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The Interfaces Between Sociobiology and Developmental Psychology

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This chapter is intended as an introduction to the field of developmental human sociobiology. Its basic purpose is to describe the history of recent evolutionary thought and to illustrate some of the potential contributions to developmental psychology to be gained from a rapprochement with evolutionary theory. In addition, there will be an attempt to integrate the theoretical and empirical research traditions of developmental psychology within an evolutionary framework.

History and Influences in Human Sociobiology

As described below, the field of developmental human sociobiology encompasses a wide range of influences, including Piaget, Bandura, Bowlby, and Wilson. However, since the purpose of the present volume is to emphasize an evolutionary approach, the history and main influences within the sociobiological tradition will be discussed.

The intellectual roots of human sociobiology lie in developments within the evolutionary biology of the 1960s. G. C. Williams (1966) defended the traditional Darwinian idea that natural selection acts at the level of the individual as opposed to the group and inaugurated what has become a major area of empirical and theoretical research in sociobiology. At about the same time William Hamilton (1964a, 1964b) developed the idea that individuals could maximize their fitness not only by maximizing the number of their own offspring but also by extending aid to their genetic relatives. These insights have led to a host of models in which the costs and benefits to an individual are weighted by the coefficient of genetic relatedness between the individual and the recipient of the behavior. Examples of such models appear in this volume (see especially chaps. 6, 7, & 10), but the most influential early models were developed by Robert Trivers. For example, Trivers (1974) developed the model of parent-offspring conflict which essentially delineates a dynamic between the generations which develops because

of asymmetries in genetic self-interest (see Chaps. 10 & 11 for a more detailed account).

These events paved the way for E. O. Wilson's (1975) highly influential work, *Sociobiology: The New Synthesis*. The final chapter of this volume as well as Wilson's (1978) subsequent *On Human Nature* inaugurated the field of human sociobiology. Another major event was the publication of Richard Alexander's (1979) volume *Darwinism and Human Affairs*. Although Alexander argued that the human genetic heritage placed no limits on human social evolution, he also argued that in general human behavior is to be understood as attempting to maximize inclusive fitness and his discussions of a wide range of human social institutions ranging from religion, morality, and legal systems to reproduction and nepotism have been highly influential. Within the social sciences the first substantial body of work attempting to determine the usefulness of sociobiological theory has been in the field of anthropology (see, e.g., Barkow, 1980; Chagnon and Irons, 1979; Kurland, 1979; van den Berghe, 1980). This work has generally attempted to show that human social behavior conforms to the predictions of evolutionary theory.

The incorporation of sociobiological thought into psychology has proved more difficult. Part of the problem is that a central concern of psychological research has always been to discover the proximal mechanisms involved in behavior rather than to ask the ultimate-level questions of the evolutionary biologist. Ultimate-level questions ask why the behavior evolved and generally involve research on the adaptiveness of a behavior or morphological trait. Research on the actual processes which underlie a behavior, such as physiological processes or social learning, is in the realm of proximal mechanisms and need not intersect with the latter investigations at all.

A second reason for the lack of integration between psychology and sociobiology is that sociobiology has been viewed as a theoretical rival rather than a general approach which can be fruitfully integrated with existing psychological theories and research. Sociobiology would indeed be a rival theory if sociobiologists in fact proposed that all human behavior was genetically determined so that psychological theories indicating the importance of environmental effects were necessarily incorrect. However, as the work of Alexander (1979) and others influenced by him illustrates, the role of genes can remain unspecified in a sociobiological theory of behavior. As Kurland (1979) states, "evolutionary biologists who study the evolution of sociality are concerned with the explanation and prediction of how behavior maps onto the environment, *not* how genes map onto behavior" (p. 147). Thus, it is quite possible to review the presently available evidence within a variety of fields in order to determine whether it conforms to the predictions

made by sociobiological theory without specifying the role of genes in producing these behaviors. Indeed, for the most part this is the strategy which will be most apparent in this volume and it is the strategy pursued by other authors attempting to link psychology and evolutionary biology. For example, Youniss (1986) describes reciprocity in children's friendships and shows that in general there is a close correspondence between the available data and the predictions made by evolutionary theory. These studies do not specify the role of genes in producing these behaviors. Nevertheless, sociobiologists remain interested in the epigenetic rules which bias human behavior in particular directions (e.g., Lumsden & Wilson, 1981; Lumsden, this vol., Chap. 8; MacDonald, 1984, 1987, this vol., Chap. 11). Many of these proposed epigenetic rules derive from the ethological tradition in developmental research described below and will figure prominently in sociobiologically influenced work in psychology.

Finally, it should be noted that there are two broad conceptions of sociobiology corresponding to the division in developmental psychology between theories of individual differences, such as behavioral genetics or social learning theory, and theories of central tendencies, such as cognitive-developmental theory and ethology (see McCall, 1981, for a discussion of this distinction). Thus Lumsden and Wilson (1981; see also Lumsden, this vol., Chap. 8) have developed a theoretical approach for discussing the role of genetic variation underlying cultural variation. On the other hand, it is possible to conceive of sociobiology as proposing important genetically based central tendencies in behavior, such as tendencies toward selfishness, and sex differences in reproductive strategy (see, e.g., this vol., Chaps. 5, 7, & 8). These approaches are consistent with each other (MacDonald, 1986c) and can both be used as elements in the explanation and prediction of behavior.

Critical Issues of Sociobiology: Adaptationism, Reductionism, and Genetic Determinism

Sociobiology has come under a great deal of criticism within the scientific community for a variety of reasons. As with any good debate the positions have been polarized, with the result that intellectual compromise is virtually impossible. Moreover, there has often been little realization that within the sociobiological perspective there is considerable diversity of opinion and that in general, sociobiology is a developing theoretical perspective rather than a theory which was written and dogmatized over a decade ago. Without attempting to respond to all of the criticisms that have beset sociobiology, this section will describe a moderate approach to three of the main criticisms of sociobiology.

ADAPTATIONISM

One of the fundamental ideas underlying an evolutionary approach to behavior is that through the process of natural selection organisms become adapted to their environments. Questions of ultimate causation are essentially questions of how a behavior is or was adaptive for the organism at some point in its phylogeny. For example, Bowlby (1969, 1973) theorized that the ultimate cause of attachment behavior in infants was the avoidance of predators and that this was accomplished by proximal mechanisms tending to keep the infant fairly close to the mother.

Such an explanation seems reasonable and, in the absence of competing hypotheses, it should be accepted. As an alternative, one could propose, for example, that the affective bonding process that attachment represents was the result of natural selection for closer family ties and hence greater paternal investment in offspring. These two possibilities, then, represent empirical propositions regarding the evolutionary history of this behavior, and it is quite possible that data could be found which would tend to confirm or disconfirm either of them. If, for example, it were shown that predation on infants is not likely to be a major focus of natural selection on human populations during the proposed period, the predation hypothesis would be disconfirmed. Since the publication of Wilson's (1975) seminal work, dozens of empirical studies have been performed with animals in attempts to verify sociobiologically influenced adaptationist hypotheses, and prior to this one of the main interests of the traditional ethologists was to discover how a behavior was adaptive for an animal. This interest in adaptation continues to attract a great deal of interest (see, e.g., Emlen, 1984, for a review of the literature on the adaptiveness of helping behavior in scrub jays).

There is no reason, therefore, to suppose that adaptationism per se is unscientific or that it inevitably leads to "just so" stories. Adaptationist hypotheses can be supported by discovering patterns of data to which they conform. Since the beginning of human sociobiology, many studies have been done by examining existing data sets in anthropology and the social sciences for conformity with adaptationist hypotheses (e.g., Alexander, 1979; see also Weisfeld & Billings, this vol., Chap. 7). The fact that these data sets often do conform significantly to sociobiological predictions is good evidence for the adaptationist perspective, especially since the data were not gathered by researchers influenced at all by the theory. It should be noted, however, that the great majority of the material in this volume does not depend on adaptationist hypotheses for its value. Instead, the great majority of the material is an attempt to determine whether human behavior conforms to the predictions made by evolutionary theory, independent of its present adaptiveness and

independent of providing detailed hypotheses about human evolutionary history.

One difficulty for the adaptationist perspective in human sociobiology is to develop a reasonable sense of adaptation. In many cases the Darwinian fitness of behavioral alternatives is unknown, although there are significant exceptions (MacDonald, 1986c). Another problem is that social controls on reproduction are a highly salient factor in Westernized societies so that differences in fitness tend to be minimized and relatively unrelated to the control of resources as in traditional societies (MacDonald, 1983; see also this vol., Chap. 11). That a strong connection between the control of resources and reproductive success as well as sexual competition among males is crucially important in understanding traditional human cultures can hardly be doubted (Dickemann, 1979; Hartung, 1976; Hill, 1984; Irons, 1979; MacDonald, 1983; see also this vol., Chap. 11) and constitutes one of the major triumphs of the sociobiological approach in anthropology.

In addition to Darwinian fitness, social class and upward and downward social mobility are important dependent variables in sociobiological analysis. High socioeconomic class is associated with relative wealth and political power, both of which are associated with reproductive success in traditional societies. Moreover, high social class status and control of resources facilitates engaging in sociobiologically predicted behavior, e.g., male reproductive behavior (MacDonald, 1986c; see also this vol., Chap. 11). From this perspective developmental factors associated with social and cognitive functioning which are in turn related to social mobility become important aspects of a sociobiological analysis (see Chap. 11).

Nevertheless, behavior need not always be adaptive. There are many reasons for this, not the least of which is that evolution is an ongoing process so that there is continuing natural selection against maladaptive behavior. Barkow (1986) has described several ways in which maladaptive behavior can occur in human societies, including conflict among factions, the accumulation of misinformation, ecological change, and negative side effects of otherwise fitness-enhancing cultural traits. Within a psychological perspective, maladaptive behavior can occur for a variety of reasons, including the five discussed below.

1. Genetic Variation

Although we suppose that as a general rule humans behave in an adaptive manner, genetic variation within the human population evidently predisposes some individuals to debilitating physical and psychiatric conditions. For example, vulnerability to schizophrenia has a genetic basis (Gottesman & Schields, 1982), and schizophrenics have a lowered fertility compared to the population as a whole (Price, Slater, & Hare,

1971; Reed, 1971; Slater, Hare, & Price, 1971) as well as downward social mobility relative to their own fathers (Dunham, 1965; Goldberg & Morrison, 1963; Turner and Wagonfeld, 1967). Various mechanisms occur which tend to result in individuals with genes predisposing them to maladaptive behavior. Burgess, Kurland, and Pensky (this vol., Chap. 10) point out that some behaviors may be by-products that are the result of natural selection for other traits. In addition, genetic variation underlying dimensions of personality may be adaptive because it yields a diversity of phenotypes which are more or less adaptive in particular environments. Random processes and assortative mating can then lead to extreme genetic combinations which are maladaptive in any environment. Thus, variation in aggressiveness may be the result of the fact that there is no one optimal level of aggressiveness in humans and this variation may lead via random processes and assortative mating to pathologically high or low levels of aggression in individuals.

2. Secondary Effects of Sociobiologically Predicted Central Tendencies

In some cases the result of individuals' acting to maximize their adaptiveness is a decrement in adaptiveness to others. For example, a sociobiological theory of divorce predicts that, in the absence of social controls, there will be a tendency for males to maximize their reproductive success by leaving behind one family and forming another with a younger female. One consequence of this behavior is a tendency for a decrement in adaptiveness in the behavior of the children of the first marriage (see this vol., Chap. 11 for a complete account). Thus, the sociobiologically predicted central tendency for individuals to maximize their own fitness can result in less than maximum adaptation for their offspring, an aspect of parent-offspring and parent-parent conflict over parental investment.

3. Cultural Change Resulting in Maladaptive Consequences for Formerly Adaptive Behavior

The epigenetic rules which influence human behavior presumably evolved for the most part during the prolonged prehistoric phase of human evolution. The recent surge in human culture leaves open the possibility that these epigenetic rules could result in maladaptive behavior within present human cultures. For example, Alexander (1979) proposes that since children are now socialized at an early age with non-relatives they may be more altruistic towards them than predicted by an adaptationist theory (see Chap. 11 for further examples).

4. Social Controls

Social controls on individual behavior can be effective independent of an individual's genotype and can result in decrements in the adaptiveness

of behavior. Social controls are extremely important in understanding human behavior, especially in the economically advanced societies, and can often have important effects on child development. Social controls affecting family structure and the socialization of children are discussed in Chapter 11.)

5. Pathological Environmental Influences

Pathological environmental influences are entirely consistent with a sociobiological perspective. Indeed, the ethological idea of an evolutionarily expected environment implies that pathological behavior can result from environments that do not conform to those expected by the organism (see Chap. 11 for a more detailed discussion). For example, McGuire and Troisi (1987) have provided evidence that "certain types and frequencies of social interactions *are essential* to maintain normal physiological function", and that "changes in certain physiological functions . . . result in unpleasant symptoms and, if the alterations persist, an increased probability of psychiatric disorders" (p. 10S) (*italics in text*). Thus individuals who are chronically exposed to environments which do not provide adequate levels of recognition, affection, respect and social support are prone to develop psychiatric disorders, some of which are debilitating and maladaptive.

Another way to view these relationships is within the framework of resource theory as developed by Charlesworth (see Chap. 2) and as exemplified by chapter 10 by Burgess, Kurland, and Pensky on child maltreatment. When economic or affective resources are inadequate, tremendous stress is placed on the individual and the social group, and behavior can become an index of pathology rather than an adaptive response to the environment.

In addition, there is a large literature within developmental psychology on plasticity. Lerner (1984) and MacDonald (1985) have emphasized the "double-edged sword" of human plasticity: 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 (MacDonald, 1985, 1986a, 1986b). 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.

In sum, an adaptationist hypothesis is an empirical proposition which is open to reasoned discussion. Alternative hypotheses, including the possibility that the behavior is maladaptive, can be reasonably considered and data can be marshaled to support the various alternatives. It

should also be said that although a healthy skepticism regarding particular hypotheses is praiseworthy, there should be an a priori assumption that some adaptationist hypothesis or other is in fact correct. An evolutionary approach demands the belief that although pathology is always possible there will be a strong central tendency toward the adaptiveness of behavior. Too often the critics of sociobiology, while not denying the principle of adaptationism, are completely unwilling, seemingly so in principle, to accept any concrete human examples as being adaptive.

REDUCTIONISM AND GENETIC DETERMINISM

There are two versions of reductionism which have been considered by various writers, neither of which must be accepted from a sociobiological point of view. One version is that the behavior of groups can be reduced to the behavior of individuals which can in turn be characterized in terms of biological central tendencies toward selfishness, etc. Such a point of view ignores phenomena such as social controls discussed above (see also MacDonald, 1983, 1987, this vol., Chap. 11), which can act to restrain individual behavior independent of its adaptiveness. Social controls can be egalitarian or antiegalitarian, and the direction of these controls, and even their existence, cannot be predicted by any biological theory (MacDonald, 1983, 1987).

Another version of reductionism is the idea that adaptive behavior is the result of natural selection and thus genetically determined. Such a viewpoint ignores the role of environmental variation in producing adaptive phenotypes and the general point that the adaptiveness of behavior is often highly context dependent. The above discussion of maladaptive behavior presents examples of both possibilities.

The adoption of an antireductionistic point of view is not equivalent to throwing out the essence of sociobiology. Human adaptation can be seen as strongly influenced by sociobiologically predicted, genetically based central tendencies toward selfishness, etc., as well as by environmental variation interacting with environment-expectant genetic systems as well as a variety of contextual variables. Such a viewpoint is not reductionistic, but it does have the virtue of conforming to many findings in the study of human development as well as to the reality of human social organizations. In general, with the exception of Nancy Segal's work (see Chap. 6) implying genetic variation for cooperation, competition, and altruism, this book contains no detailed accounts of genetic processes underlying behavior. The first stage of a sociobiological analysis is to specify the development of adaptive and maladaptive phenotypes. The genetic analysis of the epigenetic rules which bias individuals toward particular behaviors will be the next step. Given the general findings in human behavior genetics for the importance of genetic variation in human behavior, there is every reason to suppose that (1) there

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will be important genetic variation for adaptive and maladaptive human behaviors, and (2) there are strong, genetically based central tendencies toward sociobiologically predicted behavior in humans. However, even if genetic variation and genetically based central tendencies prove to be irrelevant, the present endeavor is still essential.

Sociobiology and the Theoretical and Empirical Traditions of Developmental Psychology

This section discusses several of the major theoretical and empirical traditions of developmental psychology within a sociobiological perspective. The emphasis throughout is on the consistency of sociobiology with the major theoretical approaches within developmental psychology and on the benefits of theoretical integration rather than conflict and inconsistency. The common thread of the discussion is the emphasis on the ecological context of development and the adaptiveness of behavior.

ETHOLOGICAL THEORY

In the biological study of animal behavior, ethology is the intellectual forerunner of sociobiology. Ethologists emphasize the adaptiveness of behavior as well as the genetic basis of many behaviors, and these themes have been retained by the sociobiological perspectives illustrated in this volume. Most essentially, sociobiology will result in an extension of Darwinian approaches to new domains as well as in a broader perspective for areas already influenced by ethological theory.

The main areas of influence of the ethological perspective have been restricted to attachment theory and research and the interest in dominance relations among children. Sociobiology extends the scope of the adaptationist approach to include some of the central areas of social and cognitive development. Because of the fundamental concern with the costs and benefits involved in human relationships, the areas of moral development and altruism become central areas of the adaptationist approach (chaps. 4, 5, & 6). This concern is also reflected in sociobiological approaches to peer relationships (Youniss, 1986; Weisfeld & Billings, this vol., Chap. 7) and parent-child interactions (chaps. 9-13). Moreover, the emphasis of Lumsden (Chap. 8) on attempting to delineate and classify the fundamental epigenetic rules of humans and how these rules influence cultural choices has a broad synthetic influence in many areas of cognitive and social development. More generally, and as reflected particularly in the work of Charlesworth (this vol., Chap. 2), the influence of sociobiology is reflected in a new tendency to place all of behavior within an adaptationist framework independent of the particular proximal mechanisms involved. Sociobiology, unlike ethology

and as previously described, need not emphasize genetic explanations of behavior. The entire behavioral phenotype and its adaptive significance in particular environments is the unit of analysis.

Moreover, sociobiology enables theorists to better incorporate traditional ethological approaches with cross-cultural and historical data by emphasizing sociobiologically derived contextual variables. Ethologically influenced analyses, like developmental psychology in general, have tended to be static accounts of behavior within a particular society. Cross-cultural data are gathered in order to study the universality of developmental hypotheses. A sociobiological perspective emphasizes the influence of contextual variables such as resource availability (Charlesworth, Chap. 2 this vol.), economic production, and social controls as well as sexual competition among males and biological relatedness in influencing the variation found in affective relationships within the family, socialization of children, and peer relationships (see Chap. 11). This broadening of perspective will do much to make historical and cross-cultural data central rather than peripheral to developmental theory.

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The ethological approach, particularly the ethological theory of attachment, will also have an influence on sociobiological approaches to human development. Bowlby's (1969, 1973) ethological theory of attachment remains a paradigm of a modern developmental theory because of its emphasis on (1) the adaptiveness of behavior and the idea of the environment of evolutionary adaptiveness; (2) the idea of "natural clues" (epigenetic rules in the sense of Lumsden); (3) the idea of an evolutionarily expected environment, which provides for an evolutionary basis for strong environmental influences in development; (4) the general emphasis on the interaction among cognitive, affective, perceptual, and motor systems in attachment theory; and finally (5) the ramifications of attachment for behavior in a wide variety of domains including peer relationships, cognitive style, adult attachments, etc. The centrality of theories such as that of Bowlby for an evolutionary theory of behavior provide a degree of complexity and subtlety to sociobiological analysis which clearly avoids the often stated criticism that sociobiological models are simplistic genetic models which cannot incorporate the complexity of psychological development. In the study of gene-culture coevolution, models such as this will be essential, and indeed such a model has already been applied to several areas of human development within a sociobiological perspective (MacDonald, 1984, 1987; see also this vol., Chap. 11).

SOCIAL LEARNING THEORY

Social learning theory remains a dominant tradition within developmental psychology, and sociobiological theory would not tend to lessen

this influence. Sociobiological views of social learning (Barkow, 1986; Lumsden & Wilson, 1981; MacDonald, 1984, 1987; Pulliam & Dunford, 1980) have coincided with those of writers within the traditional psychological framework (e.g., Bandura, 1969, 1977) in emphasizing the adaptiveness of social learning and its usefulness in transmitting cultural values. Sociobiological accounts, however, emphasize the fact that the adoption of a particular culturgen (Lumsden & Wilson, 1981) via social learning or via any other method of cultural transmission often has implications for the Darwinian fitness of individuals adopting the cultural variant.

Social learning theory derives from the long behaviorist tradition in empiricist psychology, and as a result social learning theorists stress the importance of the consequences of the behavior to the actor. Although learning can occur without reinforcement, it is fundamental to the social learning perspective that individuals are more likely to engage in behaviors which are rewarded. Such a viewpoint implies the existence of self-interest as a prime human motivator, as predicted by sociobiological theory, and this state of affairs is reflected in the tendency for social learning theorists to attempt to find reinforcement contingencies which underlie even apparently self-sacrificing behavior (e.g., Gelfand & Hartman, 1982). Indeed, the tendency toward self-interested behavior stands almost as an unanalyzed bedrock in developmental psychology, while much research is devoted to fostering the small amount of altruism which is actually found (see Chap. 5). That much of human behavior should be analyzable in terms of seeing individuals as performing rough cost/benefit analyses in guiding their actions toward needed resources should come as no surprise to individuals within the social learning tradition.

Social learning theory will benefit from a sociobiological viewpoint by adopting a more behavioral-ecological perspective, a perspective in which the epigenetic rules affecting social learning are given a large role and in which sociobiologically predicted contextual variables are considered. Several of the factors that have been shown to affect social learning may well involve epigenetic rules which constrain social learning and, in conjunction with various contextual variables, affect the adaptiveness of social learning.

Regarding the importance of epigenetic rules which affect social learning, several characteristics of the model appear to facilitate social learning, including the warmth, power, similarity, and competence of the model (Mischel, 1976). MacDonald (1984, 1987; see also this vol., Chap. 11) has argued that the warmth of the model is of considerable importance in affecting social learning within the family. Warm parent-child relationships appear to facilitate the effects of modeling on children, and it is argued that these effects are the result of the interaction between social learning and the epigenetic rules which influence the

affective impact of parental behaviors on children. Thus parent behaviors labeled warm obtain their affective valence via the operation of epigenetic rules characteristic of children. Moreover, the adaptiveness of familial affective relations varies in sociobiologically predicted ways with changes in economic production and sexual competition. One of the tasks of future research will be to determine how the tremendous cross-cultural variation in familial affective relationships in conjunction with contextual variables such as social controls affects social learning within the family.

The facilitative effect of the power, competence, and similarity of the model may well also be the result of epigenetic rules affecting modeling and, in any case, have clear effects on adaptive behavior. Barkow (1986) has found that the Migili (Koro) of Nigeria quickly rejected their traditional leaders and religion when exposed to Western influences associated with power, competence, and prestige. On the other hand, teenagers who adopt the behavior of wealthy, powerful models who have children out of wedlock may be behaving maladaptively (MacDonald, 1987). These examples suggest the importance of contextual variables within an adaptationist perspective, a point that is returned to below.

COGNITIVE-DEVELOPMENTAL THEORY

Cognitive-developmental theory has the potential of becoming a rich source of ideas for a sociobiological analysis of development. As many authors have pointed out, Piaget's conception of development was fundamentally biological. Flavell (1985) notes that if one wants to understand how Piaget conceived the child, one simply has to ask how evolution would have designed an optimal learning machine. First, the child should be equipped with intrinsic motivation which, from an adaptationist perspective, would involve epigenetic rules which affect the reward value of behaviors involved in learning about the world. Second, the child should be designed so that the basic processes of cognitive development will depend on very general features of the environment (Kohlberg, 1969) and thus not be dependent on a narrow range of environmental contingencies which may or may not occur (Kagan & Klein, 1973; MacDonald, 1986a, 1986b; Scarr & McCartney, 1983). The system should be fairly well buffered from environmental effects, and this appears to be the case.

By far the greatest contribution of the cognitive-developmental approach is the description of the main trends of human development. Cognitive-developmental research and theory are relatively unconcerned with individual differences (McCall, 1981) and in this regard they are similar to one of the main strands of sociobiological theory. Much of sociobiologically inspired research attempts to describe some of

the main trends of human social development, such as the tendency toward selfishness and the tendency to help relatives. Within an adaptationist perspective, the broad features of the environment necessary for normal cognitive development constitute an evolutionarily expected environment, and the organismic attributes necessary to take advantage of this environment constitute species-wide genetic invariance. Indeed, as described above, the fundamental program of human sociobiology can be accomplished without assuming any genetic variation at all: As in developmental psychology one can construct sociobiological models which emphasize genetic variation and individual differences (e.g., Lumsden & Wilson, 1981) and those which emphasize sociobiologically predicted central tendencies and ignore individual differences (MacDonald, 1986c). These models, like the corresponding models within developmental psychology, can be construed so that they are consistent with each other.

As illustrated in chapter 5 of this volume, however, a sociobiological approach makes quite different predictions regarding the conduct of moral reasoning than predictions made by some cognitive developmental researchers and theorists, particularly Lawrence Kohlberg. A sociobiological approach need not question teleological views of development in general, but it must question those which conflict with the main characteristics and goals of human behavior as predicted by sociobiological theory. Thus, sociobiological theory is consistent with a general tendency for development to proceed in a general direction of greater competence but not one in which the endpoint of development is described as involving movement toward more and more selfless behavior. Moreover, as described in Chapters 4 and 5, sociobiological theory predicts that in general, reasoning about actions will be strongly influenced by sociobiologically predictable contextual variables such as cost-benefit contingencies and biological relatedness, and that it will generally operate in an adaptive manner. Thus self-deception and the manipulation of others are expected to occur in the context of reasoning about real-life problems.

A sociobiological analysis thus focuses on conflicts of interest and the role of cognitions in these conflicts. For example, sociobiologically influenced research stemming from attribution theory will attempt to determine the role of attributions in controlling the behavior and affective states of others. Excuse-making and the study of deception (both of oneself and of others) become an important area of study. As an example of this type of research, Weiner and Handel (1985) showed that even young children (ages 5 to 7) are quite aware of some of the major dimensions of attributions (internal versus external, controllable versus uncontrollable) and that as children become older they are more likely to use attributions to manipulate another individual's affective state.

BEHAVIORAL GENETICS

Behavioral genetics is not really a theory of development but is a method used to understand the relative contribution of genetic variation and environmental variation to total phenotypic variation in a population. Although it is derived from population genetic theory, behavioral genetic methodology does not address the issue of adaptiveness which is central to sociobiology and ethology. Behavioral genetics is a method for understanding the origins of individual differences within a population rather than for understanding the invariant main trends of development. As Plomin and DeFries (1985) point out, the great majority of information coded in the genes may be invariant and thus not analyzable by behavioral genetic means, whereas these central, genetically based tendencies are fundamental to sociobiological analyses. However, as indicated above, genetic variation underlying variation in human epigenetic rules is essential to theories such as that of Lumsden and Wilson (1981), and estimates of heritability of these rules will be necessary in order to carry out this program of research. Thus, behavioral genetics will become an important tool for sociobiological research, and in the present volume Segal (Chap. 6) shows how behavioral genetic methodology can be used to study cooperation, competition, and altruism. Similarly, Rushton, Fulker, Neale, Nias, and Eysenck (1986) have shown genetic variation for altruism and aggression.

In addition, Segal (Chap. 6) points out that traditional behavioral genetic research viewed twins as individual pair members whose scores were correlated and compared with other groups with different degrees of genetic relatedness. With the introduction of sociobiological thinking, the focus is shifted to the social group. Specific hypotheses regarding the cooperation, competition, and altruism of individuals *with each other* depending on the degree of their genetic relatedness become researchable and theoretically relevant issues, and a quite different methodology must be developed to study these hypotheses. Rather than studying the sources of variation of altruism in a population viewed as consisting of independently existing individuals subjected to independently existing environments, the focus shifts to studying how the genetic relatedness of the individuals in a particular context influences altruism.

CONTEXTUALISM

Recently developmentalists have become more aware of the importance of contextual factors in human development (e.g., Bronfenbrenner, 1977; Lerner & Kaufman, 1986). Development is seen as embedded in a rich web of interactions among different levels of analysis. For example, events occurring at the level of the entire society, such as an economic depression, affect family interaction patterns and these in turn affect

child development. One of the advantages of a nonreductionistic sociobiology, as illustrated above, is that it provides a means of understanding processes which occur at levels higher than the individual. An example of an important contextual variable from a sociobiological perspective is the social control of individual behavior. Individuals are not always free to engage in behavior which maximizes their fitness due to the constraints placed on individual behavior by others. As indicated above, these constraints can be quite insensitive to genetic variation among those to whom they apply, can have egalitarian or antiegalitarian effects on human behavior, and are not predictable from any purely biological theory (MacDonald, 1983, 1987).

There are many examples of the effects of social controls on human development, perhaps the most important being those relating to family structure (MacDonald, 1983, 1987; see this vol., Chap. 11). Other important contextual variables from a sociobiological perspective include the level of available resources, economic production, and external ecological contingencies (MacDonald, 1983, 1987). In general, a sociobiological perspective expects historical and cross-cultural variation in response not only to external ecological contingencies but also to internal social dynamics based on conflicts of interest between individuals and groups. In our own society the social controls on individual behavior resulting from this dynamic are a chronic political issue.

Circumstances which affect the adaptiveness of a behavior in a particular situation constitute another type of contextual variable which is emphasized by sociobiological theory. From this perspective, for example, moral reasoning does not occur in a cognitive vacuum but is importantly influenced by contextual factors such as the biological relatedness of the persons affected by the decision and cost-benefit considerations (see Chap. 5). Human behavior is clearly quite flexible and responsive to changing contexts rather than rigid and stereotyped as in many animals. A sociobiological approach to human behavior will result in placing many of the contextual variables found relevant in empirical research within a wider theoretical perspective.

CROSS-CULTURAL RESEARCH

The incorporation of sociobiological theory into developmental psychology will result in an increased emphasis on cross-cultural research. As emphasized in the discussion of ethological theory (see above), sociobiological theory has the potential of enriching cross-cultural research by providing explanations of cross-cultural variation which incorporate sociobiologically derived variables. Thus research will be aimed not only at verifying the existence of central tendencies in human behavior as a universal phenomenon, but also at illustrating the adaptiveness of patterns of child-rearing and other influences on development within

particular cultural contexts. Such studies can be expected to result in conclusions on the importance of environmental effects in human development and, indeed, such analysis may result in some of the best evidence for environmental effects on child development. Konner (1981) has noted that cross-cultural variation in behavior tends to be far greater than within-culture variation and thus constitutes an ideal laboratory for testing adaptationist hypotheses. If cultural change occurs too rapidly to be due to natural selection acting on genetic variation, there is strong evidence in favor of purely cultural change. Thus, MacDonald (1984) has argued that the patterns of familial affective relations are associated in predictable ways with sociobiologically expected contextual variables and patterns of sexual competition, thus indicating their adaptiveness. However, there is also evidence that these patterns can change too quickly to be due to natural selection acting on genetic variation.

CONCLUSION

The above outline indicates that sociobiological considerations can be successfully integrated with the main empirical and theoretical traditions of developmental psychology. A sociobiological approach will generally add the dimension of adaptiveness to developmental research. Moreover, the focus on conflicts and confluences of interest will have a broad impact on analyses of family and peer functioning and social cognition, especially that involved in moral reasoning, altruism, and peer relations. The behavior of adults toward children will also be illuminated, particularly regarding phenomena such as differential parental solicitude, patterns of child abuse, and the secondary effects of adult sexual behavior. Moreover, there will be an increased emphasis on describing the fundamental epigenetic rules underlying human behavior and how these rules influence behavior in a wide variety of domains. Most broadly, the sociobiologically predicted central tendencies in human behavior will assume central importance, particularly the tendency toward self-interest and the importance of genetic relatedness as a modifier of human behavior. Finally, the contextual variables shown to be important to human development will be placed in a wider evolutionary context.

What Sociobiology Can't Do

Although sociobiology provides a number of significant hypotheses relevant to developmental psychology and places much of the data on social development within a broader evolutionary perspective, it sheds no light on the specific mechanisms involved. There is no methodology

derived from sociobiological theory which will tell us the relative contribution of genes and environment to the development of selfishness. The theory only tells us that selfishness is an important phenotype. The theory is fully consistent with the importance of social learning in human development, but it does not state which epigenetic rules will affect social learning or the degree of their heritability. However, sociobiological as well as ethological theory (Bowlby, 1969, 1973; Lumsden & Wilson, 1981) lead to the expectation that human development will not be fruitfully characterized as proceeding from a *tabula rasa*. At this point, however, such views have become rare among developmental psychologists, the result of a decade of research by behavioral geneticists and other mainstream biologically oriented researchers.

It might be said that although sociobiology provides hypotheses relevant to understanding children, it provides few significant hypotheses relating to human *development*. Many of the hypotheses derived from the theory tend not to single out age as an important variable, with the exception of discussions cast in terms of reproductive value (see Chaps. 3, 7, 9, & 10). This is, of course, an important exception, but nevertheless it might be said that the ecological niche of the child is not well specified with respect to the importance of age as a variable. The evolution of children's behavior has occurred within the presence of adults who are able to control and make decisions regarding the behavior of their children. A preschool child who cannot conserve number would be at a great disadvantage in dealing with a conserving adult stranger, but in fact parents form a buffer between the developing competencies of the child and the world. Children must therefore be viewed as adapted to the context of the family.

Being adapted to the context of a family, however, is consistent with a wide range of competencies and behaviors. For example, it is consistent with a complete lack of continuity in development so that the skills and competencies of the child which adapt it to the protected family environment are totally abandoned in adulthood when real-world problems must be faced. From this perspective it would not be surprising to find a very altruistic child, a child who would give everything to anyone and who is suddenly replaced by a scheming, self-interested adult. As an example of this perspective, Weisfeld and Berger (1983) emphasize the lack of continuity between childhood and adolescence within a sociobiological perspective. Young children with their small physical size are said to occupy a qualitatively different ecological niche than adolescents, with the latter showing a sudden growth spurt, the onset of sexual competence, and a tendency to seek a greater influence in the affairs of the family.

The actual degree of continuity found is, of course, an empirical question, but there is evidence, reflected in the discussions in several of the chapters of this volume for important continuities in sociobiologically

relevant behavior as well. Thus, whatever the developmental fluctuations in selfishness and resource allocation behaviors and in spite of how these behaviors are rationalized (see Chaps. 2, 4 to 6), it is clear that they vary around a generally self-interested mean. In addition, Weisfeld and Billings (Chap. 7) show strong continuity in male dominance throughout childhood. As indicated above, the degree of adaptation to the environment as well as what environment the child is adapting to are empirical questions. Sociobiologically inspired research must ask some of the same questions asked by other researchers: If Piaget had not invented the scientific description of the development of moral reasoning in children, sociobiologists would surely have had to invent it.

Conclusion

The main message of the foregoing discussion is the essential compatibility of sociobiology with the mainstream theoretical and empirical research of developmental psychology. The incorporation of sociobiological thought into developmental psychology will enrich a great many areas, particularly areas of social development, but also those relevant to the intersection of cognitive and social development. In a sense it is surprising that over 100 years after Darwin's work made evolutionary theory the fundamental paradigm of life on earth there remains so much work to be done to fully incorporate this theoretical structure into the mainstream of the scientific study of human development. The essays in this volume are intended to rectify this gap.

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