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Evolutionary Perspectives on Social Development

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Evolutionary psychology is a relatively new discipline within psychology, growing out of the sociobiology movement of the 1970s and coming into its own in the 1990s (Buss, 1995; Tooby & Cosmides, 1992). However, developmental psychology had its origins in evolutionary thinking at the turn of the twentieth century (see Charlesworth, 1992), and many developmentalists, particularly those concerned with social development, have implicitly or explicitly incorporated the concepts of evolution into their theories (e.g., Bowlby, 1969; Hinde, 1980). Thus, the examination of social development from the perspective of the "new" discipline of evolutionary psychology should not involve a theoretical paradigm shift, as it seems to have required in "adult" psychology.

In the sections below, we first describe briefly the conditions under which humans evolved, and then introduce the basic concepts of evolutionary developmental psychology, taking our examples from the arena of social development. We then examine the concept of fitness, specifically as it relates to the development of social behavior. We next examine several aspects of social development from an evolutionary perspective. In the final section, we discuss briefly the benefits of an evolutionary perspective for social development.

Environment of Evolutionary Adaptedness

Evolutionary psychologists propose that *Homo sapiens*' unique intelligence (social and otherwise) evolved to solve adaptive problems faced by our hominid ancestors in the *environment of evolutionary adaptedness*. (*Hominids* refers to the class of bipedal (upright walking) animals that includes humans and our ancient ancestors.) During this time, which is usually conceived as spanning the Pleistocene period (from about 1.8 million years ago until

about 10,000 years before present), our ancestors lived as nomadic hunters and gatherers. But our heritage and our cognitive and behavioral abilities extend further in the past. Modern humans last shared a common ancestor with chimpanzees (*Pan troglodytes)* about 5 to 7 million years ago. The earliest members of the hominid line were small-brained, bipedal animals (*Ardipithecus ramidus*, and *Australopithecus anamensis*) who lived in Africa. One group of australopithecines led to the *Homo* line, including *Homo habilis*, which gave way to *Homo ergaster* (or *Homo erectus)*. Although members of *Homo erectus* spread throughout Europe and Asia about 1.7 million years ago, modern humans apparently evolved in Africa, leaving about 100,000 years ago.

According to most paleoanthropologists, this new species replaced the aboriginal *Homo* species they encountered (e.g., *Neanderthals* in Europe, *Homo erectus* in Asia), either by killing or by out-competing them (Johanson & Edgar, 1996).

Based on analysis of the fossil and archeological records and examination of modern hunter–gatherer societies (see Johanson & Edgar, 1996; Mithen, 1996), our ancestors over the past 2 million years were surely a social species, likely living in groups of between 30 and 60 individuals. They made their living on the savannas of Africa gathering fruits, nuts, vegetables, and tubers (most likely the work of women), scavenging food left over from the kills of large predators, and hunting (most likely the work of men). For the first 4 or 5 years of life, children were most likely cared for almost exclusively by their mothers (as is the case in most mammals), although fathers likely provided protection and support in the form of food and other tangible resources for their children and their children's mothers. It is likely that some males had multiple "wives," whereas others had little or no access to females. In other words, ancient humans (as modern humans) were likely a marginally polygynous species, with males competing with one another for access to females, and females selecting males who could provide resources for themselves and their offspring. Females probably reached puberty in their late teens, with pregnancy following the cessation of nursing a previous child (likely every 3 to 5 years). Infant and childhood mortality were surely high, and, even for those who did make it to adulthood, life was relatively brief by contemporary standards, with few people living past 40 years. It was under these conditions that the modern human mind evolved.

Evolutionary Developmental Psychology

Evolutionary psychology takes the basic ideas developed by Charles Darwin (1859) and updated through the twentieth century and applies them to human behavior. It proposes that there is a true "human nature" – universal aspects of psychological functioning that have evolved to solve relatively specific problems our ancestors faced in the environment of evolutionary adaptedness. The central concept of Darwin's theory is *natural selection*. Darwin proposed that, in any generation, more offspring are born than will survive. Individuals vary in a host of features, and these features are heritable. Some of these features afford a better fit with the local environment than others, and individuals possessing these characteristics are more apt to survive, reproduce, and pass on these same features to their offspring than individuals not possessing these features. In other words, heritable

variations in physical or psychological features of an individual interact with the environment, and, over many generations, change in frequency, resulting, eventually, in species-wide traits in the population. Thus, through the process of natural selection, adaptive changes in individuals, and eventually species, are brought about.

Evolutionary psychologists use natural selection to explain complex psychological functioning (Buss, 1995; Daly & Wilson, 1988; Tooby & Cosmides, 1992). However, evolutionary psychologists have focused mainly on adults. This is reasonable, because it is adults who do the reproducing, the *sine qua non* of Darwinian success. Yet, individuals must first survive infancy and childhood before they can reproduce, and we believe that psychological characteristics favorable to survival during the juvenile period are as, or more, important to the organism as are characteristics of the adult. Along these lines, several researchers have applied an explicitly developmental perspective to evolutionary thinking and formulated the subfield of *evolutionary developmental psychology* (Bjorklund, 1997a; Bjorklund & Pellegrini, 2000, 2002; Geary & Bjorklund, 2000), which is defined as "the study of the genetic and ecological mechanisms that govern the development of social and cognitive competencies common to all human beings and the epigenetic (gene–environment interactions) processes that adapt these competencies to local conditions" (Geary & Bjorklund, 2000, p. 57). Evolutionary developmental psychology assumes that, not only are behaviors and cognitions that characterize adults the product of selection pressures operating over the course of evolution, but so are characteristics of children's behaviors and minds. Evolutionary developmental psychology is concerned not only with universals – patterns that characterize all members of a species – but also with how *individuals* adapt their behavior to their particular life circumstances. Below we will articulate what we see as some of the concepts central to evolutionary developmental psychology, particularly as they are applied to social development.

Basic principles of evolutionary developmental psychology

1. *Evolutionary developmental psychology involves the expression of evolved, epigenetic programs, as described by the developmental systems approach*. Taking an evolutionary psychological approach requires that one make explicit one's stance on the nature/nurture issue. (In fact, we believe that taking a *developmental perspective*, of any type, also requires this.) Most developmentalists, we believe, would concur that the issue is not "how much" of any trait is due to nature and "how much" is due to nurture, but rather "how do nature and nurture interact to produce a particular pattern of development." But stating that biology and environment, broadly defined, interact, in and of itself, advances the argument very little. We must specify *how* biological and environmental factors interact. We believe that the *developmental systems approach* (e.g., Gottlieb, 1991, 1998) provides the most appropriate model for describing the nature of this interaction.

Central to the developmental systems approach is the concept of *epigenesis*, which Gottlieb (1991) defines as "the emergence of new structures and functions during the course of development" (p. 7). New structures do not arise fully formed, but are the result of the bidirectional relationship between all levels of biological and experiential factors, from the genetic through the cultural. "Experience," from this perspective, involves not only events

exogenous to the individual but also self-produced activity, such as the firing of a nerve cell. Functioning at one level influences functioning at adjacent levels, with constant feedback between levels. This relationship can be expressed as follows:

> genetic activity (DNA ⇔ RNA ⇔ proteins) ⇔ structural maturation ⇔ function, activity.

From this viewpoint, there are no simple genetic or experiential causes of behavior; all development is the product of epigenesis, with complex interactions occurring among multiple levels.

Evolved psychological mechanisms can be thought of as genetically coded "messages" that, following epigenetic rules, interact with the environment over time to produce behavior. Because the experiences of each individual are unique, this suggests that there should be substantial plasticity in development. Yet, there is much that is universal about the form and function of members of a species, despite this plasticity. The reason for this is that individuals inherit not only a species-typical genome, but also a species-typical environment, beginning with the prenatal environment. To the extent that individuals grow up in environments similar to those of their ancestors, development should follow a species-typical pattern.

Infants are not born as blank slates; evolution has prepared them to "expect" certain types of environments and to process some information more readily than others. Yet, it is the constant and bidirectional interaction between various levels of organization, which changes over the course of development, that produces behavior.

2. *There is need for an extended childhood to learn the complexities of human social communities*. Central to the application of evolutionary thinking to human development is the recognition that members of *Homo sapiens* have a life history in which they spend a disproportionate amount of time as pre-reproductives. Clearly there are costs to postponing reproduction. Until relatively recently, many children died before ever reaching puberty. From an evolutionary perspective, the benefits associated with an extended period of immaturity must have outweighed the costs. Those benefits can be seen in mastering the complexities of a human social community. A number of theorists have proposed that the single most potent pressure on human intellectual evolution was the need to cooperate and compete with conspecifics (e.g., Humphrey, 1976). As hominid social groups became more complex, individuals who could better understand their social world gained more of the benefits in terms of available mates and resources and passed those characteristics along to their offspring. The greater social complexity of hominid groups required a greater awareness of ourselves and the needs and motivations of others so that we could better understand, and perhaps manipulate, others. But there is much variability in human social life, necessitating a flexible intelligence to master the vagaries of group living. This requires not only a large brain, but also a long time to accomplish. It was the confluence of a large brain, social complexity, and an extended juvenile period that set the stage for the modern human mind.

3. *Many aspects of childhood serve to prepare the way for adulthood and were selected over the course of evolution. Many sex differences in social and cognitive abilities are good examples*. Evolutionary psychologists have, like social psychologists, been interested in sex

differences. The reproductive goals of men and women are similar (i.e., to get their genes into the next generation), but they are approached in different ways. This is because males and females invest differently in their offspring, with females of most species, including humans, investing more in their offspring than males. This differential investment in reproductive and parenting effort is captured by Triver's (1972) *parental investment theory*. The potential consequences of any copulation are substantially greater for women than for men. For women, conception can result in 9 months of pregnancy, and, until the recent advent of baby formula, 3 to 4 years of nursing. Men, unlike the vast majority of males of other mammalian species, do spend significant time caring for and interacting with their offspring, but still, in all cultures observed, spend significantly less time in such endeavors than women (see Geary, 2000). These basic differences in reproductive and parenting effort should have served as selective pressures for the evolution of different mating and childrearing strategies in men and women (Bjorklund & Shackelford, 1999). Although one's culture, a proximal mechanism, surely has a profound impact on such sex differences, evolved "strategies" are the distal mechanisms that interact with these differences in all societies. But importantly, these differences do not arise fully formed at adolescence, but develop gradually over childhood, with children adapting their gender-specific behavior to the local norm, based on evolved predispositions.

Sex differences in children's play provide good examples of precursors to (and thus preparations for) adult sex differences (Bjorklund & Pellegrini, 2000). (See chapters by Pellegrini and by Göncü, Patt, & Kouba, this volume, for more detailed discussions of children's play.) Boys and girls in all cultures, and indeed in many nonhuman mammalian species (e.g., Smith, 1982), segregate themselves by sex when there are enough children in the peer group to do so (Maccoby, 1998). One reason for this sex segregation is the way in which boys and girls play. For example, as early as age 3, boys engage in more rigorous rough-and-tumble play than girls (see Pellegrini & Smith, 1998), a pattern that is found in many nonhuman primates (Smith, 1982). One function proposed for rough-and-tumble play is preparation for adult fighting and hunting in males (Biben, 1998), based on the similarity between such play and adult behaviors. Girls, on the other hand, engage in more play parenting (i.e., doll play) than boys, a sex difference that is even found in some primates (Pryce, 1995). Girls' play is less often centered around physically based dominance relationships, a difference that has been viewed as an evolved tendency that relates to the fact that females are the primary caretakers for their offspring (e.g., Biben, 1998; Geary, 2000).

Another robust sex difference is in physical aggression (Maccoby, 1988). Males engage in more physical aggression than females in all cultures and at all ages, but the greatest consequence of this sex difference is seen in adolescence and young adulthood (Daly & Wilson, 1988). According to parental investment theory, the sex that invests more in offspring (females) is more selective in choosing a mate, and the sex that invests less in offspring (males) competes for access to the higher-investing sex. In humans, as in other mammalian species, there is substantial fitness variance between the sexes. Most mammalian females will find a mate, even if not a highly desirable one; in contrast, the fitness variance is larger for mammalian males, with many males being totally excluded from mating (Trivers, 1972). As a result, selection favored a male psychology that emphasized competitive risk (Daly & Wilson, 1988). Such risk taking, and the violence that can ac-

company it, peaks in adolescence and young adulthood, when males are entering the reproductive market. This is seen in deaths and injuries from automobile accidents as well as being victims and perpetrators of homicide (National Center for Health Statistics, 1999).

The proposal that sex differences in children's social behaviors serve as preparations for adulthood and are based upon evolved epigenetic rules, does not minimize the role of culture. These evolved "strategies" develop in interaction with children's physical and social environment and can be viewed as biases that will lead children in the "right" direction (i.e., a form of adult behavior that has, over many generations, been associated with reproductive success). The strategies for complicated social behaviors that humans have evolved possess a substantial degree of plasticity. But the universality of these behaviors and the fact that many are also observed in nonhuman primates, suggest that they share a common evolved mechanism that requires a prolonged developmental period for their eventual expression.

4. *There have been different selection pressures on organisms at different times in ontogeny, and some characteristics of infants and children were selected in evolution to serve an adaptive function at that time in development and not to prepare them for later adulthood*. Development is understandably thought of as being progressive, with earlier, immature forms of acting and thinking being replaced with later, more mature forms. Coupled with this reasonable idea is the notion that childhood is a preparation for adulthood. Early experience serves to organize the personality or the mind, setting the stage for later functioning. This, too, is a wholly reasonable argument, one we advocated for aspects of children's play above. However, we believe that many features of infancy and childhood have been selected in evolution to serve an adaptive function at that time in development only and not to prepare the child for later life (Bjorklund, 1997b).

One area of social-cognitive development that may be a candidate for the adaptive value of immaturity concerns young children's abilities to estimate their competence on a wide range of tasks. Young children are notorious overestimators of their own abilities. Preschool and early school-age children think they are smarter, stronger, and generally more skilled than they really are (e.g., Bjorklund, Gaultney, & Green, 1993; Stipek, 1984). More specific to the social domain, preschoolers overestimate their own toughness, or dominance, in relation to the estimates of their peers (Sluckin & Smith, 1977). Bandura (1989) has postulated that the confidence people have in their competence in a particular domain affects which tasks they choose to perform and how long they persist at those tasks. Thus, children who think they are skilled in a domain are likely to attempt more challenging tasks and stick at them longer than less optimistic children, and this, in turn, will influence how much they learn.

One area of particular importance for social development is that of imitation. Observational learning is central to Bandura's (1989) theory of social cognitive development, and imitation is the best demonstration that observational learning has occurred. In research with preschoolers, Bjorklund and his colleagues (1993) reported that children overestimated their imitative attempts 56.9% of the time, believing that they were more competent in their imitative attempts than the actually were; in contrast, underestimation was rare (5.1% of all occurrences). In a follow-up study, verbal ability was significantly related to 3- and 4-year-old children's meta-imitation (knowledge of their own imitation abilities), with children who overestimated more having higher verbal abilities than children

who were more accurate at predicting their imitative attempts. The relation was reversed but nonsignificant for 5 year olds. Bjorklund et al. suggested that young children's immature metacognition permits them to imitate a broad range of behaviors without the knowledge that their attempts are inadequate. Thus, bright young children will continue to try a variety of different behaviors, unperturbed by the negative feedback that a more accurate perception of their abilities would provide. The central message we wish to make here is that many aspects of youth are adaptive for their own sake; they provide immediate rather than deferred advantages, and they should be evaluated not for their future benefits but for the function they serve children in the here-and-now.

5. *Most, but not all, evolved psychological mechanisms are domain-specific in nature.* Evolutionary psychologists propose that what has evolved are domain-specific information-processing programs, selected to deal with relatively specific types of problems that our ancestors would have faced in the environment of evolutionary adaptedness. Rather than seeing the human mind as consisting of a general-purpose processing mechanism that can be applied to a wide range of problems, evolutionary psychologists see the mind as consisting of a set of modules, each specialized to deal with a certain type of problem and relatively independent from other modules (Buss, 1995; Tooby & Cosmides, 1992). Within social psychology, domain-specific abilities have been hypothesized for attachment, hierarchical power, coalition groups, reciprocity, and mating (Bugental, 2000), as well as for theory of mind and other forms of social cognition (Geary, 2001), which we will discuss below.

6. *Evolved mechanisms are not always adaptive for contemporary people*. Just because some social, behavioral, or cognitive tendency was adaptive for our ancient ancestors does not mean that it continues to be adaptive for modern humans. Our penchant for sweet and fatty foods, highly adaptive in an environment when one could not be certain where the next meal was coming from, may be maladaptive today in our world of plenty. With respect to children, formal schooling represents a situation in which many of their evolved tendencies do not fit well with the demands of modern society. From the perspective of evolutionary psychology, much of what we teach children in school is "unnatural" in that teaching involves tasks never encountered by our ancestors (e.g., Pellegrini & Bjorklund, 1997).

Reading and higher mathematics may be the best examples of skills our ancestors never acquired, but the "unnaturalness" of school also extends to the social and behavioral realms. For example, most modern schools' emphasis on seat work and focusing attention for an extended period of time, may conflict with children's natural tendencies toward high activity and exploration, particularly in boys. This can be seen in the high incidence of attention-deficit/hyperactivity disorder (ADHD) among school children in some countries today (Jensen et al., 1997). Several researchers have suggested that many children diagnosed with ADHD may simply be highly active and playful youngsters who have a difficult time adjusting to the demands of school (Panksepp, 1998). Jensen et al. (1997) have suggested that the high levels of motor activity and constant switching of attentional focus in children diagnosed with ADHD may have been adaptive to our ancestors (and may still be in some environments today). Unfortunately, such behavior is in conflict with "proper" school conduct and is often treated with psychostimulant drugs that reduce hyperactivity, but may also reduce the desire and opportunity to play, which may, in turn, reduce neural and behavioral plasticity.

Fitness and the Development of Social Behavior

Although social developmentalists are concerned with a wide range of behaviors, most can be divided into two broad categories: prosocial and antagonistic, the latter including aggression and overt competition. Evolutionary psychologists have similarly been concerned with these two broad classes of social behavior, attempting to determine how these behaviors serve to benefit the reproductive success of those who engaged in them.

Any behavior has both costs and benefits to an individual, and if a behavior is associated with greater benefits relative to costs within a population, over many generations, it will be favored by natural selection. From this perspective, it is easy to see why aggression would be adaptive, especially when it is associated with low risks. When aggression "works" to secure mates or other resources more often than it fails, natural selection will favor those individuals who use it effectively. This does not make aggression inevitable; natural selection would not favor cases where costs associated with aggression outweighed benefits, for example, incurring a debilitating injury for the sake of securing a mate. But it does help us understand why aggression is so difficult to eliminate, especially in environments where resources go to the bold rather than the meek.

Although it is relatively easy to explain why aggression, in some contexts, should have benefits and be favored by natural selection, it is more difficult to explain the prevalence of prosocial behavior, particularly altruism, from an evolutionary perspective. Individuals who help others are incurring an immediate cost and no obvious immediate benefit. Given that modern evolutionary theory sees the individual, and not the group or the species, as the unit of selection, why should altruism flourish?

An initial explanation for altruism was provided by Hamilton's (1964) theory of *inclusive fitness*. Following Darwin, reproductive success is determined by how many children and grandchildren one produces. Inclusive fitness takes a gene's-eye view of evolution, however, and proposes that fitness is defined by how many copies of one's genes make it into future generations. For instance, a person enhances his or her inclusive fitness by fostering the success of genetic relatives such as siblings, children, grandchildren, nieces, and nephews.

But children (and adults) also behave prosocially with nonkin. Our ancestors likely lived in small groups that consisted of a high proportion of kin, but also many nonkin (Bowlby, 1969). As a result, groups comprised individuals with whom they shared not only genes, but also a social history as well as a social future, making cooperative relations between both kin and nonkin adaptive.

That social behavior tends to be cooperative among social actors who are familiar with each other and meet repeatedly, has been expressed in the theory of *reciprocal altruism* (Trivers, 1971). Costs associated with prosocial behaviors will be minimized, *quid pro quo*, by others reciprocating the good turn. Similarly, aggressive acts will be reciprocated. In this way, costs associated with cheating outweigh benefits when dealing with individuals in a stable social group. When actors are not related or familiar with each other, and when there is little chance of future interactions, individuals act in their own immediate self-interest. Such circumstances would reward deception and discount cooperation and altruism. In short, cooperating with kin and familiar conspecifics is favored by natural selection,

because benefits outweigh costs. By extension, the ability to detect "deception" and "cheating" are important cognitive skills that probably evolved in response to such pressures (Humphrey, 1976).

Topics in Social Development from an Evolutionary Perspective

Evolutionary psychologists believe that all aspects of human functioning can be (perhaps *should be*) explained from the perspective of natural selection. There are some domains within social development, however, that have been analyzed extensively in terms of evolutionary theory, and we will describe briefly research for several of these topics.

Theory of mind

Perhaps the single most basic ability underlying human social interaction is the understanding that other people have knowledge and desires that may be different from one's own. *Theory of mind* has been used to reflect this knowledge. Most children develop an adult-like understanding of mind by 4 years of age (Perner, Leekam, & Wimmer, 1987; Wellman, 1990) as reflected by performance on *false-belief tasks*. In one version of the task, children are shown a box of candy. They are then asked what is inside the box, and they say "candy." The box is then opened and, instead of candy, they see that the box contains pencils. The pencils are then returned to the box and they are asked what their friend, who has not seen the pencils, will think is in the box. Most children 3.5 years of age and younger say "pencils," believing that their friend will know what they know. Interestingly, when asked what they originally thought was in the box, they say "pencils," seemingly forgetting their response from just seconds before. By age 4, most children answer these questions the way adults do.

Consistent with the domain-specificity perspective of evolutionary psychology, several researchers have proposed that theory of mind consists of a series of highly specialized modules that develop over the preschool years (Baron-Cohen, 1995; Leslie, 1994). For example, Baron-Cohen (1995) has proposed four separate interacting modules involved in theory of mind. For instance, the *intentionality detector* (ID) module permits one to infer that a moving object may have some intent toward him or her (e.g., it may bite me or groom me). The *eye-direction detector* (EDD) module serves to interpret eye gazes (if an organism's eyes are looking at something, that organism then *sees* that thing). These modules develop in infancy (by 9 months of age). The *shared-attention mechanisms* (SAM) module involves three-way interactions between the child, another person, and an object, so that if person A and person B are both looking at object C, they both see the same thing. This develops by about 18 months. The *theory of mind module* (TOMM) reflects "adult" understanding, and develops around 4 years of age.

The last two modules may be unique to humans. Although field research with chimpanzees indicate that they engage in some acts of social deception and cooperation, they may accomplish these feats without having a theory of mind, but relying instead on a well-

developed learning ability that permits them to adjust their behavior as a consequence of previous interactions with other troop members (e.g., Povinelli & Eddy, 1996). In fact, some well-controlled laboratory research indicates that chimpanzees may not even possess the EDD module, for they frequently fail to recognize that an individual who is looking at an object possesses information that a blindfolded individual does not (Povinelli & Eddy, 1996). (But see research using a more natural competitive-food situation with conspecifics, Hare, Call, Agentta, & Tomasello, 2000; Hare, Call, & Tomasello 2001). Moreover, there is evidence that the principal deficit in high-functioning autistic people is related to theory of mind. Numerous studies have shown that high-functioning autistic children and adults are able to solve nonsocial problems relatively easily (comparable to an IQ-matched nonautistic sample), but more frequently fail similar problems presented in a social context (such as false-belief tasks) (see Baron-Cohen, 1995 for a review). What these individuals lack, presumably, are the SAM and TOMM modules, making the social lives of these people very different from those of others.

Although theory of mind develops at about the same time in most children around the world (e.g., Avis & Harris, 1991), the rate of its development is related to aspects of children's social environment. For example, both the number of adults and the number of older peers that a preschool child interacts with daily are positively related to their scores on false-belief tasks (Lewis et al., 1996). Similarly, children from larger families tend to pass false-belief tasks earlier than children from smaller families (Perner, Ruffman, & Leekam, 1994), although more recent research suggests that it is not family size, per se, that is so important but that the critical factor is having *older* siblings (Ruffman, Perner, Naito, Parkin, & Clements, 1998). There may be many reasons for the importance of interacting with older siblings, peers, and adults for theory-of-mind development. Among some that have been suggested are greater opportunities for discussions of mental states, managing social conflict, pretend play, and reasoning about social issues (e.g., Lewis et al., 1996; Ruffman et al., 1998; Smith, 1998). For example, Ruffman et al. argued that having older siblings stimulates fantasy play, which helps children represent "counterfactual states of affairs," a skill necessary for solving false-belief tasks. Cummins (1998) suggested an explanation based on dominance theory. Siblings are always competing for resources, with older sibs typically having the advantage because of their greater size and mental abilities. Younger children would be motivated to develop whatever latent talents they have to aid them in their social competition with their older sibs, and developing an understanding of the mind of your chief competitor sooner rather than later would certainly be to the younger sib's advantage. A similar argument can be made for interacting with older peers.

Although human children are clearly prepared to develop a theory of mind, something that seems not to be the case for any other species, they require a supportive social environment for these abilities to develop. Smith (1998) proposed a "theory-of-mind-acquisition-support system" analogous to what Bruner (1983) proposed for language acquisition. At this point in our evolutionary history, it seems that any "normal" human social environment will suffice. However, individual differences in children's social experiences, particularly over the infancy and early childhood years, may lead not only to differential rates of theory-of-mind development, but perhaps to different *types* of theory of mind, conducive to the type of environment (e.g., supportive, nonsupportive) in which children develop.

Alternative mating strategies in response to different life circumstances

One misconception many people have of evolutionary accounts of social behavior is that if some behavior "has evolved," it must be rigidly organized and not susceptible to modification. In actuality, evolutionary accounts propose that infants come into the world with predispositions to process certain classes of information in certain ways, but that different patterns of behaviors and thought will develop depending on a child's developmental history. Different patterns, however, should be generally predictable, based on what types of behaviors should produce (or should have produced in our environment of evolutionary adaptedness) adaptive outcomes.

Such differential patterns have been predicted and observed for adolescent behavior as a function of the nature or degree of parental support over childhood. For example, although secure attachment, with attentive parents who are responsive to infants' and young children's signals of physical and social needs, is viewed as optimal, it may not be the best-suited style of attachment in all environments. Different attachment styles may reflect different adaptive solutions to different environments, and insecure attachments, for example, should not automatically be viewed as less optimal than secure attachments. For instance, in comparison to children from low-stress, father-present homes, children from homes characterized by high stress, marital discord/father absence, inadequate resources, and harsh and inconsistent childcare, attain puberty earlier, form short-term and unstable pair bonds, invest relatively little in their own offspring, and tend to be noncompliant and aggressive (especially boys) (e.g., Belsky, Steinberg, & Draper, 1991; Kim, Smith, & Palermiti, 1997). Given the unpredictability of resources, this pattern of early maturation and adolescent promiscuity may lead to the greatest inclusive fitness and be the more prudent strategy than delaying reproduction and investing more in fewer offspring. The latter strategy may be most adaptive for children growing up in low-stress and stable environments. Thus, depending on the availability of resources, which is related to parental investment and spousal harmony, different patterns of socialization occur that result in differential investment in the next generation.

The effects of home environment on reproductive maturity tend to be greater in females (e.g., Kim et al., 1997), which would be expected given the greater investment in any offspring for females than for males. (Recall our earlier discussion of parental investment theory.) Other research, however, indicates that fast-developing girls from high-stress homes also had mothers who reached puberty early, indicating a possible genetic cause (Moffitt, Caspi, Belsky, & Silva, 1992). One interpretation of these findings is that, over many generations, maturation rates may be selected so that they are compatible (and confounded) with general aspects of the environment. For example, the mothers of fast-maturing daughters, too, grew up in unstable environments, making it difficult to untangle genetic from the environmental causation. Thus, we do not see evidence for the inheritance of maturation rate to be necessarily contradictory to an evolutionary psychological explanation for the phenomenon under study. Future research is needed, however, to determine how these factors interact.

Interacting with peers

Much research in social development has focused on peer interactions, and rightfully so, given the significant role that peers play in children's lives and in shaping their development. Harris (1995) has proposed that humans, and other primates, have inherited four evolutionary adaptations that underlie much of our social interactions with peers: (1) group affiliation and in-group favoritism; (2) fear of, and/or hostility toward, strangers; (3) within-group status seeking; and (4) the seeking and establishment of close dyadic relationships. Although these adaptations are found early in life, they nonetheless develop over childhood. Harris (1995), in her *group socialization theory*, further proposes that the peer group plays *the* critical role in socialization, with the effects of parents and teachers being filtered through the peer group. Although we do not mean to minimize the role that parents play in children's development (see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000), research has consistently documented the waning influence of the home environment on personality and intellectual development over the course of childhood (e.g., McCartney, Harris, & Bernieri, 1990). This makes good evolutionary sense, in that Harris proposes that, as they grow older, children will operate outside the home and compete and cooperate with agemates of their group. Becoming too well adapted to the home and too agreeable to the demands of one's parents is not (usually) conducive to one's inclusive fitness.

A thorough examination of peer relations from an evolutionary perspective is beyond the scope of this chapter. We will discuss briefly, however, the role of *social dominance* in children's groups.

Dominant individuals within a group have greater access to limited resources (be it food, mates, or toys in the case of children) and will use a variety of techniques to attain and maintain their preferred status (see Hawley, 1999). Dominance is usually expressed in terms of a hierarchy with transitive relations among individuals (e.g., if A is dominant relative to B and B is dominant relative to C, then A is dominant relative to C). Dominance in children's groups is often expressed in terms of aggressive behaviors, with more aggressive children being dominant relative to less aggressive ones (e.g., Vaughn & Waters, 1981). However, cooperative and other prosocial behaviors may also characterize high-status (i.e., dominant) children, depending on the context. In both children (e.g., Pellegrini & Bartini, 2001) and chimpanzees (e.g., de Waal, 1982), cooperative and reconciliatory strategies are used in situations where the dominant individual needs his or her subordinates and the subordinates are free to leave the group. That dominance includes both affiliation and agonistic behaviors is consistent with findings from both the period of early childhood and early adolescence, where dominance is positively and significantly correlated with popularity (Pellegrini & Bartini, 2001).

Dominance hierarchies serve to reduce antagonism within the group, distribute scarce resources, and focus division of labor. They are found at all ages in which children interact in groups, beginning during the toddler years (see Hawley, 1999). In the initial stages of group formation, children (particularly boys) attempt to establish leadership and gain access to resources via aggression (Strayer & Noel, 1986). Once dominance hierarchies are established, rates of aggression decrease and leaders use prosocial and cooperative strategies more frequently. This suggests that dominant children have a varied behavioral repertoire,

which includes both cooperative and prosocial strategies as well as aggressive strategies. The data for both childhood and early adolescence suggests that in the initial phases of group formation dominant youngsters initially use aggression in effective and Machiavellian ways (e.g., to help friends) rather than indiscriminately and reactively. After this sort of dominance exhibition, the "winners" may use more cooperative and reconciliatory strategies. In this way "defeated" individuals" can be integrated into the alpha individual's group of possible allies (deWaal, 1982).

Cummins (1998) has argued that social reasoning grew out of the need to negotiate dominance hierarchies. The realities of life in a complex social group make dominance hierarchies necessary (at least in the absence of codified laws and police enforcement). The tendency to affiliate is strong and emerges early in childhood, and patterns of social dominance seem to be a necessary dimension of such affiliations. Children are well prepared for social relations, based both on inherited evolutionary adaptations and their species-typical experiences as infants. They require no formal instruction from adults to form groups and seem intuitively to understand and to learn quickly the reality of dominance hierarchies and how to live within them.

Evolution and Social Development

One cannot consider "human nature" independent of the social world in which people live and develop. Evolutionary psychology assumes that the human mind has been prepared by natural selection, operating over geological time, for life in a human group. But social complexity is not limited to adult interactions, it also characterizes the interactions of children. Moreover, because of the diversity of environments in which humans live, the complicated and often shifting nature of social alliances, and the need to both compete and cooperate with kin, familiar nonkin, and strangers, humans need a long apprenticeship to master the ways of their social world. Children, as well as adults, have been prepared by evolution to navigate these often stormy social waters. An evolutionary developmental perspective provides a broader framework (a "metatheory") for understanding children's social behaviors and permits us to ask new questions and to see development from a different vantage point. It also may provide insights to some contemporary social issues such as teenage pregnancy, bullying in schools, sibling rivalry, child abuse, and parent–child conflict, among others. Adopting evolutionary theory does not "reduce" humans to being "mere animals," but rather allows us to view our kind from a broader perspective and to gain a better appreciation for what it means to be human.

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