dimorphism and dominance hierarchies. Another explanation is based on the concept of "reproductive strategies" (Trivers, 1972; Wilson, 1975). Gene selection leads each parent to distribute his/her available energy among the number of offspring that will maximize his/her inclusive fitness. For many species, the maximum number of offspring that the female can produce in her life time is smaller than what the male can produce. So, males can increase their fitness by mating with several females. Wilson (1975) has argued that this selection pressure for males to breed polygynously is strong, and some form of polygyny probably represents the primitive condition among mammals.

Assuming equality between the number of males and females in a population, sex-differences in reproductive strategies imply that males should compete with each other for access to females (Trivers, 1972). Selection will, therefore, favor qualities that are important for successful breeding competition (e.g. body size, horns, canines and aggressiveness) in males. The theory also predicts the establishment of a dominance hierarchy among males along the same lines as outlined above (Clutton-Brock and Harvey, 1976). In addition it predicts sex differences in nurturant behavior. The female's optimal reproductive strategy is to invest heavily in few offspring, while the male's optimal strategy is to invest less in each of a greater number of offspring.

Most primate species usually have one young at a time, perhaps because females are unable to collect enough energy or nutrients, during some stage
of the reproductive cycle, for more than one (or at most two or three) healthy infant(s) at a time, or because the parent is unable to carry several young at a time (Goss-Custard, et al., 1972). So, polygamy is likely to be the male's optimal strategy, in primates. It may also be to the female's advantage to breed polygynously with a dominant male, rather than monogamously with an inferior male, because this will increase the fitness of her offspring and because it will improve the reproductive chances of her male offspring.

Clutton-Brock and Harvey (1977) present evidence in support of Trivers' theory from a sample of 100 primate species. They use the ratio of average male to average female weight as a measure of (physical) sexual dimorphism, and the socionomic sex ratio (i.e. number of adult females per adult male in breeding groups) as a measure of inter-male competition. The two variables are highly correlated in the sample, as the theory would predict.

Another testable implication of the theory is that sex-differences should be reversed among polyandrous species. There is, in fact, evidence that this is true for polyandrous birds (Jenni, 1974). In high latitude, and particularly among tropical birds, polyandrous species exist in which one female forms either simultaneous or sequential pair bonds with more than one male. These species are characterized by large aggressive females. In most cases the small, subordinate males perform incubation and provide all parental care for the chicks. Sex-role reversals occur in most cases. For example, in the American jacana, the male stays mainly within a small territory and does not interfere in the relationship between his mate and his male neighbors. Females defend the territories of each of their
males against invasion by their other males. According to Jenni, (op. cit.) the jacana females are more aggressive than males and are able to dominate them in all situations.

Further evidence in support of Trivers' model is based on observed sex-differences in response to copulation and other sexual behaviors of conspecifics. At least for some species, females appear far less likely to interfere aggressively with other animals' copulations than males are (e.g. Tutin, 1979b), indicating, perhaps, that competition among males for females has significant behavioral effects as the theory would predict. In some species males which occupy a troop after ejecting the previous male(s) may attack and kill infants and force abortions in pregnant females, perhaps to remove potential competitors of their own offspring and ensure that the females of the group come quickly into estrus. (For references, see Clutton-Brock and Harvey (1976, 1978:294.)

Trivers' model seems strongly supported by the above evidence. However, as with the kin selection hypothesis the "intervening variable" which links environmental pressures to observed physical and behavioral patterns is reproductive success. If the model is valid, we should also expect the dominant males to contribute a disproportionately large number of offspring to the next generation. As was pointed out above, Bernstein's (1976) survey of the literature suggests that the empirical verdict on this point remains ambiguous. More recent evidence (e.g. Packer, 1979) continues to support the theory for some species, but not for others (e.g. Tutin, 1979a). This ambiguity of evidence might, in part, be due to the inherent difficulties of measuring reproductive success, and Trivers' theory might be considered strongly supported by the evidence despite the ambiguity.
To summarize, sex-differences in reproductive strategies seem to explain sex-differences in nurturant and aggressive behavior. Kin selection provides at least a theoretically acceptable explanation of differences between individuals in efforts to protect infants and other group members. In particular, it suggests that the alpha male, or high ranking males as a group, usually have the largest inclusive fitness interest in protecting the troop. It does not seem to suggest that males as a group will provide protection for females as a group. Neither theory, explains why males, or females for that matter, should "bond" and exhibit "sexist" behavior, nor does the evidence seem to support Tiger's (1969) claim for any nonhuman primate species. Finally, the high rank of the alpha and other combative males can be theoretically explained, but there is no reason why other males should dominate the females and we seem to have no clear evidence that they do.

3. Experiential Determinants of Behavior, Nurture, and Conflict

The discussion of section two has demonstrated that the extreme nurture position is untenable. Two questions remain, however. First, how significant are the biological determinants of behavioral sexual dimorphism? That is, is sex-typed behavior unavoidable, or can it be reversed by socialization? Second, what range of behavior patterns is determined or strongly influenced by biological differences? Can all sex-role patterns be viewed as natural extensions of the basic sex-division of labor that assigns child-care to the nurturant female and hunting or defense to the aggressive male? These two questions will be successively considered in the present section.
Experimental factors and "learning" are believed to have significant effects on behavior in all higher animals. In fact, even in rats, whose brain structure is relatively simple by the standards of many other mammals, aspects of behavior such as emotionality, exploratory behavior, food and water intake, seem to be affected not only by the animal's early experiences, but also by the early experiences of its mother or even grandmother. (For references, see Hinde, 1974:230-234.) There is also evidence that childhood experiences can modify a rat's brain (Konner, 1982a:60-61).

The effects of experiential factors on aggression have received considerable attention (e.g. Hinde, 1974:234-238, 284-288; Boelkins and Heiser, 1970:33-41; Konner, 1982a:196-201). In particular, rearing in isolation from other members of the species can have profound effects on subsequent aggressive behavior. The direction and duration of the effect seem to vary across species, but in primates isolation seems to increase aggression and to have long term effects.

Experience seems to affect aggression through the process of learning the costs and benefits of certain patterns of behavior. As Konner (1982a:198) points out, this is the principle underlying the training of some pets to behave aggressively. The effects of learning can also be observed in natural environments, particularly among primates. In several species, immigrant males seem to show indiscriminate aggression toward other males at first, but seem to learn later to avoid contests where they have little chance of winning. There is also evidence that individuals may learn to "assess" the costs of contests on the basis of their opponent's
likely response by "evaluating" the potential benefits of access to the disputed privilege to the opponent, in some species (e.g. baboons; see Popp, 1978).

Money's (1976) case studies of human hermaphrodites strongly suggest that biological sex can be dominated by a contradictor, socially imposed gender, as long as there is no ambiguity or ambivalence about the latter. In one case, a genetic female child suffering from AGS was thought to be, and raised as, a boy until age 12. In adolescence, she developed attraction towards girls. Although signs of her true biological sex (i.e. growing breasts, etc.) were becoming quite clear, she thought of herself as male. It was decided that the male sex assignment should be maintained and androgen therapy was administered.

Another case documented by Money (1976) involves a normal set of male twins. Because of accidental surgical loss of the penis during circumcision, one of the boys was reassigned the female gender by his parents. A vagina was created surgically before the age of two and female hormone therapy was planned for. Money reports that at age seven the reassigned twin has the typical behavior and tastes of a typical (or perhaps slightly tomboyish) girl.

The plasticity of human nature supported by Money's studies is the major theme of cultural relativists in anthropology. Although the cross-cultural evidence does not seem to suggest the random variability which would be predicted from an extreme nurturist perspective, it does seem to suggest that biological constraints on feasible patterns of behavior are rather loose.
This looseness of biological constraints is the main theme of Mead's (1935) study of three neighboring tribes in New Guinea. In one tribe, the Arapesh, Mead found that men and women both were gentle and unaggressive in their actions, and shared what we normally consider feminine traits of character. In a second tribe, the Mundugumor both sexes were fiercely aggressive and exhibited alleged masculine traits of character - women even exhibited dislike of children and very little nurturance. In the third tribe, the Tehambuli, women had many of what we call masculine traits (a matter-of-fact, efficient, way of going after their business, decisiveness, etc.) while men exhibited what we call feminine traits (self adornment, gossip, artistic interests). Moreover, the Tehambuli were found to retain some of the traditional Western sex roles (e.g. child-care by women) and some institutions commonly supposed to degrade women (e.g. polygyny and patrilineal organization) but it was the women who had the real position of power and ran the economy by fishing and marketing.

(It should be noted that the accuracy of Mead's report from her New Guinea fieldwork is disputed by others (Fortune, 1939; Gewertz, 1980). In view of this and recent controversies over the accuracy of her report from Samoa, associated with Freeman's (forthcoming) book (Leo, 1983; Freeman, 1983; Angier, 1983) it is perhaps worth pointing to other reports on cultures where traditional Western sex roles are reversed. Besides Tehambuli, there are at least four known cultures (Stephens, 1963:299-301) where wives seem to have a power advantage over their husbands and dominate men in economic and/or social spheres.

In a sense, the extreme nurture position is "robust" to the contradicting evidence presented in section two above, because it does not
claim that men and women are identical. Rather it maintains that existing differences between the sexes—such as men's greater physical strength and aggressiveness (which may be severe binding constraints on feasible sex-role patterns in primitive humans or in animals)—matter very little as far as modern humans are concerned: "now that law suits have been substituted for hand to hand encounters,...the difference in strength between men and women is no longer worth elaboration in cultural institutions." (Mead, 1935:313).

The problem with such statements is that they are too robust—almost irrefutable—and therefore have little empirical content. One strategy for giving empirical content to the nurture position would be to focus, not on arguing against the inevitability of biologically imposed patterns, but on the identification of other independent variables that have systematic effects on the status of women. This is the approach taken by many conflict theorists whose main empirical strategy is to document a relationship between the status of women and their economic independence in cross sectional samples where biology, presumably, is held constant.

Conflict, Exploitation, and the Status of Women

It is difficult to find arguments that relate all cross-cultural regularities in sex-roles to biology, or to extensions of basic sex-roles, in turn, explained by biology. For example, why are most prostitutes female, and why is it that even the minority who are male sell their services to other males rather than females (with some modern exceptions)? The answer, it would seem, has to do little with biology and much with economics; men have control over the disposition of surplus wealth; they
can back their desires for pleasure (whether heterosexual or homosexual) with ability to pay. Women have acquired some control over the disposition of surplus wealth only recently and in a limited number of societies. In these societies various forms of male prostitution serving females is rapidly developing in the form of professional male strippers, escorts, etc.

According to conflict theorists, since women invest more than men in reproductive activities, men have a better chance of monopolizing the wealth in all cultures (Firestone, 1971). To recoup some power, women have turned their sexuality into a resource (Collins, 1971) and have submitted to artificially imposed standards of accomplishment, such as beauty, romanticism, and selflessness, (Firestone, 1971).

If this theory is valid, we should expect career women to have higher status than homemakers within their families and to be less "feminine" by traditional standards. Although casual observation seems to confirm these conjectures, rigorous empirical investigation of power and status within the family runs into obvious problems concerning the objective, operational definition of the variables. In one outstanding study (Scanzoni, 1978) a representative sample of married American women were interviewed in 1971 and again in 1975. During the first interview respondents reported an issue that was conceptualized as regulated conflict, i.e. husbands were demonstrating greater power over these issues by maintaining the status quo against their wife's desires. During the second interview women reported on their bargaining strategies and on how the conflict was resolved. It was found, among other things, that career women (and generally those with more resources) were more likely to be more effective bargainers (i.e. got more of what they wanted) than traditional homemakers. Moreover, the
latter were more likely to have bargained on the basis of family well-being (i.e. with apparent selflessness) and the former on the basis of individualistic concerns or self-interest.

It has also been found that women's financial resources affect their ability to get their husbands to share child-care and strictly domestic duties (Scanzoni, 1978). The significance of economic resources for division of tasks and power within the family is also indicated by studies based on extensive interviews with a smaller number of respondents (e.g. Hunt, 1980). Such interviews also seem to indicate that women who specialize in "domestic production", i.e. homemakers, often do not consider themselves economically productive or entitled to a share of their husband's income. Because their output has no exchange value they fail to perceive its use value in economic terms, and therefore feel "guilty" about spending their husband's income according to their own needs and desires.

The cross-sectional comparison of financially dependent and independent women strongly supports the "exploited woman" hypothesis. However cross-sectional evidence poses a major problem of interpretation. Namely, given a random distribution of talents among the women in a given society, one might expect to observe the most talented to show the greatest accomplishment economically and the highest achievements in interpersonal relationships both within and outside the family unit. So the observed relationship between economic status and power within the family may be spurious. In fact Scanzoni's (1978) evidence does show that a woman's education and family background significantly affect her attitude toward sex-roles (on the egalitarian-traditional spectrum). This attitude in turn is highly correlated both with economic accomplishments and with power within the family.
To avoid the problems of interpreting cross-sectional evidence, the following section proposes to examine the evolution of sex-roles through time. The implicit assumption here is that biological constraints on human behavior do not change through time in such a way to require a decline in the status of women. In fact, if anything, male aggressiveness would seem likely to lose some of its functional significance through time and childcare would seem to become less demanding as average (i.e. per female) birth rate falls. So declines in the status of women through time are likely to reflect exploitation. On the other hand, exploitation, by definition, cannot arise in a society with no surplus wealth - in such societies there is no incentive to discriminate against women because there is no significant surplus to be divided between the sexes. So, sex-role patterns that have appeared early in human history, and obviously those present in other primates, are most likely to reflect functional biological constraints.

4. Towards a More Dynamic Model

This section proposes a dynamic model of the evolution of sex-roles (see figure 1 below for a summary sketch of the model) and discusses some of its implications.

It seems likely that the observed sex-differences in aggressive and nurturant behavior in contemporary humans reflect the adaptive responses of our ancestors to environmental pressures. They probably found it advantageous to breed polygamously, and this gave rise to sex-differences in reproductive strategies. Women found it advantageous to invest heavily in relatively few offspring and therefore selection favored more nurturant
females. Men, on the other hand, had to compete with each other for access to women and, therefore, aggressiveness and physical strength were selected male characteristics.

It is beyond the scope of the present discussion to speculate about the origins and consequences of the evolution of monogamy in some human societies. However, since monogamous species (e.g. gibbons) show little sex-difference in body size, aggression, or parental investment, it seems worthwhile to speculate about why these sex-differences may have persisted in monogamous humans. First, by evolutionary standards the history of human social life is rather short. So, even though selection, in monogamous species, favors males who are as nurturant as females and not any more aggressive modern humans may continue to show the residues of traits which were functional for their polygynous ancestors. Second, inherited culture may perpetuate traits which have lost their functional significance. For example, physical sexual dimorphism may persist, despite the lack of emphasis on hunting or combat in modern societies, because women have culturally inherited a taste for physically strong men in their choice of mates.

Also, as terrestrial primates, our ancestors may have evolved by kin selection to protect their offspring. Kin selection seems to have implications for early humans that differ in some respects from its consequences in species who cannot recognize their kin. Among the latter, dominant males with significant inclusive fitness interest in the troop are likely to protect all the infants. Low ranking males may have smaller interest in protecting the infants because the probability that the particular infant in danger is their's is low. Among humans, however, a
male can recognize his kin and has no genetic interest (in terms of inclusive fitness) in defending individuals who are not related to him. So low ranking males cannot rely on high ranking ones for protection of their offspring. Also, each male has an incentive to protect prospective mating partners because emotional bonds resulting from such protection are likely to lead to sexual favors and improved reproductive success.

Sex-differences in reproductive strategies and the need for protection have led to a basic sex-division of labor with females occupied principally by child-care and males by hunting, weapon making and protection. Child-care is a more demanding task in humans than other primates: the larger head-size of babies necessitated by greater brain capacity, and the narrower pelvis of the mother necessitated by the upright posture require birth at an earlier stage of growth, and thus prolonged child-care. Furthermore, basic sex-role differentiation may have intensified in hunter-gatherer societies because hunters have to travel long distances, often daily, in search of their hunt (Gough, 1971).

It is not difficult to imagine how the basic sex-division of labor might be extended to areas unrelated to child-care and hunting. In a society with no effective birth control and primitive technology, child-care effectively occupies a significant part of a woman's daily activity for most of her active years. Being a part-time mother restricts the woman's freedom in choosing her other activities. In particular, domestic activities like cooking are easier to combine with child-care than activities which take place far from the home base. On the other hand, men's experiences as weapon makers give them a comparative advantage in tool making.
As to male supremacy, in a society with little surplus wealth, a family's status is likely to depend on its access to food. Thus a hunter's success and the quality of his weapons are about the only things that can distinguish his family from others. This might well accord him higher status within the family.

Since, the most important tools of a hunter society, weapons, are related to the male specialization, the emerging property rights are likely to discriminate against women. Studies of hunting societies in modern times seem to indicate that sex-discrimination in property rights, although present, is less pronounced among hunters than it is among peoples with more advanced survival technologies (Gough, 1971).

It would seem reasonable to attribute the sex-role differentiation and male dominance present in hunting societies to environmental pressures. Economic surplus in these societies is relatively insignificant and exchange is limited. There would, therefore, seem to exist little room for any conflict of interest between the sexes.

However, as economic surplus grows, so does conflict over its division. Therefore, one might expect conflict between the sexes to intensify in post hunting societies. Because in these societies aggression is such an important resource, men have the upper hand in resolving disputes in their favor. Whether they consciously bond together and "exploit" women or merely pursue their self-interest individually seems a polemic question. Perhaps the least "loaded" interpretation is to postulate that human beings pursue their own interests regardless of whether their opponent has the same or the opposite sex. Only men, on average, succeed more frequently than women in getting their way because they can resort to aggression.

With the emergence of states, particular patterns of resolving recurring
conflicts are institutionalized. The emerging laws and customs are likely to discriminate against women who do not have access to surplus wealth, cannot participate in defending the state, and, therefore, are underrepresented among the elite who play a key role in the shaping of institutions.

Industrialization brings a break down of economic activity into domestic and industrial production, with women specializing in the former. The output of domestic production is increasingly specialized to services which are "exchanged" within the family without intermediation of money. It is, perhaps, worth emphasizing that, contrary to claims by a number of marxist social scientists (e.g. Hunt, 1980: 1-2), this break down of economic activity is not logically a consequence of capitalism. Capitalism is a system of ownership of property, while the need for specialization in domestic or industrial production arises from the technology of production, and is therefore related to industrialization. Historically, of cause, the break down of economic activity can be associated with capitalism because the latter has evolved hand in hand with industrialization.

Women specialize in domestic production for a good reason, In the absence of, effective birth control, they are effectively restricted to stay home during much of their active years, to raise children. Furthermore, even when they are not pregnant or raising children, employers are likely to discriminate against them because of the uncertainty associated with un-expected pregnancies. As industrial workers, women are unreliable sources of labor and their "on the job training" many be completely wasted if they become pregnant.

Once sex-division of labor between domestic and industrial production is established two independent forces work to lower the relative status of
women. First, since industrial production is financially rewarded directly while domestic production is not, men monopolize wealth. In a "laissez-faire" society those who have wealth can effectively translate their wishes into patterns of production, availability of services, political power, and even laws. In this report, the status of women in industrial societies reflects "exploitation," in the original narrow sense of the word—i.e., the "use-value" of their services exceeds their "exchange-value." Second, independently of any exploitations, the relative status of women deteriorates in early industrial societies with technological advance, because productivity growth is faster in the industrial sector than it is in the domestic sector. That is, men improve their skills faster than women by specializing in the more dynamic industrial activities.

The above theoretical speculations are difficult to substantiate empirically. However, one of their major implications is that the relative status of women should decline as economic surplus increases. There is evidence that this is indeed the case for some periods and regions of human social life (see Hochschild, 1973: 1023, for references). Studies of women in the under developed world and of American women from the puritan era to the 19th century, indicate that women's relative status declines with industrializations. There is also evidence that women's position, as measured by income, education, and occupation, declined in the U.S. during the post-War era of economic growth until the late '60's.

Turning to earlier periods in human history, direct evidence on trends in the status of women is difficult to come by. One possible source of indirect evidence is the reflection of attitudes toward the sexes in a people's symbolic world. Sanday (1981) has suggested that the predominance of female duties in a culture reflects an "inner" (plant) orientation which emphasizes the female
power to give life at the expense of the male power to take it away. This orientation, other things being equal, is argued to lead to higher socioeconomic status of women in the culture. On the other hand, the predominance of male duties is interpreted as reflection of an "outer" (animal) orientation emphasizing male power.

If this association between the gender of duties and relative status of the sexes is accepted then evidence of predominance of goddesses in many cultures (e.g. Gimbutas, 1974; Robbins, 1980) and their subsequent decline may be interpreted as a deterioration in the status of women.

If the model proposed above is accepted a number of implications for social policy seem to follow. First of all, in our pursuit of "equality" between the sexes, we cannot abolish sex as a criterion in the assignment of tasks and roles. For example, the association of masculine gender with the position of "army general," by contemporary Americans, is likely to be functional in the event of a war--female army generals would probably be less effective in mobilizing aggressive behavior. So it might not be feasible to abolish sex-discrimination in promotions in the army. (On the other hand, the association of masculine gender to the position of "President of the United States" may well reflect the historical male monoploy of wealth and power.)

Secondly, no amount of anti-discriminating legislation will, by itself, improve the status of women, without access to surplus wealth. This means that our efforts should concentrate on improving women's employment opportunities, and on somehow compensating them for part of their domestic production, through pension plans for homemakers, increased maternity benefits for career women, etc.
sex-differences in reproductive strategies

special features of human anatomy (i.e. larger brain, narrower pelvis)

Polygamy

inefficiency of woman as protectors

Potential threat in open country habitats

kin selection

need for protection

emergence of men as protectors

aggressive males/physical sexual dimorphism

competition over women among men

nurturant females

basic sex-role differences

Prolonged child-care

intensification of sex-division of labor

requisites of hunting (e.g. male ownership of important tools)

lower status of women

emergence of surplus wealth

discriminatory customs and property rights

formation of states

institutionalized sex-discrimination

industrialization

specialization of women in domestic production

higher productivity growth in industrial production

lower relative status of women

Figure 1. A model of the evolution of sex-roles
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