

# An Ethological-Social Learning Theory of the Development of Altruism: Implications for Human Sociobiology

Kevin Mac Donald

*Department of Psychology,  
University of Illinois at Urbana-Champaign*

This paper presents an ethological-social learning theory of the development of human altruism. Central to the theory is the idea that altruism is a biological system involving the interaction of cognitive, affective, and perceptual processes. These affective processes are viewed as depending crucially on biologically based predispositions to respond to social stimuli, especially parents, during development, and as crucially affecting social learning processes central to altruism. Cross-cultural and historical evidence are discussed indicating associations between the degree of genetic relatedness in societies and familial affective relationships and it is argued that cultural controls on altruism have operated by manipulating the affective environment during development. Understanding the mechanisms underlying human altruism is necessary in order to properly investigate the flexibility, control, and genetic bases of altruism.

**Key words:** Altruism, Ethology, Social learning, Human sociobiology.

Issues surrounding social cooperation and competition have emerged as central to understanding social behavior in animals and humans. At a theoretical level this interest has resulted in theories of group selection, kin selection, and reciprocity in order to account for the myriad forms that social behavior has taken. Lumsden and Wilson (1981) point out that the traditional models of sociobiology have not been concerned with the mechanisms underlying particular be-

havioral systems, but tend to "apply basic principles of optimality in order to predict the behavior and the social patterns that should exist if humans maximize their inclusive fitness . . . the epigenetic mechanisms that give rise to these products are left entirely unexplained" (pp. 348-349). In addition, many of the theoretical formulations of altruism derived from population genetics are almost completely lacking in any discussion of mechanisms, especially as they apply to the advanced vertebrates and humans.

This article is an attempt to sketch an evolutionary theory of some of the proximate genetic and cultural mechanisms or epigenetic rules (Lumsden and Wilson, 1981) involved in the development of human altruism, a topic considered central by sociobiologists. Consideration of these proximate mechanisms is necessary in order to determine the flexibility of human altruism. Secondly, an understanding of the proximal mechanisms sheds light on the means of control of this behavioral system, and, it will be argued, leads to the view that the manipulation of the social environment in conjunction with the genetic substrate for social behavior is quite possibly a major force in human evolution. Humans are seen as selecting their own environments. In addition, a better understanding of the proximate mechanisms involved in social behavior will allow more detailed genetic analysis of the implicated systems. Detailed information on secular shifts in altruistic behavior is also important since, in conjunction with recent theoretical formulations, it is possible to provide reasonable answers to questions regarding the relative influence of genetic versus purely cul-

Received May 20, 1983; revised January 27, 1984.

Address reprint request to Kevin Mac Donald, Department of Psychology, Trinity College, Hartford, Connecticut 06106, USA.

tural transmission in producing variation in altruistic behavior. Lumsden and Wilson (1981) propose that significant genetic change underlying cultural change could occur in as little as 1000 years. Maynard-Smith and Warren (1982) point out that this estimate depends on very high levels of heritability and selection differentials. Nevertheless, if it can be shown that significant cultural change affecting behaviors reasonably classed as altruistic can occur on relatively short time scales, it is evidence that the cultural variation is not significantly affected by genetic variation.

The point of view adopted here is that the analysis of human altruism requires consideration of several different types of variables. The discussion here will focus on developmental influences affecting altruism, and thus represents a fairly small part of the overall problem. An adequate theory would consider at least the following:

*Social controls.* Social controls on altruism can result in involuntary transfers of fitness within or between societies. These fitness transfers may be relatively insensitive to genetic differences among the individuals affected by the transfers. Prime examples would be slavery, military conscription, and taxation which redistributes wealth to individuals without regard for reciprocity. In these cases altruism is maintained by elaborate systems of social controls, often acting on very broadly defined phenotypic classifications such as racial or national classification, age, and sex rather than acting sensitively on genetic variation.

*Ideological factors.* Several authors have pointed out that there are frequent gaps between kinship rules controlling altruism and those predicted on the basis of genetic relatedness. For example, Richarson and Boyd (1978) point out that the unilineal kinship systems so common in human groups often result in the exclusion of altruism from closely related but extra-lineal individuals. It is unlikely that the myriad forms of human kinship systems can be shown to rigidly adhere to fitness maximizing criteria, and Cavalli-Sforza and Feldman (1981) and MacDonald (1983) point out the general possibility of gaps between cultural and Darwinian selection. Moreover, anthropological field studies have shown that kinship classification is often manip-

ulated by individuals for their own ends, resulting in discrepancies between actual behavior and behavior predicted on the basis of the principles of inclusive fitness (Chagnon, 1982), so that a level of ideology relatively free from Darwinian constraints is indicated. Finally, personal ideologies involving moral principles or beliefs in an afterlife may well motivate some individuals to perform self-sacrificing acts or accept lives of celibacy. (See MacDonald, 1983 for a detailed examination of the roles of ideology and social controls in affecting variance in male reproductive success.)

In the following I will begin by discussing the ethological theory of attachment because it is an excellent example of a contemporary developmental mechanism and because attachment, like altruism, involves interactions among a variety of behavioral subsystems. Particularly important is the fact that attachment involves the affective systems, and the following section provides an ethological theory of affective development which will be incorporated into the developmental model for human altruism. Social learning is another system which is crucial for the development of altruism, and the next section summarizes connections between social learning theory and recent sociobiological theorizing. Finally, a developmental model of human altruism involving social learning and affective influences within the family is presented and data are discussed suggesting that environmental manipulations involving the affective systems has been an important factor in human evolution. The theory is thus an attempt to integrate social learning theory and a biological theory of affective development around the issue of altruism.

---

#### ATTACHMENT AS A PARADIGM OF A HUMAN BEHAVIORAL SYSTEM

---

Bowlby's (1969) ethological theory of attachment has had a wide influence on the research and conceptualization of early parent-child interaction. Two aspects of the theory are particularly important for thinking about models for how complex human behavioral systems develop: 1) Bowlby postulates that secure attachment is based on "natural clues" provided by certain stimuli, particularly the presence or absence of the caretaker. These "natural clues" or epigenetic rules in the sense of Lumsden and

Wilson (1981) form the fundamental basis for the ethological theory of affective development discussed in the next section. 2) The attachment behavioral system consists of complex interactions among several behavioral subsystems, including cognitive, affective, perceptual, and motor systems. Thus the infant builds up a schema of its caretaker as responsive or unresponsive, based on a variety of complex cognitive systems. He/she must be able to monitor the caretaker's whereabouts and respond appropriately to the caretaker's absence, and these processes will be affected by the caretaker's behavior as well as any predispositions of the infant. Attachment classification is the outcome of a complex developmental process involving all these processes. Moreover, there are important interactions between attachment and other behavior systems such as exploration, wariness, and affiliation (Sroufe, 1979). Securely attached infants can use their caretaker as a secure base for exploration and are therefore able to attempt mastery of the world of objects, implying the utilization of a great many cognitive skills.

Early attachment behavior has been found to be associated with individual differences in a variety of behavioral domains, including cognitive style, social competence, ego resiliency, and ego control (Sroufe, 1979), and thus is a behavioral system with important adaptive implications. There is evidence that distributions of attachment classification differ cross-culturally and that the mechanisms involved in producing attachment classification have important implications for how variation in attachment classification might be regulated cross-culturally. Since attachment classification depends crucially on the environment, and particularly on the affective environment provided by parents, the theory suggests that culturally-based manipulations of the environment may be important in affecting variation in attachment classification. Thus Grossman, Huber, and Wartner (1981) found a much higher percentage of insecurely attached infants in Germany than is typical of American samples, with 41% of the infants being insecurely attached to both parents, and Sagi, Lamb, Lewkowicz, Shoham, Dvir, and Estes (in press) found very high levels of resistant infants using the strange situation assessment on a Kibbutz sample in Israel. Although no detailed observations of the parents were conducted, Grossman et al. comment that in the area of the

study there is less body contact and a strong push for affective reserve between parents and children. These considerations fit well with the general findings of Ainsworth, Blehar, Waters, and Bell (1978) that lack of body contact and distant parent-child relationships are associated with insecure attachments.

Although other direct evidence for cross-cultural variation in the distribution of attachment classification is lacking, there is clear and systematic evidence for variation in affectively toned parent-child interactions. For example, Konner (1981) and Rohner (1975) summarize evidence suggesting that decreasing parental indulgence is associated with increasing political complexity. (Other evidence for cross-cultural variation in affectively toned parent-child interactions is summarized in subsequent sections of this paper.) Konner (1981) points out that the fact that secure attachment in infancy has been selected for does not mean that secure early attachment is adaptive in all societies (see also Super, 1981). From a sociobiological perspective increasing political complexity is also associated with decreasing genetic relatedness in the society as a whole (Alexander, 1979). Behaviors which have been selected for in societies which are organized around close kinship relations may well be maladaptive in more complex societies where the average degree of genetic relatedness is essentially zero. If it is indeed true, as current research indicates (Sroufe, 1979; Pastor, 1981), that attachment classification has important effects on social interactions with peers (i.e., non-family members) and it is true that degree of genetic relatedness is of fundamental importance in human relationships, one would in fact predict correlations between political complexity and secure attachment. Although there have not been enough cross-cultural studies to make this claim, the data described by Konner (1981) and Rohner (1975) point in this direction.

---

#### THE BIOLOGICAL BASIS OF AFFECTIVE DEVELOPMENT

---

Crucial to the present theory of altruism is that it is a biological system involving a variety of subsystems, including especially the affective environment of the developing child. In this section a biological view of affective development will be presented. As Sroufe (1979) states, "affect is the link between the instinctive behavior

of animals and the flexible behavior of man (p. 501)." Affect here refers to the emotional consequences to the child of the behaviors of those around him/her.

Recent work has shown that parent-child interactions have a large affective component. Stern (1977) discusses the delicate dance of affective modulation between infant and mother. The infant is viewed as an active stimulus seeker with the goal of these playful interactions being simply "to be with and enjoy someone else (p. 71). The interactions involve the provision of stimuli which are attended to with interest and which allow for the buildup and fluctuation of excitement so that affectively positive experiences result. The maintenance of an optimal range of such stimuli requires complex and subtle ability, especially on the part of the parent, to regulate the quality, quantity, and timing of appropriate stimulus events. A similar situation is found in very young infants: The presentation of social stimuli in the form of maternal attention is arousing to the child, and the most important rule for maintaining interaction is that the mother "develop sensitivity to her infant's capacity for attention and his need for withdrawal—partial or complete—after a period of attention to her" (Brazelton, Koslowski, and Main, 1974; p. 59). It has also been found that fathers engage in more affectively arousing styles of play than mothers, especially involving physical activities (Power and Parke, 1981; Lamb, 1977a, b; Clarke-Stewart, 1978). MacDonald and Parke (1984) have found that this style of play is typical of fathers well beyond infancy and is associated with social competence in children.

This suggests that social development can be characterized as a continuum involving the regulation of affectively arousing stimuli between caretakers and children. This process begins shortly after birth, as described by Brazelton et al. (1974), continues throughout infancy (Stern, 1977) and beyond (MacDonald and Parke, 1984). Sroufe (1979) points out that a general trend in development is for the child to be able to control and modulate higher levels of affectively arousing social stimulation. Stimuli that result in crying in very young infants result in laughter in older infants. The older infant does not avert his attention as readily when the mother merely gazes and smiles at him. Intense physical play between fathers and children represents the more intense end of this spectrum.

The evolutionary theory of affect-regulation between parent and child focuses on the proposition that certain nonrandom classes of stimuli from parents are appraised by the child, via a variety of cognitive processes, as subjectively pleasurable. These classes of stimuli are then viewed as part of an evolved meshing of parent and child behaviors which allow for the possibility of arousal regulating behaviors on the part of the parent. The biology of an important aspect of human social behavior is thus fundamentally environment-expectant. Genes are viewed not as programming for dispositions directly, but as programming the affective results of stimuli emanating from the social environment. Stern (1977) and Emde and Gaensbauer (1981) have taken positions similar to this regarding the evolutionary analysis of social interaction between mothers and children.

This point of view is made more plausible by the following considerations: 1) The secondary drive explanation of the development of social reinforcers has been entirely discredited (Rajecki, Lamb, and Obmascher, 1977; Gewirtz, 1972), in large part because of the work of Harlow and his colleagues (Harlow and Harlow, 1965). Thus, the subjectively pleasurable aspects of stimulation during infancy and early childhood cannot be explained as due to conditioning or generalization from prior drive reduction. 2) Parental behaviors which result in positive affect in the child do not comprise a random selection of inputs that varies widely between infants. In fact it is possible to set up stimulus conditions in the laboratory that will reliably elicit affective response in a sample of infants. For example, Cichetti and Sroufe (1978) used a series of 30 procedures to assess positive affect in infants. These included such activities as "with lips relaxed, blow through them as a horse does when tired," use of a falsetto voice, gentle tickling under the chin, and grabbing the child around the stomach after saying "I'm going to get you." As any parent knows, these procedures are likely, given the appropriate circumstances, to result in laughter in a baby. Kagan (1978) also gives a list of "incentive conditions" which result in predictable emotional consequences "in all settings in which children are raised by and live with human beings," among them assimilable or unassimilable discrepant events. 3) Data from other primate species also support the concept of father as playmate (see Parke and Suomi,

1982 for a review). In species in which interactions between adult males and young animals occur, a substantial proportion of the interactions is play. In species with relatively low rates of interaction, play is often the most frequent nonaggressive behavior observed. Even in species where the male does a large amount of caretaking, male-infant play remains at least as high as in other species. By contrast, physical play is not a prominent component of mother-infant behavior.

This point of view fits in well with some aspects of present sociobiological theory. Sociobiologists have emphasized that what humans find reinforcing has evolved by natural selection to maximize inclusive fitness. Thus, Wilson (1975) translates statements made by psychologists concerning the rewarding properties of a behavior as due to selection for such reward responses in the limbic system of the brain (see Pulliam and Dunford 1980 for a more detailed discussion). Such a formulation at once brings sociobiological concerns closer to traditional psychology, and allows for an evolutionary basis for highly flexible behavioral systems. If an individual finds X reinforcing, he/she may well perform any number of nonstereotyped, highly flexible responses to attain X. An example used by Barash (1977) emphasizes this point. Barash asks why sugar tastes sweet. The proposed answer is that sugar from fruit is a very useful food for humans, so that there has been selection for reacting with pleasure to the taste of sugar. Ant-eaters presumably have been selected to enjoy eating ants which taste quite unpleasant to us.

The common thread in these examples and the above discussion of affective development is that in some cases the proximate genetic mechanisms for behavior work by programming for the subjective, affective consequences of environmental stimuli which can then be termed primary reinforcers. The sociobiological theorists above imply a crucial point: Evolution is seen as maximizing subjective, affective pleasure obtained via adaptive interactions with the environment.

---

#### THE EVOLUTIONARY ANALYSIS OF SOCIAL LEARNING

---

It is argued here that, as in the case of attachment, altruism is a complex behavioral system in humans, involving biological predispositions

and the interaction of a variety of behavioral subsystems. Crucial to the discussion is an evolutionary analysis of social learning. Pulliam and Dunford (1980) describe social learning as a shortcut for obtaining adaptive behaviors, since it need not rely on individual trial and error learning. They propose primary reinforcers which have resulted from natural selection which facilitate this process. The cognitive-developmental theory of Kohlberg (1969), which postulates that imitation is intrinsically motivated, is compatible with this point of view. Imitation and identification have long been viewed as of considerable importance in behavioral development in humans and they presumably have important effects on human adaptiveness. Recent studies indicate that imitation is common in a variety of animals (see Galef 1976 for a review). Imitation is clearly a flexible behavioral system: The behaviors that are emulated can vary widely, so that we are not dealing with fixed action patterns of the ethologists. The evolutionary analysis proposes that the system is not constrained by the type of responses possible, but rather by the characteristics of the model which the imitator finds reinforcing as well as the observable results of the modeled action.

That the observable results of the modeled action can influence imitation is well established and indeed Gewirtz (1969) proposes that all imitation is performed ultimately because of external reinforcement and Bandura (1969) states that identificatory responses are greatly influenced by reinforcing the consequences of the behavior. Lumsden and Wilson (1981) also describe imitation and vicarious learning as one of the primary means of "culturgen" transmission, with people assessing the costs and benefits of an action before deciding to adopt a particular cultural choice. These authors propose and give theoretical reasons for supposing that such a system is genetically constrained so that a particular choice is favored over other choices.

Apart from the consequences of the modeled behavior, there is good evidence that characteristics of the model are important for imitation and identification, especially from a developmental perspective. The four main characteristics of the model studied have been the warmth, power, competence and similarity of the model to the subject (Bandura, 1969; Mischel, 1976). Of particular importance here is the construct of warmth, since parental warmth has been shown

repeatedly to be an independent factor in parent-child interactions (Maccoby and Martin, 1983) and has been shown to be associated with altruism in children. The evolutionary analysis of parental warmth postulates that this construct consists of behaviors which are "natural clues" in the sense of Bowlby, behaviors which are experienced by the child as affectively positive because of predispositions which have resulted in the course of natural selection. Although the emphasis here will be on affective relationships within the family, it should be briefly noted that the other effective characteristics of models implicated by the social learning literature may also be important in a complete analysis of human altruism. From an evolutionary point of view it is not at all surprising that power and competence facilitate the effectiveness of a model, since these characteristics are often associated with control of resources.

The case for postulating that there are biologically based predispositions for affectively positive reactions to those behaviors of parents that are labeled warm derives from ethological attachment theory. Such behavior in parents can be seen as a continuation of the types of behaviors necessary for secure, nonanxious attachment in infancy. Ainsworth et al. (1978), as discussed above, have shown that cold, distant mothers are more likely to have anxiously attached children. In addition, since there is no support for the secondary drive theory of attachment and social reinforcers (Rajecki et al., 1981), it is unlikely that parental warmth at later ages is only secondarily reinforcing to children.

---

#### THE HUMAN SOCIOBIOLOGY OF ALTRUISM

---

Altruism is undoubtedly a focal issue of sociobiological theory. In biological terms, an altruist is an individual who gives part of his/her fitness to another individual. Such behavior is observed in social species and the contemporary orthodoxy is that such behavior has evolved via reciprocity or via individual selection acting on the inclusive fitness of the altruist, i.e., the altruist helps those with whom he shares his genes. In accordance with the above considerations, we would expect that there would be some biological basis for altruism in humans.

The theory does not state that there are predispositions for prosocial behavior toward relatives.

For humans there is no evidence that individuals are programmed to recognize relatives and Alexander (1979) argues that prosocial behavior is simply directed toward the individuals one is reared with. Since primitive human social organization is believed to center around the family, such individuals would in fact be relatives, and there is evidence that there is no genetic basis for the recognition of relatives which nevertheless develops as a natural outgrowth of males and females living together for long periods during development (Shepher, 1975; Bischof, 1975; Wolf, 1968). Unrelated individuals who grow up together are generally unable to develop a satisfactory sexual relationship.

There are important implications of this evolutionary scenario. Individuals are viewed as having inclinations to prosocial behavior but with no genetic mechanism to determine those in whom it is in their self interest to help. In small societies based on the extended family this presents no problem, since natural dispositions toward altruism will in fact benefit the individual genetically. However, as societies become larger so that the degree of genetic relatedness is essentially zero for most people in the population, a general disposition toward altruistic behavior, as in the case of secure attachment discussed above, could well be maladaptive and is quite possibly simply the other side of the coin of exploitation. For example, Dickeman (1979) describes traditional Chinese society as structured with high ranking males controlling most of the females of reproductive age while low ranking, unrelated males performed much of the labor on which the society was based. These low ranking males were clearly altruistic in the genetic sense whether or not they accepted their lot. It is certainly biologically possible that such an arrangement would be acceptable to all parties, but human history suggests that such extreme levels of exploitation are based on elaborate social controls which regulate the control of resources, an example of what one might call involuntary altruism.

However, one need not pick so extreme an example to illustrate the idea that a lack of altruism may be adaptive. In an economically stratified society not based on the extended family, competitiveness, aggressiveness, and the ability to manipulate others to one's advantage rather than attend to their needs may predispose toward upward mobility. Indeed Mussen and Ei-

senberg-Berg (1977) summarize much data showing that competitive behavior is much more characteristic of urban societies than traditional rural cultures, and that prosocial behavior is more characteristic of societies where extended families live together, as predicted by sociobiological theory. The proposal here is that by understanding altruism as a behavioral system involving a variety of cognitive and affective subsystems and genetic predispositions we will be better able to account for these cross-cultural data.

Hoffman (1978; 1981) reviews evidence that altruism does indeed have a genetic, evolutionary basis. He points out the high percentage of children who exhibit altruism and experience empathy in experimental situations and the independence of altruism from egoistic motivation. Altruistic behavior often has an automatic quality that also suggests a biologically based motive. Altruistic individuals also tend to be confident and secure, and experimentally arousing positive moods results in higher levels of altruism whereas negative moods and a concern for failure lower prosocial behavior. This is highly relevant since, as argued above, if there is an evolutionary basis to altruism we would expect that altruistic behavior would be associated with subjective pleasure. Finally, Hoffman points out that even 1 or 2 day old infants show empathic responses to the cries of other infants.

This evidence suggests some sort of evolutionary basis for empathy and altruism, but does not indicate the proximate mechanisms involved and does not preclude an evolved environmental control for altruism. Hoffman (1981) argues that bases for egoism and altruism must exist in humans and that there must be ways of distinguishing which is appropriate in a given situation. In particular, the cost/benefit ratio and the degree of kinship must be assessed. This in turn implicates perceptual and cognitive processes as mediators of altruistic behavior in humans. These cognitive processes are theorized by Hoffman to have assumed control over primitive empathic responses in human evolution, and evidence is presented that cognitive appraisal does occur between the presentation of the precipitating stimulus and the visceral arousal associated with empathy.

This is a very persuasive evolutionary scenario and I propose only to add that there is ev-

idence that the affective environment during development has effects on the tendency to engage in altruistic behavior. These environmental forces can then be seen as resulting in a disposition affecting the outcome of cost/benefit decisions when individuals decide whether to help others. In line with the earlier theoretical discussion, the affective environment is seen as an evolved system which affects whether the actions of significant individuals are imitated. Along with the perceptual and cognitive processes described above, human altruism is seen as the result of complex interactions among a variety of behavioral subsystems.

There is very good evidence that a variety of environmental factors during development have important effects on prosocial behavior (see Staub 1979a, b; and Mussen and Eisenberg-Berg 1977 for reviews of the evidence). Staub (1979b) states that perhaps the most important of these environmental influences is an affectionate relationship between parents and children. This variable is here construed as a reciprocal system based on the affective consequences of particular environmental stimuli peculiar to social behavior. Thus, a prosocial orientation is the expected and natural outcome of a parent-child relationship based on these social stimuli. Staub proposes several possible mechanisms by which warm parent-child relations give rise to prosocial behavior, including the possibility that the affective character of the relationship, whether warm or cold, is likely to generalize to other people. Several studies have shown that secure mother-child attachment relationships are associated with positive social interaction with peers (Lieberman, 1977; Pastor, 1981), an effect Pastor ascribes to generalization from the earlier relationship. That social learning is important is shown by data summarized by Mussen and Eisenberg-Berg (1977) who document the effects of the model's warmth and nurturance and state that the effects of parental nurturance on children's prosocial behavior are more consistent if the parents themselves model prosocial behavior.

A study by Rosenhan (1970) will be discussed in detail because it included behavior that involved considerable risk and commitment by the subjects, thus ensuring the highest degree of ecological validity, and it shows clear evidence of the importance of a warm, nurturant environment and the modeling of prosocial behavior.

Rosenhan distinguishes between normative altruism, which involves low personal risk and cost, and autonomous altruism, which involves great risk and sustained action. The latter type of altruism is represented in his study by individuals who participated in the civil rights movement in the South prior to 1961 (the Fully Committed) and the former by individuals who only supported the movement in the relatively painless manner of participating in a very limited number of activities for a short period of time (the Partially Committed). Fully committed individuals "seemed to have formed and maintained a positive, cordial, warm, and respecting relationship with their parent (and often with both parents)" (p. 261). The partially committed on the other hand tended to describe their relationship with their parents as negative or ambivalent, and often as quite hostile. In addition, parents of both groups showed a concern for moral issues but only in the committed group was there a strong tendency for the parents themselves to be committed to an altruistic cause during the respondent's childhood. These parents clearly modeled prosocial, altruistic behavior to their children while among the partially committed there was evidence for a discrepancy between ideology and practice. The author concludes by noting the warm relationship between parent and child resulted in the child being more likely to imitate aspects of parental behavior which the parent wanted to inculcate in the child.

Similar but less clear cut findings have been reported in other naturalistic studies of altruism under less extreme circumstances. Hoffman and Saltzstein (1967) found that maternal and/or paternal affection was associated with consideration for others as well as identification with parents. Hoffman (1975) also found maternal affection to be associated with peer perceptions of boys' but not girls' consideration for others. Rutherford and Mussen (1968) found that children who perceived their father as warm and nurturant were more generous in sharing a reward with other children. Finally, mention should also be made of an extensive literature on experimental work in laboratory settings that is basically consistent with the view that parental affection, warmth and nurturance are important for the development of prosocial behavior and that these dimensions are effective at least in part because these qualities promote identifi-

cation with the parents as models (see Staub 1979a, b; and Hoffman 1981 for reviews).

The above evidence is consistent with the view proposed here of a highly flexible behavioral system, susceptible to environmental influences involving affectively salient social stimuli acting on genetically based response systems. It is thus quite possible that humans with their relatively great ability to manipulate their own environments and those of their children are able to control the adaptiveness of themselves and their children in ways that are far more extensive than is the case with animals. If the genetic systems underlying social behavior are fundamentally environment-expectant, the possibility of manipulating the environment to affect adaptiveness becomes an important consideration. Lewontin (1981) makes a similar point regarding evolution in general, that organisms select their own environments. In a world not dominated by the economically autonomous nuclear family, an environment fostering suspicion and hostility toward others may be highly adaptive.

Cross-cultural data also indicate the importance of affectively-toned familial relationships. Katz and Konner (1981) in a survey involving 80 preindustrial cultures found that fathers tend to be closer to their children in cultures "where combinations of polygyny, patrilocal residence, the extended family, or patridominant division of labor are absent" (p. 203). Father distance is also associated with violent or hypermasculine behavior and one study indicates more assault, homicide, and a preoccupation with violence and strife in father-distant cultures (Whiting and Whiting, 1975a), data highly congruent with Stone's interpretation of the results of parent-child distance in 17th century England (see following). Moreover, Bacon, Child, and Berry (1963) found that personal crime, defined by the intent to injure or kill others, was associated with father-distance and independence training which is "punitive and productive of emotional disturbance in the child" (p. 298). Children in these societies tend to be distrustful and hostile. Katz and Konner point out that in many societies the aggression and violence associated with father distance are used to accumulate women and resources, results obviously relevant to sociobiological theory.

In addition, Whiting and Whiting (1975b) found that father-child distance was associated with distant husband-wife relationships and this

type of relationship was associated with polygyny and military activity on the part of the husband. Since there is a clear association between polygyny and economic productivity (Van den Berghe, 1979), this suggests that economic and political complexity, low genetic relatedness and distant human relationships are associated, a conclusion congruent with the data on parental indulgence and economic complexity discussed by Konner (1981). Corroborating this, in another cross-cultural survey Rohner (1975) found a significant negative correlation between cultural complexity and parental warmth, and Whiting and Whiting (1975b) found that husband-wife aloofness was very rare in the economically less complex hunting, gathering, and fishing societies. The study by Rohner is particularly interesting because it was found that adults who were rejected as children were "less generous and liberal in their giving" (p. 103) than adults from cultures where parental warmth was the norm, indicating an effect on altruism. This study also found the expected negative relationships between parental warmth and hostility in children and adults, and with aggression and a lack of emotional responsiveness in adults. Adults from societies where parents reject their children "are inclined to view the world, life, the very universe itself, as being an unfriendly, uncertain, insecure, and often hostile place in which to live" (p. 103). Peer groups in the societies with warm parent-child relationships also tended to be less hostile.

These data can be accounted for without assuming genetic differences between cultures, but by postulating the manipulation of environmental factors interacting with a genetic substrate as described above. Nevertheless, the data previously summarized are also explainable as being due to parent-offspring genetic correlations. Genetic correlations between parents and offspring may result in parents providing affectively warm environments for their children who are also genetically predisposed to react in the previously described manner to this environment (see Scarr and McCartney 1983 for an extended discussion of this point of view).

That cultural factors can be important is shown by the shifting trends found in Western societies in the last several centuries. Stone (1977) provides an historical account of child-rearing in England from 1500 to 1800 that places some of the above data in an historical perspec-

tive. The usual modes of child-rearing in the 16th and 17th centuries were extremely repressive, including an emphasis on flogging, the early breaking of affectional bonds by the practice of wet nursing and fostering out of children at an early age to act as servants or live-in apprentices, and, for the wealthy, leaving home at an early age for boarding school. In addition there was a conscious attempt to break the will of the child and an emphasis on generally cool and distant relationships between parents and children. Adults in the culture are characterized as "cold, suspicious, distrustful, and cruel, unable to form close emotional relationships and liable to sudden outbursts of aggressive hostility" (pp. 194-195). From 1660-1800 there was a steady reversal of these trends, especially in the upwardly mobile classes. John Locke, for example, believed flogging to be completely ineffectual for intellectual or moral improvement, an association that appears well confirmed by contemporary psychological data. Kagan (1979) comments on the association between more child-oriented ways of child rearing and the emphasis on instrumental competence as a way of achieving upward mobility. Interestingly, the emphasis on warmth and affection was least characteristic of the highest level of society, where position was inherited, and the lowest level of society, where exploitation and indifference were common. However, the 19th century saw a return to many of the repressive aspects of child-rearing characteristics of the 1500-1600 period (Stone, 1977), so that it is not correct to argue on the basis of historical trends that the less repressive system of child-rearing is generally more adaptive in a modern, industrial society. At any rate, there is no evidence of massive natural selection occurring in England at this time for the phenotype of warm parent-child relationships, and it would appear that significant cultural change can occur in this system in a time span that is too short to be due primarily to natural selection acting on genetic variation. Another example in which cultural change relevant to the distribution of resources occurred too quickly to be due primarily to genetic change is described by Richardson and Boyd (1977). In this case the kinship system regulating the social behavior of some groups of North American Indians changed very rapidly in response to the introduction of a horse-hunting mode of existence.

The foregoing indicates that cultural change can occur at rates too fast to be due to genetic

variation. This does not mean that this is the case in the cross-cultural data reviewed above, and several studies quite convincingly suggest genetically influenced differences in affectively-toned interactions between parents and children. For example, Freedman (1979) found differences between Chinese and American infants on dimensions related to affective arousability and soothability and these differences were related to quite different patterns of parent-child interactions in the two ethnic groups. Similar differences have been found between Caucasian and Navajo infants. Thus, the etiology of cross-cultural differences may depend on selection acting on epigenetic rules involving parent-child interaction, although, as indicated by the data from early modern England, this need not be the case. It should also be noted that Cavalli-Sforza and Feldman (1981) show that the parent-child (vertical) pattern of cultural transmission tends to be quite stable, so that the rapid change noted in this case may well involve oblique and/or horizontal transmission of culture, perhaps acting on parental beliefs about appropriate parent-child interaction.

In summary, the data indicate that human altruism comprises a highly flexible behavioral system that is influenced strongly by affectively salient stimuli present during development. This system is manipulable by altering the affective system during development, and the data indicate that differences in the affective environment are associated with meaningful differences in prosocial behaviors in cross-cultural samples. The affective system is viewed as a biologically based system resulting from selection for the affective consequences of social stimulation during development. As in the case of attachment, the altruism system is seen as affected by a variety of perceptual and cognitive processes as well as biological predispositions.

## CONCLUSION

The above account suggests that although there have been immense changes in human social structure since the days of the hunter-gatherers, these changes have been tracked by manipulating genetic systems that were present from the beginning of human evolution. The world of small groups based on genetic relatedness (Alexander, 1979) has given way to civilizations typified by class structure and immense productive

resources (Van den Berghe, 1979), and a decline of societies based on the extended family (Alexander, 1979). This article suggests the possibility that the tremendous changes in social organization have been tracked not only genetically but via manipulation of environments that interact with genetically primed response systems. Research on the role of cross-cultural differences involving affect regulation during childhood is still in its infancy, but there is evidence for cross-cultural variation in this dimension. Dixon, Tronick, Keefer, and Brazelton (1981) found that mother-infant interaction among the Gusii of Kenya was characterized by far fewer affectively arousing interchanges than is typical of American samples. Whereas American mothers tend to stimulate the infant to the limit of its capabilities, the Gusii break off interactions when they become affectively arousing. Adults in the society are not emotionally expressive. Research on the correlates of variation in this type of affective expressiveness is lacking, but the study by Katz and Konner (1981) is a step in the right direction.

The perspective developed here assigns a central role to the development of affective relationships within the family in human evolution. This is so not merely because there is an important biological basis for affective development, but also because the system, based as proposed here on the unconditioned affective results of the behaviors of other people in the environment, is manipulable by programming the social environment of the individual in adaptive or maladaptive ways. If the genetic systems underlying social behavior are fundamentally environment-expectant, an adaptive strategy based on environmental programming of biological systems is a relatively quick route to adaptive responses. A similar analysis applies at the cultural level. Cultural controls on social mobility and male access to females, including ideologies, coercion, and environmental programming can ensure the reproductive success of individuals at the top of the social pyramid far more successfully and with far more certainty than relying on the genetic roulette wheel to result in adaptive phenotypes in one's offspring, and indeed these methods have been used in virtually all historical societies, especially the highly stratified, highly productive societies (MacDonald, 1983; Van den Berghe, 1979). The conflict of interests engendered in any such soci-

ety can lead to social tensions, leveling ideologies, and a host of phenomena which cannot be explained genetically except in the most general way. (For example, one might suppose that individuals are programmed in general to resist genetic exploitation by others.) These phenomena can, however, be placed in an evolutionary, sociobiological context. (For a general discussion of these issues, see MacDonald, 1983.)

The perspective developed here views the biology of human social behavior as the result of the complex interplay between a variety of systems and the social environment. Rather than view attachment classification or altruism as being the result of genes specifically selected to affect these phenotypes directly, these phenotypes are seen as at least partly the result of the interplay between social learning processes endogenous to the organism and the biologically programmed affective consequences of environmental stimulation, especially within the family. Altruism, attachment, and the affective systems generally are environment-expectant systems, i.e., systems in which genes specify not the behavioral phenotype, but the reaction of the organism to the environment. Such systems are highly flexible, since there need be no genetic correlation between the relevant aspects of the environment, such as parental behaviors, and the behavioral phenotype of the organism. As a result, environmental factors resulting from ecological contingencies such as the need for males to leave the family for extended periods of time for military purposes or to guard important resources (Whiting and Whiting, 1975b; Bacon et al., 1963), may have profound consequences on the development of children. Social controls, such as could occur in a highly stratified, exploitative society, may be very insensitive to the genotypes of the individuals subjected to them and yet have important affective consequences within the family, as would occur if these controls resulted in inadequate resources for the family or resulted in the breakup of the family unit. Thus, in some cases it is incorrect to speak of manipulation by individuals of their own affective environment, but more correct to speak of the manipulation of the affective environment by other, unrelated individuals. These phenotypes may well be adaptive or maladaptive in particular environments.

Other genetically based systems and their expected environments are probably also involved

in producing human phenotypes, as well as learning processes such as generalization, discussed above with respect to altruism. The end result appears to be best conceived according to the principles of general systems theory (Sameroff, 1983): The development of an individual is viewed as involving a hierarchy of systems which constantly interact both with each other and with the social environment at all its levels to result in observed behavior.

These considerations lead away from viewing biological systems as consisting of a genetic substrate for some behavioral trait that has been under selection combined with a norm of reaction to environmental stimulation (Dobzhansky, 1970). The affective systems discussed here appear to interact in complex ways with other behavioral systems that may involve learning or other biological systems that have been under natural selection. The genetic basis of the affective system does not code for some behavioral trait that is modifiable by the environment *simpliciter*. Rather, the affective response to environmental stimulation, which has been under natural selection, affects, among other things, what models are attended to, what expectations the child forms regarding others, and what generalizations he/she makes on the basis of experience. Thus, there may indeed be a biologically based empathic emotion that gives rise to altruistic behavior. However, the affective responses to the models in one's environment as well as the actions of the models are also important in determining the circumstances under which altruistic behavior actually occurs. It is these contingencies that result in the highly flexible behavioral systems characteristic of humans. In a sense, the affective systems are nothing in themselves. It is only when they interact with other systems that they profoundly affect social and cognitive development.

I would like to thank Michael Lamb, Department of Psychology, University of Utah, Ross Parke, Department of Psychology, University of Illinois, and Maurice Wade, Department of Philosophy, Trinity College for their helpful comments on previous versions of this article.

---

## REFERENCES

- Ainsworth, M.D.S. The development of mother-infant attachment. In *Review of Child Development*

- Research, B.M. Caldwell and H.N. Riciuti (Eds.). Chicago: University of Chicago Press, Vol. 3 1973.
- Blehar, M.C., Waters, E., Wall, S. *Patterns of Attachment*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1978.
- Alexander R. *Darwinism and Human Affairs*. Seattle: University of Washington Press, 1979.
- Bacon, M.K., Child, I.L., Berry, H. A cross-cultural study of the correlates of crime. *Journal of Abnormal and Social Psychology* 66: 291–300 (1963).
- Bandura, A. Social learning theory of identificatory processes. In *Handbook of Socialization Theory and Research*, D.A. Goslin (Ed.). Chicago: Rand McNally and Co. 1969.
- *Social Learning Theory*. Englewood-Cliffs, NJ: Prentice-Hall, 1977.
- Barash, D.P. *Sociobiology and Behavior*. New York: Elsevier North-Holland, 1977.
- Bischof, N. Comparative ethology of incest avoidance. In *Biosocial Anthropology*, R. Fox (Ed.). New York: Wiley and Sons, 1975.
- Brazelton, T.B., Koslowski, B., Main, M. The origins of reciprocity: The early mother–infant interaction. In *The Effect of the Infant on Its Caregiver*, M. Lewis and L.A. Rosenblum (Eds.). New York: Wiley, 1974.
- Cavalli-Sforza, L.L., Feldman, M.W. *Cultural Transmission and Evolution: A Quantitative Approach*. Princeton, New Jersey: Princeton University press, 1981.
- Chagnon, N. Paper presented at the Human Sociobiology Symposium, Midwest Regional Animal Behavior Society Meeting, University of Illinois at Urbana–Champaign, February, 1982.
- Cicchetti, D., Sroufe, L.A. An organizational view of affect: Illustration from the study of Down's Syndrome infants. In *The Development of Affect*, M. Lewis and L.A. Rosenblum (Eds.). New York: Plenum Press, 1978.
- Clarke–Stewart, A. And daddy makes three: The father's impact on mother and young child. *Child Development* 49: 466–478 (1978).
- ickeman, M. The reproductive structure of stratified human societies: A preliminary model. In *Evolutionary Biology and Human Social Organization: An Anthropological Perspective*, N.A. Chagnon and W.G. Irons (Eds.). North Scituate, MA: Duxbury Press, 1979.
- Dixon, S., Tronick, E., Keefer, C., Brazelton, T.B. Mother–infant interaction among the Gusii of Kenya. In *Culture and Early Interaction*, T. Field (Ed.). Hillsdale, NJ: Lawrence Erlbaum Associates, 1981.
- Dobzhansky, T. *Genetics of the Evolutionary Process*. New York: Columbia University Press, 1970.
- Emde, R.N., Gaensbauer, T. Some emerging models of emotion in human infancy. In *Behavioral Development*, K. Immelmann, G.W. Barlow, L. Petrinovich, and M. Main (Eds.) New York: Cambridge University Press, 1982.
- Freedman, D.G. Ethnic differences in babies. *Human Nature* 2: 36–47 (1979).
- Galef, B.G. Social transmission of acquired behavior: A discussion of traditional social learning in vertebrates. *Advances in the Study of Behavior* 6: 77–100 (1976).
- Gewirtz, J.L. Mechanisms of social learning: Some roles of stimulation on behavior in early human development. In *Handbook of Socialization Theory and Research*, D.A. Goslin (Ed.). Chicago: Rand McNally and Co., 1969.
- Grossman, K.E., Grossman, K., Huber, F., Wartner, U. German children's behavior toward their mothers at 12 months and their fathers at 18 months. *International Journal of Behavior Development* 4: 157–181 (1981).
- Harlow, H.F., Harlow, M.K. The affectional systems. In *The Behavior of Non-human Primates*, A.M. Schrier, H.F. Harlow, and F. Stoltz (Eds.). New York: Academic Press, 1965.
- Hoffman, M.L. Altruistic behavior and parent–child relationships. *Journal of Personality and Social Psychology* 31: 937–943 (1975).
- Psychological and biological perspectives on altruism. *International Journal of Behavior Development* 1: 323–339 (1978).
- Is altruism part of human nature? *Journal of Personality and Social Psychology* 40: 121–137 (1981).
- Saltzstein, H.P. Parent discipline and the child's moral development. *Journal of Personality and Social Psychology* 15: 45–57 (1967).
- Kagan J. On emotion and its development: A working paper. In *The Development of Affect*, M. Lewis and L.A. Rosenblum (Eds.). New York: Plenum Press, 1978.
- Overview. In *The Handbook of Infant Development*. New York: Wiley and Sons, 1979.
- Katz, M.M., Konner, M.J. The role of the father: An anthropological perspective. In *The Role of the Father in Child Development*, (2nd edition), M.E. Lamb (Ed.). New York: Wiley and Sons, 1981.
- Kohlberg, L. Stage and sequence: The cognitive-developmental approach to socialization. In *The Handbook of Socialization Theory and Research*, D.A. Goslin (Ed.). Chicago: Rand McNally and Co., 1969.
- Konner, M.J. Evolution of human behavior development. In *Handbook of Cross-Cultural Human Development*, R.H. Monroe, R.L. Monroe, and B.B. Whiting (Eds.). New York: Garland Press, 1981.
- Lamb, M.E. Father–infant and mother–infant interaction in the first year of life. *Child Development* 48: 167–181 (1977a).
- The development of mother–infant and father–infant attachments in the second year of life. *Developmental Psychology* 13: 639–649 (1977b).

- Thompson, R.A., Gardner, W., Charnov, E.L., Estes, D. Security of infantile attachment as assessed in the "strange situation." *Behavioral and Brain Sciences*, In press.
- Lieberman, A.F. Preschoolers' competence with a peer: Relations with attachment and peer experience. *Child Development* 48: 1277-1287 (1977).
- Lumsden, C.J., Wilson, E.O. *Genes, Mind, and Culture*. Cambridge: Harvard University Press, 1981.
- Maccoby, E., Martin, J. Parent-child relationships. In *Social Development*, (Volume 3 of *Carmichael's Manual of Child Psychology*), E.M. Hetherington (Ed.). New York: Wiley and Sons, 1983.
- MacDonald, K.B. Economics, social controls and ideology: Toward a sociobiology of the phenotype. *Journal of Social and Biological Structures* 6: 297-317 (1983).
- , Parke, R.D. Bridging the gap: Parent-child play interactions and peer social competence. *Child Development* (1984), In press.
- Maynard-Smith, J., Warren, N. Models of cultural and genetic change. *Evolution* 36: 620-627 (1982).
- Mischel, W. *Introduction to Personality*. (2nd edition) New York: Holt, Reinhardt and Winston, 1976.
- Mussen, P., Eisenberg-Berg, N. *Roots of Caring, Sharing, and Helping*. San Francisco: W.H. Freeman, 1977.
- Parke, R.D., Suomi, S. Adult male-infant relationships: Human and non-human primate evidence. In *Behavioral Development*, K. Immelmann, G.W. Barlow, L. Petrinovich, and M. Main (Eds.). New York: Cambridge University Press, 1982.
- Pastor, D.L. The quality of mother-infant attachment and its relationship to toddler's initial sociability with peers. *Developmental Psychology* 17: 326-335 (1981).
- Pulliam, H.R., Dunford, C. *Programmed to Learn*. New York: Columbia University Press, 1980.
- Rajecki, D.W., Lamb, M.E., Obmascher, P. Toward a general theory of infantile attachment: A comparative review of aspects of the social bond. *Behavioral and Brain Sciences* 1: 417-464 (1978).
- Richardson, P.J., Boyd, R. A dual inheritance model of the human evolutionary process I: Basic postulates and a simple model. *Journal of Social and Biological Structures* 1: 127-154 (1978).
- Rohner, R.P. *They Love Me, They Love Me Not*. New Haven, CT: HRAF Press, 1975.
- Rosenhan, D. The natural socialization of altruistic autonomy. In *Altruism and Helping Behavior*, J. Macauley and L. Berkowitz (Eds.). New York: Academic Press, 1970.
- Rutherford, E., Mussen, P. Generosity in nursery school boys. *Child Development* 39: 755-765 (1968).
- Sagi, A., Lamb, M.E., Lewkowicz, K.S., Shoham, R., Dvir, R., Estes, D. Security of infant-mother, -father, and -metapelet attachments among kibbutz-reared Israeli children. In *The Strange Situation: New Directions for Research*, I. Bretherton (Ed.). *Monographs for Research in Child Development*. Chicago: University of Chicago Press, In press.
- Sameroff, A.J. Contexts of development: The systems and their evolution. In *History, Methods, and Theories*, (Volume 1 of *Carmichael's Manual of Child Psychology*), W. Kessen (Ed.). New York: Wiley and Sons, 1983.
- Scarr, S., McCartney, K. How people make their own environments: A theory of genotype-environment effects. *Child Development* 54: 424-435 (1983).
- Shepher, J. Mate selection among second generation kibbutz adolescents and adults: Incest avoidance and negative imprinting. *Archives of Sexual Behavior* 1: 293-307 (1975).
- Sroufe, L.A. Socio-emotional development. In *Handbook of Infant Development*, J.D. Osofsky (Ed.). New York: Wiley and Sons, 1979.
- Staub, E. *Positive Social Behavior and Morality* (Volume 1: *Personal and Social Influences*). New York: Academic Press, 1979a.
- *Positive Social Behavior and Morality* (Volume 2: *Socialization and Development*). New York: Academic Press, 1979b.
- Stern, D. *The First Relationship*. Cambridge, MA: Harvard University Press, 1977.
- Stone, L. *The Family, Sex, and Marriage in England 1500-1800*. New York: Harper and Row, 1977.
- Super, C.M. Behavioral development in infancy. In *Handbook of Cross Cultural Human Development*, R.H. Monroe, R.L. Monroe, and B.B. Whiting (Eds.). New York: Garland Press, 1981.
- Whiting, B.B., Whiting, J.W.M. *Children of Six Cultures: A Psycho-cultural Analysis*. Cambridge, MA: Harvard University Press, 1975a.
- Whiting, J.W.M., Whiting, B.B. Aloofness and intimacy between husbands and wives. *Ethos* 3: 183-207 (1975b).
- Wilson, E.O. *Sociobiology*. Cambridge, MA: Harvard University Press, 1975.
- *On Human Nature*. Cambridge, MA: Harvard University Press, 1978.
- Wolf, A.P. Adopt a daughter-in-law, marry a sister: A Chinese solution of the incest problem. *American Anthropologist* 70: 864-874 (1968).