
The Plasticity of Human Social Organization and Behavior

Contextual Variables and Proximal Mechanisms

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The purpose of this paper is to illustrate a behavioral-ecological, contextual approach to thinking about cultural variation as well as the problem of the gap between actual behavior and optimal behavior. This approach emphasizes sociobiologically predicted, genetically based, central tendencies in human behavior rather than genetic variation, but it is consistent with theories emphasizing genetic variation. The variable of economic production is introduced as a contextual variable associated, in sociobiologically predictable ways, with variation in sexual competition, family and social structure, and the socialization of children. Social controls on individual behavior as well as personal ideology are described as contextual variables that strongly affect individual fitness within societies, but do so in ways that are underdetermined by biological theory. For example, there is no way derived from biological theory to predict whether ideology or social controls in a society will be egalitarian or antiegalitarian. Individual behavior is also strongly affected by the interactions of these contextual variables with proximal mechanisms. Examples of maladaptive behavior emphasizing the interactions among the proposed contextual variables, the sociobiologically expected central tendencies in human behavior, and the proximal mechanisms proposed by psychologists are provided.

KEY WORDS: Sociobiology; Plasticity; Proximal mechanisms; Context

INTRODUCTION

Within the field of developmental psychology, two general types of theoretical and methodological approaches have been developed. Social learning theory and behavioral genetics provide a framework for attempting to understand individual differences, while approaches such as cognitive-developmental theory (e.g., Piaget) and ethology emphasize the central tendencies found in human be-

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havior. Both types of approach are necessary, and there is no inconsistency involved in stating that both types of theory are essential to a complete understanding of the domain of child psychology. McCall (1981) likens the difference between these theoretical approaches to the difference between the forests and the trees: At a certain distance from the forest, one notices the main overall trends of development, while at a closer distance one need scarcely be aware of the general trends of development as one observes the subtle differences among the "trees" of a particular age.

This difference between central tendencies and individual differences can be appreciated by comparing the mental abilities of 3-year-old children and adolescents. A psychologist interested in individual differences would attempt to find how and why children of one age or the other differ from each other. Such an approach is important but leaves out the massive average difference in mental ability between the two ages. It is the attempt to describe these average differences that has given rise to stage theories of cognitive development, and although strict stage theories are now in relative disrepute in developmental psychology, there is no question as to the importance of these large average developmental differences associated with age. These differing perspectives can also be extended to thinking about the differences between species. Considering the mental abilities of adult humans and chimpanzees, there is a very large average difference between these species in their mental abilities, which would be unnoticed by adopting individual difference methods within a species. Finally, an example that is quite relevant to sociobiology: Psychologists are interested in finding the factors that affect variation in donating behavior in children. It has been found that a variety of circumstances affect donations, including exhortations, reinforcement, praise from adults, etc. (see Rushton 1980, for a review). These studies have generally not been concerned with the absolute levels of donation, but only with the sources of variation in donation, i.e., the level of donation of individuals in different treatment groups. From a sociobiological perspective, it is also quite important to note the absolute level of donation, and it is predicted that these average levels will reflect an important degree of self-interest. In other words, it is of crucial importance whether the variation in donations is around a mean of 10% or around a mean of 90%. The former is consistent with a sociobiological prediction of a tendency toward self-interest in donating behavior; the latter would be difficult to explain in this manner.

Similarly, within the developing field of human sociobiology there have been contrasting theoretical approaches. For example, Lumsden and Wilson (1981) provide a theory in which genetic variation between cultures influences cultural differences. Such an approach essentially views the problem as one of explaining differences between cultures, and it views the solution as lying in the explication of the relation between genetic variation underlying variation in epigenetic rules and cultural variation. The gene-culture co-evolutionary circuit results in cultural variation as a function of genetic

variation, which is expressed at the cellular, organismic, and, ultimately, the cultural level. Variation between cultures is thus a function of genetic variation underlying the traits expressed at the cultural level.

In the present case, variations between cultures and individuals are also the central concern, but the approach utilized emphasizes the interactions among the central tendencies of human behavior that are products of genetic evolution and a variety of contextual variables. Such an approach takes advantage of the natural form of sociobiological theory as a theory of central tendencies. Sociobiological theory leads one to expect that on the whole, individuals will be more self-interested than truly altruistic, that males and females will have vastly different reproductive strategies, and that individuals will attempt to advance the interests of genetic relatives. The idea of a central tendency implies a general population average or mode of behavior and is consistent with a distribution of variation around the average. Thus, it is expected that, on the whole, there will be major differences between the sexes in reproductive strategies, so that if, for example, one were to tabulate numbers of women with more than one husband and compare the result with the number of men with more than one wife and do this cross-culturally, one would find the latter to be more common than the former. The fact that several individual females in a highly polygynous society have two husbands does not affect the general finding of a major sex difference in accord with evolutionary theory. Nor would the finding of a few cultures, in which females in fact had more husbands, affect the central tendency. Similarly, in the vast majority of animal species, males compete for females as a limiting resource. The finding that in some species, such as phalaropes and pipefishes, females compete for males (Daly and Wilson 1983) does not affect this general principle. An empirical study can then be performed in an effort to determine why the exceptions occur. In the human examples provided in this paper, it is argued that some of the variation in human behavior will be due to adaptive or maladaptive responses to particular contextual features of the environment, while in other cases the variation involves maladaptive behavior that results from the fallibility of the proximal mechanisms underlying human behavior.

However, an approach emphasizing theoretically based central tendencies must eventually deal with cultural differences and individual behavioral differences, and in the present case it will be argued that certain contextual variables, in conjunction with the sociobiologically expected central tendencies of human behavior, can explain a significant amount of the variance in cultural differences in family structure and the socialization of children. Such an approach is seen as complementary rather than inconsistent with approaches such as that of Lumsden and Wilson (1981).

Central to the present discussion is the idea that human adaptation is strongly dependent on the context of behavior. Contextual variables are variables that reflect the features of the situation in which behavior occurs. In the first section of this paper, the contextual variables of economic pro-

duction, social controls, and ideology are discussed. These variables provide the context in which behavior, influenced by the sociobiologically predicted central tendencies and other proximate psychological mechanisms, occurs. Thus, contextual variables are not viewed as proximal behavioral mechanisms, but as providing the context in which proximal mechanisms are expressed. In the first section of this essay, variation in family structure is related to variation in these contextual variables in conjunction with sociobiologically predicted central tendencies in human behavior. In the second section, the importance of these contextual factors in understanding the adaptiveness of the proximal psychological mechanisms underlying behavior is emphasized. This approach is highly compatible with recent contextualist views of human development (Lerner 1986; Lerner and Kaufman 1986).

The approach taken here is not a general theory of gene-culture interaction. It restricts itself to the domain of understanding a significant portion of the variation in family structure and social structure as well as the socialization of children. Although this approach could very well be applied to other areas where strong central tendencies exist, such as incest avoidance, there is no claim that a similar perspective would apply to the relationships between genes and all aspects of cultural variation. For example, it would be difficult to analyze historical variation in modes of dressing or variations in religious beliefs in the manner proposed here. Nevertheless, the approach taken here deals with areas such as resource control and reproduction, which are central to a sociobiological approach.

1. CONTEXTUAL VARIABLES: PRODUCTION, SOCIAL CONTROLS, AND IDEOLOGY

A. Production

Human societies can be graded in terms of the amount of production per individual. At the low end of the scale are hunting-gathering cultures, followed by relatively primitive (hoe) agriculture and pastoral societies, and culminating in the advanced (plow) agricultural and industrial societies (Goody 1976; Sahlins 1974). This pattern of increasing production results in increased potential for sexual competition among males (MacDonald 1983). The vastly different reproductive strategies and capacities of males and females, so central to sociobiological theory, result in the possibility of more and more intensive polygyny at higher levels of economic production, since at these higher levels one male can control enough resources to support more than one wife and their children. Accumulation of resources can occur either through one's own effort or by controlling the production of others, but, in any case, the result of the surplus value produced in the more advanced economies is to increase the potential for sexual competition among males and the variance in reproductive success among males.

There is considerable empirical support for the idea that reproductive strategies are influenced as predicted by the above considerations (MacDonald 1983). Thus, Van den Berghe (1979) found an association between increasing economic production and polygyny in a cross-cultural sample. Reflecting these relationships, Draper and Harpending (1982, 1988; see also Blain and Barkow 1988) have dichotomized human societies into father-absent and father-present societies. Father-present societies are characterized by intimate familial relationships, relatively high psychological availability of the father to his children, and monogamous mating arrangements. Conversely, father-absent societies are characterized by interpersonal aloofness and hostility and polygynous mating arrangements. Draper and Harpending note that these contrasting styles are associated with differing resource bases. The father-present strategy is associated with hunter-gatherer level of economic production, whereas the father-absent style occurs in relatively high-resource base environments. Interestingly, among traditional societies, the father-absent type of social organization also occurs among hunter-gatherers in rich, stable environments (Northern Australia, New Guinea, the Northwest coast of North America), while father-present hunter-gatherers are found in less-rich ecosystems (!Kung, Bushmen, Shoshone). These findings are consistent with the idea that it is the increased resource base that leads to the father-absent style, rather than the hunter-gatherer mode per se.

The interaction between the contextual variable of economic production and the central tendencies of human behavior predicted by the sociobiological theory of sex differences in reproductive strategies has implications for understanding a significant portion of the variation in human social and family structure, affective relationships, and child socialization. These relationships are an active source of theorizing within developmental human sociobiology (Blain and Barkow 1988; Draper and Harpending 1988; MacDonald 1988a). Thus, Draper and Harpending (1988) argue that there are evolutionarily based learning biases that sensitize children to the availability of resources and thereby affect their future reproductive strategy in an adaptive manner. In the following section, the contextual variable of production and sociobiologically predicted differences in reproductive strategy will be related to family and social structure, while the implications of this perspective for the socialization of children will be deferred until the discussion of proximal mechanisms.

At low levels of economic production, typified by the low-resource, hunter-gatherer economy, social structure tends toward economically independent family units (Paige and Paige 1981; Sahlins 1974), and monogamy is an empirically derived general rule. Thus, Sahlins (1974) argues that the Domestic Mode of Production (DMP) results in maximum dispersion of the productive units in the absence of interdependence and common authority. These centrifugal forces are overcome in societies with intensified production by the immersion of the independent domestic productive units in ex-

tensive kinship relationships and centralized political control. For example, the relatively extensive kinship relationships and social stratification and political control typical of Hawaii were associated with a relatively high level of economic production compared to that of the Eskimo. In Hawaii, political control was necessary to "negate the centrifugal tendency to which the DMP is naturally inclined" (p. 131). Political power resides in an extensive kinship nexus that was characterized by inherent cleavages: "The position of the household in these primitive societies is one of constant dilemma and continuous manoeuvre, temporizing always between domestic welfare and broader obligations toward kinsmen in the hope of satisfying the latter without menacing the former" (p. 127).

From a sociobiological perspective, these cleavages result from increasing genetic distance between individuals as one moves beyond the immediate family to immersion in extensive kinship relations. As a result of the increased resource base, there is increasing pressure to form larger social units beyond the nuclear family in order to acquire and defend these resources. The extended kinship type of social organization thus represents a movement beyond the primitive decentralizing force of the human family. One of the fundamental theoretical results of the modern evolutionary synthesis is the difficulty of achieving social cohesion in groups of sexually reproducing diploid organisms (Wilson 1975). Selection at the individual level results in immense decentralizing tendencies, tendencies that have been overcome to some extent in the evolution of increased levels of paternal investment resulting in the evolution of the fundamental unit of human sociality, the nuclear family. In this perspective, the epigenetic rules underlying human family functioning, particularly the affective bonding mechanisms, evolved during this period as a cohesive force in human evolution (MacDonald, 1987; 1988a). However, these mechanisms remain a decentralizing force with respect to larger forms of human social organization, and this fact results in the antagonistic nature of the relationship between the family and the larger social unit noted by Sahlins.

These relationships can be seen with an examination of the literature on reproductive rituals. Paige and Paige (1981) note the association between variation in production and the existence of extensive kinship groupings with the occurrence of reproductive rituals. At relatively low levels of production, a man who wants to arrange an attractive marriage for his daughter is unable to rely on a large kinship group to enforce his interests but must instead form temporary political alliances in order to gain political support against possible seducers and to assure a proper marriage for his daughter. The form of these rituals generally involves large ceremonies that advertize the economic success and power of the girl's family. Since sexual competition is relatively low in these societies, and no one male controls great resources, there is no bride-wealth.

In more economically advanced societies, the family is embedded in a large kinship network, and societies are characterized by the existence of

fraternal interest groups (Paige and Paige 1981). These already-formed groups of related males function to safeguard the father's interest in his daughter's marriage, and, as a result, there is no need for the elaborate ceremonies described above. The large kinship grouping functions to protect the daughter from unsuitable mates until the best possible marriage can be made. Since sexual competition is increased in these societies, bride-wealth becomes an important factor, and, indeed, the main function for the protection bestowed by the large kinship group is to make sure that the girl will command the best possible bridewealth or that she will be found attractive by the highest status males (Dickemann 1981). Economically successful males can ensure high levels of polygyny for themselves and their sons by being able to purchase wives.

Thus, family structure (monogamous versus polygynous) as well as social structure (society organized around the economically independent nuclear family versus society organized around extended kinship networks characterized by groups of related males) is importantly affected by the level of economic production in conjunction with the central tendencies of human behavior derived from sociobiological theory. In societies with highly advanced agriculture, e.g., classical China, very intense levels of sexual competition, characterized by some males controlling very large numbers of females, commonly occurred. In these societies, elaborate cultural practices such as claustration, veiling, and foot-binding protected females from males who could be potential sexual partners (Dickemann 1981).

The importance of production can also be seen in the characteristics of male initiation rites (MacDonald 1987). Young (1961, 1965) points out that in societies at intermediate levels of production, both polygyny and large groups of solidary males tend to occur. Warfare tends to be engaged in by the entire community of males acting in concert. Although extended kinship among males is important, the relatively large size of these groups results in large conflicts of interest within these societies, and male initiation rites appear to function to show allegiance to the tribal elders (Paige and Paige 1981). These "rites of submission" indicate allegiance under circumstances in which centrifugal tendencies resulting from individual genetic self-interest are particularly likely to occur. The ceremonies thus promote group cohesiveness and ideological solidarity in groups in which fission and conflict of interest are particularly likely to occur. At lower levels of production, ceremonies, if they exist at all, are more likely to be restricted to the immediate family, and they tend to be affectively positive. The positive affective tone of these ceremonies contrasts strongly with the hostility often observed in male initiation ceremonies in larger societies and corresponds to the general association between levels of production and familial affective relations described below. At the most advanced levels of production, the possibility of efficient social and political controls on individual behavior (see below) lessen the occurrence of such ceremonies.

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B. Social Controls

A second contextual variable of importance derives from the fact that the behavior of individuals can be controlled by others. The preceding discussion of economic production leads to the theoretical prediction that the most economically productive societies should be characterized by the most intensive forms of polygyny, and indeed the classical civilizations of Eurasia practiced very intensive polygyny (Dickemann 1979; MacDonald 1983). In the present section, it is argued that the predominance of exclusive monogamy in societies influenced by Western customs is explainable by the existence of social controls regulating sexual behavior in these societies.

Alexander (1979) discusses social controls on individual behavior quite extensively and Campbell (1982) distinguishes between mutual monitoring and legal control. Mutual monitoring includes activities such as approval and disapproval, ostracism, and conformity pressure. Legal control includes the enforcement of penalties for proscribed behavior carried out by specialized agencies (see Gruter and Masters 1986, for discussions of a variety of social controls in human and animal societies).

Social controls thus include a wide range of cultural practices that channel the behavior of individuals, ranging from physical force to social disapproval. At one extreme are rigidly enforced sanctions on behavior, such as would occur in slavery, while at the other extreme are subtler sanctions, such as those that result when one wears outlandish clothes. From a sociobiological perspective, this leads to the possibility of forced lack of reciprocity, in which individuals are forcibly required to give up resources to others. Slavery would be a good example. In terms of the preceding discussion of production, it is expected that as societies become more complex, there is an increasing possibility of legal controls on individual behavior. At the low end of the scale of production, social structure is relatively egalitarian and based on the economically independent family. Legal control is nonexistent, and the control exerted by mutual monitoring is not sufficient to overcome the centrifugal tendencies of the Domestic Mode of Production (Sahlins 1974). At intermediate levels, individual males must integrate themselves into large kinship networks (Sahlins 1974; Paige and Paige 1981) that have considerable influence on individual behavior. Social controls become more formal and institutionalized: For example, in Polynesia "men do not personally construct their power over others; they come *to* power" as part of an institutionalized social structure (Sahlins 1974; p. 139). The highest levels of social control are achieved by politically centralized states.

These relationships can be seen in the discussion of pubertal reproductive rites described above. At relatively high levels of economic production, the social controls exercised by the fraternal interest group obviate the need for temporary political alliances when a daughter is married. Paige and Paige (1981) provide examples where individuals who seduce or attempt to seduce a man's daughter are subjected to economic and often violent reprisals by

the man's kinship group. As indicated above, in a highly sexually competitive society, a virgin daughter is an important economic asset. At lower levels of economic production and without the level of social control found in these more economically advanced societies, the father must form a temporary coalition in order to advance his interest in his daughter's marriage. Without the ability to rely on a fraternal interest group, he must advance his interests by essentially bribing others and advertizing his wealth with a large feast and ceremony.

Regarding male reproductive rites, the increased incidence and importance of these rites at higher levels of economic production, as well as their negative affective character, reflect the increased importance of integration into a wider kinship group. Although lacking formal legal procedures and formal laws characteristic of the institutions of social control typical of the most advanced human societies, these rites involve submission to the tribal elders and an acknowledgement of allegiance, a mechanism of social control.

At the most advanced levels of economic production, social controls are ubiquitous and include such practices as taxation, slavery, the draft, and penalties for criminal behavior. Such social controls are often quite insensitive to genetic and even phenotypic variation among those to whom they apply (MacDonald 1983; 1984). For example, independent of one's own willingness to support people on welfare, one can be forced to do so by being required to pay taxes. Children of slaves remained slaves independent of their intelligence, personality, or any other personal characteristic. This feature makes social controls an emergent phenomenon and a truly contextual variable in human societies: The effects of social controls cannot be reduced to a function of the genetic characteristics of individuals.

A crucial issue involving social controls is the issue of the degree to which they result in increasing or decreasing the variance in control of resources and reproductive success. Egalitarian social controls limit the extent to which individuals can differ from other individuals in these dimensions, while antiegalitarian social controls have the opposite effect. Examples of egalitarian social controls would be laws in contemporary Western-influenced societies that require each male to have no more than one wife (MacDonald 1983), what Alexander (1979) terms "socially imposed monogamy."

Although there may indeed be a sociobiologically predicted tendency for social controls to reflect the interests of the wealthy and powerful (Bar-kow 1988), biological theory provides no means of predicting whether social controls will be egalitarian or antiegalitarian. In every society, the degree of social control over individual behavior is a chronic political issue, and in our own society the next election can result in greater or lesser control over individual behavior. Even professional polsters cannot predict these results, much less a biological theory. Although there is a tendency consonant with sociobiological theory for social controls to reflect the interests of the wealthy and powerful, there are many examples of egalitarian social con-

trols, such as controls reinforcing monogamy, which have the effect of reducing the variance in reproductive success (MacDonald 1983). Thus, in modern China families are required to have no more than one child, and heavy economic penalties as well as abortion and infanticide have been used to enforce these controls. Socialist societies exert social controls on the individual accumulation of wealth and have the goal of redistributing the wealth so that individual differences in wealth are reduced.

Although there is every reason to suppose individuals will attempt to "cheat" under these circumstances, given the sociobiologically expected central tendencies of human behavior, the centralized power of the modern state can exert significant levels of compliance. Moreover, there is no biological reason to suppose that decrements in fitness to some or even most members of a society resulting from social controls will have a tendency to be righted because of sociobiologically predicted psychological characteristics or for any other reason. Classical China went on for centuries with huge disparities in wealth and reproductive success, and although dynasties came and went, the family structure resulting in large inequities among males remained unchanged (MacDonald 1983). A modern state with very advanced, highly technological means of social control could enforce massive differences in power, wealth, and reproductive success, or it could enforce a pervasive egalitarianism—the nightmare of 1984. Finally, there is no theoretical reason to suppose that social controls generally optimize cooperation and the restraint of individual self-interest, as Campbell (1975; 1982) believes. Although egalitarian social controls that act to restrain the self-interest of individuals do occur (see discussion below), there is no reason to invoke a group selection position for their occurrence (MacDonald 1983). Social controls may be thought of as the outcome of conflicts of interest within societies rather than as the result of behavior that is individually deleterious but socially beneficial. As Alexander (1979) points out, behavior that is against the interest of an individual or a sub-group is unlikely to occur unless the penalties imposed by the whole group are sufficient to eliminate the behavior.

C. Ideology

Social controls are essentially external sources of motivation for behavior. However, behavior is often believed to result also from internal sources of motivation involving ideologies, belief systems, internalized norms, etc. The role of ideology within sociobiology is particularly difficult. Although one can readily force an individual to submit to social controls, one cannot readily force an individual to adopt an ideology. Thus, it is expected on the basis of sociobiological theory that ideology reflects self-interest (Wilson 1978).

This is very good evidence that, in fact, personal beliefs generally motivate and rationalize self-interested behavior. Thus, moral reasoning can be interpreted as the justification of self-interest and self-serving self-de-

ception is a common feature of our attributions about our own behavior as well as the behavior of others (Krebs et al. 1988; MacDonald 1988b). Individuals attempt to maintain self-esteem and a view of themselves as having great moral rectitude even in the presence of self-interested behavior.

On the other hand, ideology often reflects and is dependent on social controls, and great energy is devoted to controlling the ideologies of others. Ideologies thus sometimes function as part of a broad context of human behavior paralleling and often reinforcing social controls. For example, Marxist ideology justifies strong social controls on individual behavior, and the pervasive teaching of Marxist ideology in public education in Marxist societies is supported by these social controls. Similarly, Christian ideology, including beliefs in strong restraints on sexual attitudes and behavior reinforcing monogamy, has been promulgated within churches, schools, and families, and it has been reinforced with a variety of social sanctions ranging from public disapproval to the ecclesiastical courts of Puritan England. Stone (1977) describes the fear of God as a powerful force for sexual restraint in early modern England, a comment that suggests that personal ideology could have important effects on behaviors relevant to fitness independent of the social controls reinforcing the ideology.

It is an important fact that social controls are usually justified with an ideology. To the extent that ideology justifies social controls that result in decrements in fitness to some individuals and increments to others, it is quite possible that one function of ideology is to provide an internal source of motivation for fitness-decreasing behavior. For example, a wealthy individual who believes that if he engages in polygyny or has a mistress, he will go to hell, and a poor person who believes that the fact that the emperor has 500 wives is part of the natural state of things, may both be acting in ways that decrease their fitness. Such internalized beliefs facilitate the functioning of social controls and often render the use of force unnecessary. Marx had this idea when he described religion as the "opium of the people," but a similar point could be made about the role of Communist ideology in facilitating and justifying social controls on individual behavior.

Societies often go to great lengths to indoctrinate individuals with ideology, thereby indicating their belief in its importance in the control of behavior. In the 20th century, totalitarian governments have attempted to rigidly control the socialization process in ways that bypass the traditional sources of influence such as the family and Church. We have noted above that the nuclear family acts as a decentralizing social force with respect to larger forms of human social organization such as extended kinship relations. The family is also a decentralizing force in modern industrial societies, so that governments often attempt to circumvent family influences on the socialization process by inculcating ideology and with the aid of social controls.

For example, Bronfenbrenner (1970) notes that in the Soviet Union, family influences are viewed as discordant with the interests of the state, and state-supervised education directed toward the indoctrination of socialist

ideology begins at an early age. Similarly, in Nazi Germany the Hitler Youth as well as the schools served the function of teaching Nazi ideology to children in a self-conscious attempt to circumvent family influences (Koch 1976). In both of these cases, there is considerable evidence that these efforts at indoctrination had important effects on behavior, most notably on self-sacrificing and altruistic behavior (Bronfenbrenner 1970; Koch 1976).

Ideologies, like social controls, can be egalitarian or antiegalitarian, and, as in the case of social controls, this aspect of ideology is underdetermined by biological theory, i.e., there are no means within biological theory of predicting which will prevail in a given society. Moreover, as in the case of social controls, the inculcation of ideologies, whether egalitarian or antiegalitarian, is insensitive to genetic variation and thus presumably to the self-interest of those being inculcated. For example, Christian ideology concerning sexual practices was accepted by all classes in some historical societies and apparently had an effect on behavior in some historical eras (MacDonald 1983).

Indeed, the contextualist perspective suggests a strong effect of context on the results of behavioral genetic studies (Bronfenbrenner 1986), including those studying personal ideology. In societies where ideological pluralism is possible, there is genetic variation for sociopolitical attitudes such as attitudes toward the death penalty (e.g., Martin et al. 1986), although the great majority of sociopolitical attitudes are strongly influenced by the common environment, and some, such as religious preference (Eaves 1986), show no evidence of genetic influence. Behavior genetic studies also suggest that as children get older they are able to choose their environments in accord with their genetic proclivities (Scarr and McCartney 1983). However, in traditional societies where belief systems are characteristic of the vast majority of the individuals in the population and in modern societies where massive efforts at ideological control are sometimes made, there is apparently much less ideological variation (MacDonald 1987; Eysenck and Wilson 1978), and individual choice of environments is rigidly controlled. Thus, e.g., in Nazi Germany children were obliged to attend ideologically oriented, state-controlled schools, participate in the Hitler Youth, and were ultimately drafted for military service. As a result, individual choice of environmental niche was greatly curtailed. Historical evidence indicates the overwhelming success of ideological indoctrination in this case (Koch 1976). Reflecting these contextual constraints, Eysenck and Wilson (1978) restrict their claim for genetic influences on political attitudes to Western democracies and explicitly exclude totalitarian societies. It should also be pointed out that a large literature on attitude change as well as the rapidity of secular changes in attitudes indicate that attitudes and the behaviors they influence are a relatively plastic characteristic of humans not tied closely to changes in gene frequency (e.g., Eagly and Chaiken 1984; Zimbardo et al. 1977).

The contextualist analysis clearly implies the possibility of a degree of slippage between sociobiologically predicted behavior and what actually oc-

curs. However, it does not imply that personal ideologies inevitably reflect social controls. It is obviously the case that individuals often hold personal ideologies in conflict with an official ideology that reinforces social controls, as, e.g., a revolutionary ideology. There is presumably a central tendency for such ideologies to be in the perceived self-interest of the individuals holding them, but every reason to suppose that instances of maladaptive personal ideologies occur as well. As with any other phenotype, there is presumably continuing selection against ideologies that lead to maladaptive behavior. For example, Alexander (1979) describes a religious cult that proscribed sexual intercourse for its members. Not only did the cult die out but presumably the biological fitness of the individual members was adversely affected. Muslim suicide bombers in the contemporary Mideast may well be another example where individuals can be inculcated with an ideology that is against their self-interest.

It should also be pointed out that individuals often use the ideology of kinship relations in a self-serving manner, so that, again, there may be slippage between theoretically predicted behavior and what actually occurs. Chagnon (1982) notes that among the Yanomamo, individuals redefine kinship relations in order to obtain resources and better marriages, and Sahlins (1974) gives many examples of individuals manipulating kinship terms in their self-interest. Finally, Barkow (1982) and Burgess et al. (1988) present examples of maladaptive cultural practices maintained by ideology, such as practices involving nutrition and medical procedures. Such practices can be maintained independent of social controls (i.e., voluntarily) despite their fitness reducing consequences.

D. Contextual Variables: Summary and Conclusion

The foregoing has argued for the necessity of recognizing contextual variables as an indispensable and irreducible aspect of sociobiological theorizing. These variables are indispensable because, in conjunction with the central tendencies derived from sociobiological theory, they have considerable power in explaining variation in cultural practices related to family structure and interaction patterns as well as resource control and reproduction. Moreover, this power is obtained without assuming any genetic variation in the epigenetic rules underlying human behavior. These variables are irreducible because they cannot be analyzed in terms of the genotypic or phenotypic characteristics of individuals and are thus emergent properties of social groups (social controls and ideology) or aspects of the material environment (economic production). The result is a genuinely nonreductionistic sociobiology. The contextualist perspective need not deny the possibility that genetic variation underlying the epigenetic rules biasing human behavior is also an important source of cultural variation (Lumsden and Wilson 1981). It only states that an analysis in terms of genetic variation is necessarily incomplete. Indeed, there is already evidence for such genetic variation in

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altruism and other phenotypes of interest to sociobiological theory (Segal 1988; Rushton et al. 1986).

Finally, there is no implication that the contextual variables considered here constitute a complete list. For example, another contextual variable with important implications for human behavior is that of environmental instability (Burgess et al. 1988), considered briefly in the section on proximal mechanisms and maladaptive behavior below. Research such as that of Blain and Barkow (1988), Burgess et al. (1988), and Draper and Harpending (1988) will continue to extend sociobiological theorizing to the relationships among contextual variables, sociobiologically predicted central tendencies, genetic variation, and the proximal mechanisms underlying behavior. Human behavior is seen as "flexible strategizing" (Alexander 1987, p. 9) in the reaction to and the creation of contextual variation, a strategizing that reflects the central tendencies of human behavior as predicted by sociobiological theory.

2. PROXIMAL MECHANISMS, CONTEXTUAL VARIABLES, AND MALADAPTIVE BEHAVIOR

One of the problems faced by an adaptationist theory such as sociobiology is that of accounting for maladaptive behavior. As an outgrowth of fundamental biological theory, sociobiology has necessarily emphasized the adaptiveness of behavior—the idea of behavioral optimization. From this standpoint, humans are "survival machines" (Dawkins 1976) honed by natural selection to behave in ways that maximize biological fitness. However, some of the most frequent criticisms of sociobiological theory have turned on just this point (e.g., Gould and Lewontin 1979). The purposes of the following are to provide examples of types of maladaptive behavior involving mechanisms studied by psychologists and to relate some of these examples to the contextual variables described above. Because of the sociobiologically predicted central tendencies of human behavior, I expect that, as a general rule, behavior will indeed be adaptive. But enough examples of arguably maladaptive behavior exist to suggest the need for a general approach to maladaptive behavior within a psychological framework.

One difficult problem at the outset is to provide clear cases of biologically maladaptive behavior, i.e., behavior that decreases an individual's Darwinian fitness. The problem is that detailed analyses of the biological adaptiveness of the behaviors studied by psychologists are, for the most part, not available. The most likely candidates for maladaptive behaviors among humans, such as drug abuse, criminal behavior, debilitating psychiatric conditions, etc., have not been well studied with a view to their fitness implications, although some data are available and will be discussed here.

Another approach is to concentrate on the social status or prestige of an individual without regard to biological fitness—what one might term

“cultural fitness.” In this case, the dependent variable is the social class status of the individual or his cognitive and social adjustment and the focus of the analysis is to emphasize the effects of the behavior on upward and downward social mobility. The assumption here is that high social class status and optimal cognitive and social functioning are inherently desirable from a sociobiological perspective because of their association with relative wealth and political power, and independent of considerations of biological fitness.

In this perspective, resources and their control are fundamental to an evolutionary analysis (Charlesworth 1988) because of their clear associations with reproductive success among animals and in traditional human societies. Charlesworth (1988) notes the centrality of resources to evolutionary theorizing about behavior. He describes organisms as having genetic imperatives of maintenance, development, and reproduction, all of which require mechanisms of resource acquisition and control. That resource control is crucial for human reproduction in traditional human societies is an important triumph of human sociobiology (e.g., Betzig 1986; Dickemann 1979; Hartung 1976; Hill 1984; Irons 1979; MacDonald 1983). Although the relationship is tenuous at best in contemporary societies (Barkow and Burley 1980; MacDonald 1983; see Vining 1986, for a review), social class status retains its appeal as a dependent variable in sociobiological theory because of these very strong and very predictable associations in traditional human societies. In economically advanced societies, the social controls on reproduction that effectively lessen the association between control of resources and reproductive success (see above) nevertheless often allow for large variation in control of resources and political power.

Sociobiological theory thus supports the counterfactual conditional that if there were no social controls on reproductive success, there would be a strong correlation between social class and reproductive success in contemporary industrial societies, even though such controls are a reality. In the same manner, psychological theory supports the counterfactual conditional that if poor children were adopted into middle class homes, their IQs would increase whether or not such children are ever adopted, and theoretical physics supports the counterfactual conditional that if the temperature of absolute zero was reached, there would be no resistance to electrical current, even though this is presently impossible. (See Aronson [1984] for a discussion of the importance of theoretically justified counterfactual conditional statements for scientific theory.)

As a second rationale for using social class and social mobility as dependent variables in a sociobiological analysis, although it is deprived of much of its ultimate evolutionary end, social class status and social mobility often facilitate sociobiologically predicted behavior and must therefore remain important dependent variables in a sociobiological analysis. For example, wealthy males are able to ameliorate the effects of divorce on their

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children to a much greater extent than are other males (see discussion below).

Both the approach stressing Darwinian fitness and the approach stressing cultural fitness are quite useful, and in the following I will attempt to provide several ways in which maladaptive behavior can come about in addition to the acceptance of maladaptive ideologies discussed above. These mechanisms are consistent with a fundamentally sociobiological approach and will be illustrated with examples in which there is evidence for decrements in biological and/or cultural fitness.

Genetic Variation

There is evidence for continuing natural selection for behavior within human populations. For example, there is ample evidence for: 1) the role of genetic factors in the development of schizophrenia (e.g., Gottesman and Schields 1972; 1982), 2) the lowered fertility of schizophrenics (Price et al. 1971; Reed 1971; Slater et al. 1971), and 3) the downward social mobility of schizophrenics relative to their own fathers (Dunham 1965; Goldberg and Morrison 1963; Turner and Wagenfeld 1967). Our large demes would ensure that such selection would be slow, however.

Secondary Effects of Biological Central Tendencies

If indeed the behavior of individuals tends to be self-interested, it is expected that the sociobiologically predicted behavior of some individuals may result in less than optimal behavior of others. For example, the negative effects of divorce on children can be seen as resulting from the optimization of male reproductive behavior while at the same time resulting in decrements in adaptiveness, including downward social mobility, to other family members (MacDonald 1988a). Moreover, these negative effects on family members are mitigated when the divorcing male is of high socioeconomic status, a finding that indicates the importance for a sociobiological analysis of resource control and socioeconomic status as dependent variables even in an industrial society. The result of this behavior is to create a context for the child's development that is nonoptimal from the point of view of the mother and child. However, there is no implication that the children do not attempt to maximize their own adaptiveness. The decrements can be seen within the context of parent-offspring conflict as well as parent-parent conflict regarding the appropriate level of investment in offspring (Trivers 1974).

Cultural Change Resulting in Maladaptive Consequences for Formerly Adaptive Behavior

One consequence of the changing context of human behavior is that mechanisms evolved in one context can become maladaptive in another (Alex-

ander 1979). In the discussion of production as a contextual variable, the importance of the epigenetic affective rules underlying the cohesion of the family social system was discussed. If these epigenetic rules evolved in the prolonged phase of human evolution in which social structure was based on the nuclear family, these rules might become maladaptive later as different social forms evolved. There is indeed evidence indicating culturally-based changes in the affective environment corresponding to changes in the contextual variables described above. Several studies (Bacon et al. 1963; Katz and Konner 1981; Konner 1981; Paige and Paige 1981; Rohner 1975; Whiting and Whiting 1975a,b) have shown that societies with relatively low intensity of economic production tend to have relatively warm affective relationships among husband, wife, and children while more economically advanced societies tend toward dissension, conflict of interest, and cool or hostile familial relationships. This variation in the affective tone of societies is reflected in the affective tone of male initiation rites, which tend to be positive in societies with relatively low levels of production and to be quite hostile in larger, more productive societies in which males must integrate themselves into a large kinship group.

There is also evidence that change in familial affective relationships can occur too quickly to be due to natural selection (MacDonald 1984; 1987). Thus, Stone (1977) found that a major change in the affective tone of familial relationships in England took place within 200 years and coincided with a shift from an emphasis on the importance of extended kinship relationships to the economically independent nuclear family. The foregoing suggests that the adaptationist approach to familial relationships provides some of the best evidence for environmental effects on child development. The result is that the epigenetic mechanisms underlying familial affective relationships must be seen as highly responsive to environmental contingencies. Nevertheless, it is expected that change is gradual and results in decrements in adaptiveness for families not adopting the new, more adaptive forms of family interaction. Thus, warm family relationships and stable, monogamous nuclear family structure in the early modern era were most typical of the upwardly mobile middle classes (Stone 1977). Families not adopting this style of interaction tended not to have upwardly mobile offspring. Supporting these relationships, modern psychological research generally supports the idea that warm familial relationships and stable family structure provide optimal development in children (e.g., Maccoby and Martin 1983).

Social Controls Promoting Maladaptive Behaviors

Social controls often have a major effect on the context of human development and thereby affect the existence of discrepancies between optimal and actual patterns of behavior. For example, it is only recently that the divorce rate in the United States has reached epidemic proportions, increasing from two per 1,000 individuals in 1940 to over five per 1,000 in 1980, a

change accompanied by decreasing legal and social restrictions on divorce. In addition, enactment of no-fault divorce laws has resulted in large increases in divorce (Adams et al. 1984). These changes in social controls have affected the incidence of decrements in adaptiveness associated with divorce. Other examples include the effect of welfare policies on the structure of poor families and teenage fertility, the effect of economic policy on neighborhoods, and many more. In the advanced societies that characterize the world today, social controls have the possibility of affecting virtually every aspect of behavior and must be included in a sociobiological analysis. Indeed, as indicated above, it has not been uncommon for the state to use social controls to attempt to indoctrinate children with a particular ideology and alter their behavior in ways that may be maladaptive.

Proximal Environmental Influences During Development

There are several ways in which pathological effects due to the environment can be conceptualized. First, behavior genetic studies indicate environmental variance affecting maladaptive psychiatric disorders. Thus Price et al. (1971) and Slater et al. (1971) documented lower fertility patterns, marriage rates, and downward social mobility for a variety of psychiatric diagnoses, including schizophrenia, manic depression, personality disorder, neurosis, and substance addiction. Since the heritability of these disorders is substantially less than 1.00, there are environmental factors that affect these diagnoses, presumably including many of the familial interaction patterns suggested as causes by psychologists (see e.g., Hetherington and Martin (1986) for a review of parent-child interaction patterns associated with psychiatric conditions in children).

Second, the ethological idea that behavioral systems often involve expectations of an appropriate environment—Bowlby's (1969, 1973) environment of evolutionary adaptiveness—is consistent with the idea that departures from this expected environment will lead to pathological behavior. Consistent with this perspective, McGuire and Troisi (1987) have recently proposed that social interactions are vital for adaptive physiological functioning and that prolonged departures from an environment with adequate levels of specific responses such as being liked, recognized, respected, etc., are likely to lead to physiological deregulation and psychiatric disorder. From the perspective of a resource-based theory of human adaptation such as that of Charlesworth (1988), environments that are deficient in affective resources are likely to result in maladaptive behavior.

Third, environmental instability associated with lack of adequate economic resources or other types of social support results in tremendous stress placed on the family and an increased rate of child maltreatment (Burgess et al. 1988). Child abuse is particularly likely when parents have had a "bad day" and is associated with loss of job and low income. Under such cir-

cumstances, behavior becomes an index of pathology rather than an adaptive response to environmental contingencies.

Finally, there is a large literature within developmental psychology on plasticity indicating that plasticity is a "double-edged sword" (Lerner 1984; MacDonald 1985; 1986a,b). Although human plasticity allows for great adaptability to changing environments as well as an openness to a very complex enculturation process, it also leaves open the possibility that individuals will be pathologically influenced by these environments. This is particularly true in the case of environments that depart radically from normative environmental variation, such as the effects of maternal drug abuse on infant health and behavior (MacDonald 1985, 1986a,b). There is also evidence that humans exhibit declining plasticity as they get older (MacDonald 1985, 1986a), so that if individuals are not exposed to intensive remediation of early environmental insults, long-term pathological outcomes are likely.

The results in this section can all be seen as indicating the importance of the context for influencing human behavioral variation and adaptation. The context of human behavior includes centrally a wide variation in the material and affective resources essential to human adaptation (Charlesworth 1988), and this variation is closely tied to variation in the adaptiveness of human behavior.

Developmental Constraints

The foregoing comments on plasticity indicate one type of developmental constraint on the adaptiveness of behavior. Another type of constraint involves the very concept of development itself. One of the problems in developing an adaptationist theory of development is to conceptualize exactly what children are adapted to. Parents form a shield between children and the world, providing them with resources and perhaps preventing them from becoming overly altruistic. Children's competencies develop only gradually, so that at any point in development they will appear incompetent compared to adult levels of functioning. Thus, research in the cognitive-developmental tradition of moral development has shown that young children's moral reasoning emphasizes the self-interest of the child (Kohlberg 1984), a strategy that is unlikely to be persuasive to unbiased observers and thus less effective in reasoning with peers and others who do not see things from the point view of the child (MacDonald 1988b). Recently, Parkhurst and Gottman (1986) have shown that children's resource acquisition behavior with their peers becomes much more sophisticated after age 5. At this age, children learn the rudiments of politeness, i.e., they learn to take account of status differences with other children and to take account of the other child's self-interest in the situation. As a result, the form of peer-directed resource acquisition behaviors appears far from optimal prior to age 5.

3. CONCLUSION

The above discussion indicates the need for a multivariate, contextual approach to the question of the adaptiveness of behavior, what Lerner and Kauffman (1986) have termed the embeddedness of human development. In order to explain behavior, one must invoke different levels of analysis (social controls and proximal mechanisms), different biological systems (affective bonding versus biological self-interest), and different environmental influences that interface with proximal mechanisms (affective influences, social learning contingencies, and parental control). One must be aware of how historical and cross-cultural variation in production and social controls create different contexts that the human family system and social learning generally must adapt to. The result, as suggested by the above examples, is to create the possibility of much slippage between optimal behavior and what actually occurs but still within a fundamentally sociobiological framework. The concept of adaptation is essential to any evolutionary analysis of behavior, and by recognizing specific sources of maladaptive behavior and taking them into account in analyzing behavior, it will be possible to more convincingly argue for the adaptiveness of particular behaviors. Sociobiology emerges as a fundamentally descriptive rather than predictive account of human behavior (Barkow 1988; MacDonald 1983).

In addition, it is also possible that the complexity of the biological basis of human social behavior is itself responsible for a great deal of slippage between optimal behavior and what actually exists. Human behavior is characterized by both centripetal tendencies that bond family members together and that underlie high levels of paternal investment, as well as centrifugal tendencies arising from the existence of biological self-interest and asymmetries in reproductive strategies between the sexes (MacDonald 1988a). Both types of tendencies explain a significant proportion of human behavior, and they often pull in different directions. Thus, it would not be surprising to find that men who were highly attached to their wives failed to maximize their reproductive potential by engaging in divorce or polygyny even when such behavior is possible.

Are there evolutionary constraints on human culture? I agree with Wilson (1978) that there must be some such constraints. Wilson notes that all the variation in human social behavior nevertheless comprises a very small percentage of the amount realized by other social species. Our genetic predispositions would prevent us from adopting the social structure and interaction style of the orangutan, and presumably also those of the wolf as well as those of lower animals. Such a social system would not "feel right," and no one would have an interest in or indeed be able to impose such a human social structure even with any conceivable social controls. Moreover, even if one succeeded in imposing such a system, its gross inferiority compared to other forms of human social organization would presumably doom it if it had to compete with other forms of human social organization.

However, despite these genetic constraints, the above discussion indicates that some of the central aspects of human culture are very plastic and underdetermined by biological theory. Central to a sociobiological analysis of human behavior are the concerns of variation in control of resources, variation in reproduction, and the control of individual behavior. The preceding has argued that all of these concerns can be drastically affected by social controls acting on individuals and that there is no biological theory that can predict whether the controls enacted and enforced will be egalitarian or antiegalitarian. The issues raised by these concerns are central to most of the political debate within the last 250 years in the West, and rapid changes in these areas can take place—changes that are too rapid to be due to natural selection acting on genetic variation. The thesis that there are genetically based central tendencies toward, e.g., selfishness and nepotism, implies only that curbs on self-interested behavior will tend to be resisted, not that they will fail to exact significant compliance.

Finally, although the previous discussion has emphasized that a significant amount of variance in human social behavior and structure can be explained, there is no claim that all or even most aspects of human culture are closely tied to biological or cultural adaptation. Indeed, just as there may be genes in gene pools that neither increase nor decrease fitness but that evolve by random processes, human cultures contain features that are neutral with respect to adaptation. The color of clothing worn in a desert climate may be adaptive, but it is unlikely that every last nuance of clothing color that has ever existed could be reasonably said to be adaptive. The same could be said for variation in religious rituals. The strength of the adaptationist position is the ability to explain the central trends in human social behavior and organization. The adaptation of organisms to their environments is an empirically and theoretically derived central tendency, not a law of nature.

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