



COOPERATION OR CONFLICT?

It's Not All Sex and Violence: Integrated Anthropology and the Role of Cooperation and Social Complexity in Human Evolution

ABSTRACT Social scientists, especially anthropologists, have long endeavored to understand the evolution of “human nature.” This investigation frequently focuses on the relative importance of competition versus cooperation in human evolutionary trajectories and usually results in a primary emphasis on competition, aggression, and even war in attempting to understand humanity. This perspective conflicts with long-standing perspectives in anthropology and some emerging trends and theory in evolutionary biology and ecology. Cooperation and competition are not mutually exclusive in an evolutionary context. As anthropologists, we have demonstrated that humans can—and usually do—get along. Evolution is complex with multiple processes and patterns, not all of which involve competition and conflict. In this article, I summarize elements of modern ecological and evolutionary theory in the context of human cooperative patterns in an attempt to illustrate the valuable role of evolutionary theory and cooperative patterns in integrative anthropological approaches to the human condition. [Keywords: cooperation, competition, evolution, violence, war]

THERE IS A LONG HISTORY in Western thinking of debating whether humans are innately competitive or cooperative. Within this debate, it has not been unusual for the lay public, philosophers, and social scientists alike to contrast Hobbesian notions of an intrinsic competitive human nature resulting in intergroup aggression with the Rousseauian concept of human aggressive competition arising exclusively from patterns of social control and hierarchy. In such discussions, the existence of warfare and intergroup aggression are frequently used to indicate natural tendencies toward competition, whereas a lack of warfare or constant overt competition is taken as evidence of tendencies toward peaceful cooperation.

In his review of the history of the debate on warfare among humans, Doyne Dawson (1996) indicates how in much contemporary thinking, the broad Hobbesian view of innate aggression has come to be overlaid with both the Malthusian idea that warfare has the adaptive function of controlling population growth and the Spencerian idea that competition and warfare have served the grand

selective function of enabling the “fittest” of groups to evolve and progress. Given Charles Darwin’s (1871) own reliance on both Malthusian and Spencerian notions of intergroup competition as a prime driver of evolutionary change, it is not surprising to find continued endorsement of these ideas in the theories of anthropologists using the neo-Darwinian framework to understand human behavior (Robarchek 1989). For example, Hobbesian and Spencerian views can be seen in anthropological work focused on interindividual competition and adaptive intergroup aggression resulting from imbalances of power (Chagnon and Irons 1979; Eibl-Eibesfeldt and Salter 1998; Wrangham and Peterson 1996) and in those positing a pattern of hunting and male bonding as central to human history (Washburn and Lancaster 1968; for overviews, see Robarchek 1989 and Sussman 1999).

Dawson contrasts such views with those of other anthropologists who have preferred, in his words, the “cultural anthropological thesis” that warfare—as a form of intense competition—is, as Margaret Mead put it, a

“dysfunctional historical accident” (Dawson 1996:12). Over the past century, such anthropologists have argued a pseudo-Rousseauian perspective, seeing warfare and broad-scale competition as emergent properties catalyzed by increasing social complexity in modern human societies (see, e.g., Mead 1964; see also Ortner 1984 for review of symbolic and practice theoretical perspectives in anthropology during the 1950s–80s). Because such theorists disavow the idea that aggression is innate, they often, although certainly not always, have ignored evolutionary forces acting on human behavior. Other anthropologists have taken the perspective of contesting the primacy of competition in human societies (see, e.g., Dentan 1968; Fry in press; Robarchek 1989; Robarchek and Robarchek 1998; Sponsel and Gregor 1994; Tanner and Zihlman 1976) or have emphasized the core role of adaptability and flexibility in human evolution (see, e.g., Dobzhansky 1972 [a biologist writing about humans]; Potts 1999, 2004; Richerson and Boyd 1998; Tattersall 2001; Tomasello 1999; Washburn 1972).

After years of debate, much of the discussion of human nature has not moved sufficiently beyond a traditional dichotomous conceptualization: Humans often continue to be understood as either essentially competitive or fundamentally peaceful (Dawson 1996; Robarchek 1989). This is certainly the case in the popular press, in which this discourse has been largely taken out of the hands of anthropologists and the artificial dichotomy of what is “natural” for humans is maintained, and vociferously articulated, by evolutionary psychologists, journalist science writers, and even radio and television talk show hosts (Cartwright 2000; Daly and Wilson 1999; Ridley 1993; Wright 1994).

Given the rich store of information in anthropology about the complexity of human behavior, I suggest that such “either-or” scenarios be abandoned. On the one hand, much available data today indicate that anything we might term *human nature* is complex and that it might be more fruitful to envision multiple human *natures* (Erich 2001). On the other hand, such an understanding cannot rest easily on a disavowal of the importance of evolutionary forces on human behavior. Thus, scenarios that pit a traditionalist neo-Darwinian competition-driven perspective alongside an equally limited view of the human experience that ignores evolutionary models and theory are bound to fail as explanations. As Theodosius Dobzhansky suggested long ago,

As theoretical possibilities, one can envisage that man might be genetically determined as aggressive or submissive, warlike or peaceful, territorial or wanderer, selfish or generous, mean or good. Are any of these possibilities likely to be realized? Would the fixation of any of these dispositions, so that they become uncontrollable urges or drives, increase the adaptiveness of a species which relies on culture for its survival? I believe that the answers to these questions are in the negative. [1972:425]

Rather than engaging in a continued series of pitched battles debating competition versus cooperation, the discussion would be enriched by more integrative investiga-

tions exploring how both competition and cooperation are involved in the human experience (Pasternak 1976; Richerson and Boyd 1998; Sponsel and Gregor 1994; Sussman and Chapman 2004; Wilson and Sober 1994). For example, in humans, costly interindividual and intergroup competition—whether in the form of communal aggression, war, or homicide—may very well have played a role in human evolutionary history. These behaviors most certainly produced deaths and affected the ability of some individuals to pass their genes to future generations. But how likely is it that the majority of deaths or other negative impacts on reproductive success in human populations throughout history have resulted from such activities? Other pressures facing humans—such as disease, food acquisition and processing, successful child rearing, predation avoidance, climate change, and environmental instability—would also have had profound effects on early human populations, and such pressures may have been effectively dealt with through patterns of cooperative behavior. What were the relative costs and benefits to particular populations of such competitive and cooperative behaviors? Only integrative studies that draw simultaneously on insights from evolutionary and ecological theory and from ethnographic and archeological sources about human behavioral complexity will allow us to account for and acknowledge the role played by a range of types of behavior—including, but not limited to, agonistic and affiliative behaviors.

The range of evidence available to anthropologists suggests that it would be wise to accept more broadly the possibility that there is no single answer to the question of what humans are patterned to do. The human adaptive zone is broad and cultural, therefore specific, limited adaptations shared across disparate populations are unlikely to have arisen in human ancestry. Given this, theories reliant on individual-based “selfish gene” perspectives (Dawkins 1976) are insufficient to effectively model human evolution. The human niche—our bioecological space (ecology) and the construction of a human place (the human interactive engagement with and impact on our environments)—is itself too complex for such simple, linear models (Scoones 1999). As much recent writing has indicated, the human ability to produce flexible phenotypic patterns of behavior within diverse social and ecological contexts has been central to human evolution and cannot be ignored (Ingold 2001; Klopfer 2001; Potts 1999, 2004; Scoones 1999; Simpson 1966; Sussman and Chapman 2004; Tomasello 1999; Washburn 1972; Wilson 1975). At the same time, models of human behavior that ignore the complexity of evolutionary biology are similarly shortsighted. Because humans are biocultural organisms, it may be difficult to articulate and model our evolutionary histories (Ingold 2001; Potts 1987, 2004; Tattersall 2001, 2004), but concepts emerging from ecology and evolutionary biology today provide a promising space to engage in such endeavors. They suggest that the old question “Are humans cooperative or competitive?” should be abandoned. Instead, we need to investigate the role of both

competition and cooperation, relying on neither as the sole driver of what it means to be human.

We need to look beyond individual strategies arising from classic neo-Darwinian theory to get a better handle on the multifarious facets of human evolution. Kin selection, reciprocal altruism, and individual fitness strategies are valid and important modalities of assessing evolutionary strategies. However, here I propose that looking at cooperative *intergroup* interactions, multilevel selection, and aspects of how intra- and intergroup interactions affect the selection pressures on individuals within those groups is also important.

Couching this perspective against a backdrop of a history of assumptions about the primacy of competition and human aggression is appropriate. It is not clear that most anthropologists think frequently about complex evolutionary theory, or that when they do, they see cooperative interactions within and between groups in the context of multilevel evolutionary processes. Although it is true that many anthropologists are examining everyday lives and the complex patterns within them, are we effectively tying these facets into broader themes in evolutionary biology in a nonreductionist way? Much of the focus on the evolution of human patterns remains on interindividual or intergroup competition for access to resources (social, nutritional, etc.) or patterns of conflict and reconciliation within and between groups.

I suggest that it is a worthwhile endeavor to refocus the inquiry away from an exclusive focus on individual fitness modeling to explain facets of cooperation and human evolution. We can move toward looking at the impact that groups have on their environment and how cooperation across groups (not just within groups) may be one human adaptive pattern. This is not arguing against the existence and importance of competition, just against its primacy in driving evolutionary change. The traditional neo-Darwinian perspective explains cooperation as having arisen as an adaptive mechanism to deal with competition (be it from other members within the same group or with other groups entirely). This may be an oversimplification of human evolutionary history and is a focus that may be obfuscating other potential adaptive patterns in human history. It privileges competition as the initial driver in evolutionary change and, thus, constrains the potential range of inquiry. Including the possibility of an alternative perspective based in emerging complexities in evolutionary theory can assist in our quest to model our evolutionary past.

In this article, I outline a number of insights from evolutionary ecology and biology that, over the last few decades, have substantially revised how processes and patterns of biocological change are understood. Many of these insights, which focus on evolutionary change in the context of organisms' development and life history, can be grouped under the rubric Developmental Systems Theory (DST; Oyama et al. 2001). Other useful concepts focus our attention on complex processes of evolutionary change over longer periods of time and necessarily broaden our

inquiries into, and understanding of, human evolution. But as John F. Bruno and colleagues have pointed out, such concepts do not necessarily imply that "the current theory emphasizing competition or predation is wrong, but that it paints an incomplete, and in some cases misleading picture of our understanding of the structure and organization of ecological systems" (2003:124). My concern is with how some of these newer concepts and ideas might alter our understanding of human cooperative and competitive behavior and the impact of this understanding on theories of human evolution. Many of my points are suggestive, intended to provide a broad framework for rethinking old and inadequate theories.

CENTRAL CONCEPTS OF DEVELOPMENTAL SYSTEMS THEORY

In traditional neo-Darwinian theory, competition tends to be understood as the primary driving force in evolutionary change, with natural selection viewed as playing the role of "architect" of the function of traits and behaviors. Other processes of biological change over time, such as drift and gene flow, tend to be downplayed in terms of their impact on the function and patterns of behavior. In addition, phenotypic flexibility (the variability inherent in form and behavior) tends to be viewed as limited responses in form or function, resulting from environmental impacts during sensitive periods of development. Such assumptions have long tended to dominate theories of human evolution, as has the more recent assumption that evolutionary patterns are driven by *anisogamy*—the differential size of male and female gametes within a species—and its associated implications for parental investment and subsequent adaptive strategies.

A number of insights from DST complicate this picture. These include the following, as summarized by Susan Oyama and colleagues (2001) and expanded upon by me regarding how they relate to humans:

Joint determination by multiple causes: Every trait is produced by the interaction of many developmental resources. The gene/environment dichotomy is only one of the many ways to divide up the interactants in evolutionary processes. Therefore, functional explanations assuming the primacy of "genes," their competition for propagation, and their interactions with an environment—while forceful and important—are not the only venues for inquiry into the evolution of human behavior.

Context sensitivity and contingency: The significance of any one cause is contingent on the state of the rest of the system. This means that—given the complex, bioculturally integrated nature of human lives—the assessment of the evolution of human traits/patterns must take into account various contexts including intra- and intergroup dynamics, multiple modalities of information transmission, and micro- and macromanipulation of the environment and the resulting selection pressures. Single aspects of human behavior or morphology cannot be seen as independent in an evolutionary sense from any others.

Extended inheritance: An organism inherits a wide range of resources that interact to construct that organism's life

cycle. In humans, inherited resources include the memory and experience (history) of other group members, the previous manipulation of the area in which the group lives, and the patterns of cultural interaction extant in that population. These extrasomatic factors must be included in the construction of evolutionary hypotheses as they affect—and are affected by—gene flow (population/individual movement and mating), genetic drift (chance events altering the composition and behavior of populations), and natural selection (the inherited extrasomatic complex that provides a multifarious web of potential microadaptations and constraints into which human beings are born).

Development as construction: Neither traits nor representations of traits are transmitted to offspring. Instead, traits are made—reconstructed—in development. The implication of incorporating this concept in models of human evolution is that human life histories are extended relative to many animals and the hypercomplex social environment in which they exist requires dynamic learning and is primarily socially negotiated. Human development is equally affected by somatic and extrasomatic factors interacting with one another during the course of constructing the adult human. Therefore, the assumption of inheritance of specific, discrete behavioral traits as units that emerge during development is highly questionable. Human development is a bioculturally contingent phenomenon.

Distributed control: No one type of interactant controls development, consequently the focus on natural selection resulting in the construction of hyperspecific behavioral proclivities is unlikely to effectively explain many human evolutionary patterns.

Evolution as construction: Evolution is not a matter of organisms or populations being molded by their environments but of organism-environment systems changing over time. This conceptualization reframes much current thinking by envisioning human evolutionary patterns as constantly constructing—and being constructed by—constituent elements of demography, social interactions, cultural variations, complex information transfer, and manipulation of the environment in intra- and intergroup contexts in addition to the biological and ecological factors in development and throughout the course of life history. [Oyama et al. 2001:2]

The traditional focus on individual-based fitness strategies, competition, and the adaptations emerging out of strong specific-trait selective processes has contributed substantially to our understanding of models for optimal patterns of behavior and the constraints on them in human evolution. However, it has also directed our gaze away from some aspects of variation, cooperation, and flexibility in favor of a focus on potential strategies to maximize individual fitness under specific selective paradigms. By integrating this current reliance on competition-based selection models with the emerging understanding of complexities in ecology and the proposals of DST, we may be able to facilitate a greater and increasingly successful engagement in attempts to model complexity in our evolutionary histories.

In addition to the premises from DST, a number of concepts from ecology and evolutionary biology—including fa-

ilitation, niche construction, and phenotypic variability—provide a more complex picture of evolutionary change than the traditional model outlined above. So do revised assumptions about estimates of fitness-enhancing values and the adaptiveness of certain human behaviors and reformulations of our understanding of sexual investment patterns. Combining these concepts and insights can help move us away from some of the dichotomous thinking that has so often characterized explanations of human evolution and human nature, as I indicate more specifically below.

COMPLEXITY IN NATURE AND THEORY

Facilitation

Although competition is a significant factor in the evolution of organisms, *facilitation*—positive interaction between species or potentially between groups within a species—also drives evolutionary change. Research from ecology, especially intertidal and plant ecosystems, demonstrates that the interactions between two or more species may alter the selective environments such that each of the groups does better when the other is also sharing the environment (Bruno et al. 2003).

This pattern is seen in the distinction between realized and fundamental niches (Hutchinson 1957). The fundamental niche describes a range in which a species or population can live indefinitely in the absence of negative interspecific interactions. The realized niche is the space actually occupied by a species or population after exclusion or competition by other species or competitors. Research has demonstrated that facilitation can, in effect, expand the realized niche of many organisms in a shared system (Bruno et al. 2003). Hypothetically, we can envision an expansion of this concept to examine within-species or within-population level patterns.

Although this research is currently focused on small animals and plants, the theoretical emphasis on examining multispecies, multigroup, or metapopulation interactions for patterns of facilitation in addition to competition can have dramatic impact on our models of what selective forces were acting on early humans. Interactions between human groups need not be defined exclusively in terms of *contest competition* (direct competition over resources) or *scramble competition* (temporally or spatially dispersed competition over the use or acquisition of resources). Instead, the concept of “facilitation” allows us to envision a complex of cooperative and competitive relationships varying over space and time among individual humans and human groups.

Niche Construction

Among the most salient concepts in evolutionary biology and ecology is that of “niche construction,” which, according to Kevin N. Laland and colleagues, occurs

when an organism modifies the functional relationship between itself and its environment by actively changing one of the factors in its environment either by physically perturbing these factors at its current address or by

relocating to a different address thereby exposing itself to different factors. [2001:118]

According to this definition, *niche construction* is a dynamic process of reenvisioning an organism's *niche*—the “multidimensional hypervolume” (Hutchinson 1957) in which it resides and its way of making a living. Recent studies confirm that through niche construction organisms not only affect their immediate environments but also, in part, shape the selection pressures that they face in the process (Laland et al. 2001; Scoones 1999; Stamps 2003; see also Imanishi 2002). This understanding calls for a fundamental reevaluation of the organism–environment dichotomy in much evolutionary thinking.

Phenotypic Plasticity

There is emerging recognition that *phenotypic plasticity*—defined as continuous and reversible transformations in behavior, physiology, and morphology in response to rapid environmental fluctuations—can be adaptive. Theunis Piersma and Jan Drent, for example, suggest that “when environments change over shorter timescales than a lifetime, individuals that can show continuous, but reversible, transformations in behavior, physiology or morphology, might incur a selective advantage” (2003:228). Richard Potts (1999) has posited that variability selection was important in the evolution of humans during the terminal Pliocene and Pleistocene, citing the significance of the ability to flexibly respond to differing, potentially unpredictable, environmental variables. In this case, the abilities of humans (or humans' ancestors) to respond bioculturally with rapidity and in multiple modalities (to change their phenotype) may have facilitated their success relative to the other hominins who existed at the same time.

COMPLEXITY IN NATURAL SELECTION

Another important factor in revising standard views of human evolution is the emerging recognition that environmental variation can lead to overestimates of the strength of natural selection. This means that location can have an impact on architecture (Kruuk et al. 2003). Many arguments for the evolution of specific traits or behavioral patterns rely on demonstrating the potential strength of specific selection pressures on the trait in question. Underlying most estimates of the power of natural selection on a trait is the assumption that there is a causal link between fitness (lifetime reproductive success potential) and the trait in question. It is becoming apparent that, in at least some cases, the fitness variation observed is in fact only associated with the environmental component of the trait (not the trait itself). Loeske E. B. Kruuk and colleagues (2003) present an example wherein birds that happen to be very healthy can breed early; early breeders can also produce large healthy broods. This differential birth outcome could result in an erroneous assumption of a positive fitness relationship between the behavior of early breeding and the resulting brood size, leading some to possibly argue that there has been selection of

early breeding as a higher fitness behavior. However, there is an important intervening variable in this process: resource availability, which affects birds' size and condition (health). In years in which resources are plentiful, more birds will be healthier and breed earlier than in resource-stressed years. We need not assume that early breeding is an adaptation—the result of a history of selective pressures.

In cases such as this, the magnitude of selection may be grossly distorted and we may think we are seeing a behavioral adaptation (early breeding) when we are only seeing environmental variation. Thus, our assumptions about fitness-enhancing values and the “adaptiveness” of certain human behaviors, in some contexts, may overlook the influence of environmental variation and confounding factors (Cheverud 2004). This can mislead us to assume that a behavior is adaptive (like early breeding) whereas it is actually an environmentally based outcome (i.e., the behavior itself is not necessarily the product of focal selection but the state of the birds' health resulting from climatological factors that influenced the behavior).

This may be why natural selection rarely follows the modeled trajectories. These trajectories are constructed from optimality models or controlled responses to artificial selection and, thus, predict a fitness-maximizing equilibrium. In fact, most evolutionary outcomes include significant oscillations and can approach the border of chaos (Lansing 2003; Nowak and Sigmund 2004), especially when one integrates complex gene-behavior relationships and complex population structures into evolutionary models (Cheverud 2004; Wilson 2004). As Kinji Imanishi pointed out in 1941, understanding this may be an important caution when making simple Darwinian evolutionary predictions: Artificial selection may present an overly powerful model that is seldom realized in natural selection. We, therefore, need to be careful when we propose very tight-fitting models explaining fitness correlations for a specific human behavioral trait or pattern in the absence of clear data measuring the specific strength of selection (as assessed in fitness impact) and the normal range of effects of environmental variation on populations over time (Cheverud 2004).

COMPLEXITY IN SEXUAL RELATIONS

Much of the focus on competition in human evolution and behavior has come to be envisioned as arising from the battle between males and females over disparate investment in offspring initiated via anisogamy (Trivers 1972). Angus J. Batemen (1948) established a basic premise of anisogamy in evolutionary models decades ago: Females with their large, costly eggs have greater cost per offspring and should, therefore, invest more in each offspring, whereas males, with their cheap, plentiful sperm, should invest minimally in individual offspring and maximize their mating opportunities. Robert L. Trivers (1972) and others have translated this basic understanding into models of parental investment and created behavioral predictions for many organisms, including humans, based on it. These include positing

distinct reproductive pressures on males and females resulting in competition between the sexes caused by the differential goals and patterns in their strategies for reproduction. Numerous critiques of these assumptions have been made over the years, including that of Hanna Kokko and Michael Jennions (2003), who argue that the initial assumptions propagated by Trivers and others overlook the fact that all offspring have a mother and a father. If all males and females in a population mate, their reproductive variance is equal and males should invest equally. This suggests that anisogamy, in and of itself, may not alone predict levels and patterns of investment. However, if there is variance in reproductive success between individuals introduced into the system by female choice or male–male competition, then varying investment behavior patterns would be favored.

Recent studies suggest that it is patterns and contexts of sexual selection, not baseline anisogamy, which drive sexual investment patterns (Borgerhoff-Mulder 2004; Tang-Martinez 2000). Rather than envisioning an unvarying anisogamic “battle,” studies suggest that we view intersexual relations more as a complex and negotiated “dance” (see, e.g., Kokko and Jennions 2003). Because behavioral patterns and mating contexts resulting in sexual selection are malleable and vary across time within a population, the relationship between the sexes is not necessarily one of competition but of negotiated interactions (some competitive, some cooperative) resulting in the production of offspring (Zihlman 1997). It is possible, then, that the human niche alters the true payoffs and costs of reproductive investment such that cooperative patterns between males and females are a viable strategy. Males and females are not necessarily “equal” or identical in labor or patterns of behavior, but they may frequently (but not exclusively) be primarily cooperative, as opposed to primarily competitive, in ensuring the successful raising of their offspring.

COMPLICATING THE PICTURE IN HUMAN EVOLUTION

Applying these concepts to human evolution allows us to construct a complex picture of our evolutionary past. For example, understanding the role of facilitation suggests that, rather than seeing groups within a population of early humans as engaged in strict competition with each other and other organisms over resources, it may be more accurate to imagine humans engaged in different levels of cooperation and competition simultaneously, such that their mutual occupation and interaction within the environment ameliorates the intensity and alters the structure of environmental pressures (selection). Data from the Standard Cross Cultural Survey of forager societies and recent overviews of hunter-gatherer societies suggest that this scenario of mixed cooperation and occasional competition resulting in facilitation emerges as a central tendency in nomadic hunter-gatherer bands (Fry in press). Fry's survey bears this out. He found relatively little or mild “warfare” (if present at all) in most simple hunter-gatherer societies, and variable presence of warfare in complex hunter-gatherer societies. However, in

these societies interindividual violence is present and occurs in varying frequencies (Fry in press). There is no doubt that the potential for aggressive conflict in a variety of forms is present in humans, but such evidence also indicates that intergroup competition may not be a fundamental adaptive characteristic in human history. Fry also suggests that reciprocal alliances and exchanges across groups with populations and regions may be an important factor in humans' successful dealings with climactic and other environmental stressors (see also Sahlins 1965). With these factors in mind, it is shortsighted to see aggression and conflict as driving the system. It is perhaps more accurate to understand them as emerging in differing circumstances and in concert with patterns of cooperation, variably affecting the human niche and, therefore, the selective pressures on particular groups. Here we can take note that under some situations individual aggressive strategies or large-scale aggression such as war may appear to have fitness payoffs, but our estimates of the strength of selection in these cases may be limited by the lack of a broad temporal and climactic overview or a quantitative measurement of the long-term reproductive impact of such patterns.

There is widespread evidence that the human niche is characterized by a good deal of social coordination (Fiske 2000; Ingold 2001; Knauff 1994; Richerson and Boyd 1998; Scoones 1999; Soltis et al. 1995; Watanabe and Smuts 2004; Wilson and Sober 1994). Given our neurological complexity, individual biobehavioral diversity, and ability to convey extremely large and temporally disparate amounts of information behaviorally as humans, it appears that cooperation and shared information exchange, combined with socially negotiated distribution of labor, seems to effectively coordinate large groups of people. Indeed, few anthropologists would disagree that human cooperative social interactions form the backbone of human societies. Evidence indicates that our ancestors were engaged in some relatively complex level of social coordination and cooperative ventures by at least 2.5 million years ago, when the first stone tools appear in the fossil record of the Gona region in Eastern Africa (de Heinzelien et al. 1999). These tools, and their increasingly complex later models, are wholly implicated in dramatic alternation of human environments. Thus, cooperative behavior has been an important aspect of niche construction in humans for millennia. Human cooperative social interactions would have affected the environments humans inhabited, altering the very structure and pressures within those environments and, in turn, shaping the selection pressures early humans would have faced. This means that even cooperative interactions with apparent evolutionary (or fitness) costs (in the short term) may have been central to human evolution. How might we envision this? Intergroup interactions—including the transport and trade of raw materials, coordinated use of the landscape and resources therein, and other associated interactions—alter the selective landscape. Engaging in these behaviors can increase the threat of predation as well as increase travel costs and other potential fitness costs to individuals; however,

the impact of many individuals within a population, across groups, engaging in these behaviors may alter the patterns and contexts of environmental pressures such that they result in long-term benefits to offset short-term costs.

Add to the notion of “niche construction” the notion of “phenotypic plasticity”—humans’ broad and flexible responses to changing ecological and social environments—and we are in a better position to account for the diversity of patterns found in the archeological record. Over the last two million years, humans have expanded across countless habitats, geographic areas, and ecological contexts, implying a flexible behavioral potential and an increasingly complex infrastructure of social complexity (e.g., human cultural practice). Potts (1987, 1999, 2004) and others have demonstrated substantial variability in hominin environments during the Pleistocene and we have ample fossil and material evidence that humans moved, successfully, into new environments at an extremely rapid rate, when our confamilials and consubfamilials (the apes and the australopithecines and other hominins) could not (Conroy 1997; Gabunia et al. 2001; Potts 1987, 1999). It is likely that the type and complexity of cooperation—on a level beyond that found in other primates and the other hominins—combined with rapid behavioral plasticity and innovation—both facilitated by cooperation and social coordination—is what allowed us to successfully construct our niche and evolve with it (see also Richerson and Boyd 1998; Soltis et al. 1995; Sussman and Chapman 2004; Watanabe and Smuts 2004).

The complexity in human communicative and material cultures may have facilitated the enhancement of a broad primate pattern of social affiliation and cooperation within human groups (see Tomasello 1999; Watanabe and Smuts 2004). In fact, this trend may have been a prerequisite for the evolution of human patterns (Sussman and Chapman 2004; Watanabe and Smuts 2004). This view of human evolutionary history as involving niche construction, potential facilitation, and the behavioral flexibility inherent in human social coordination is supported by data that suggest that the basal physiology and behavioral patterns for all primates include cooperation and social affiliation as a core primate wide trend (Sussman and Garber 2004). Recent survey research (Sussman et al. in press) indicates that primates engage in relatively little aggressive behavior and that most social interactions are in fact affiliative. This suggests that the majority of primates’ energetic output is in social interactions that are not competitively aggressive in content or context, suggesting a strong basal pattern of social affiliation rather than conflict as central in primate societies (Fuentes 2004; Sussman and Garber 2004). Even in modern human society today, when headlines seem to scream about death and destruction all around us—documenting not only large-scale competitive aggression (or war) but also case after case of interindividual aggression—the vast majority of humans still spend almost all of their lives getting along with others. This level of social tolerance and cooperation occurs in some of the most overcrowded, dif-

ficult, and stressful conditions imaginable, even if media emphasis on conflicts, rather than cooperation and mutual tolerance, often paints a different picture. Studies of soldiers’ actions during warfare indicate that humans need to be trained to be effective, systematic killers. The fact that such training is required suggests that humans may not have patterned intergroup aggressive responses as a part of our evolutionary “toolkit” and that there may be physiological and neurological mechanisms to reinforce cooperative interactions as an adaptation of humanity (Axelrod 1984; Barash 1991; Grossman 1996).

Because of this social complexity and the patterns of living in mixed-sex communities that characterize the vast majority of human populations, variable biobehavioral patterns between males and females are also probably characterized by complex combinations of competition and cooperation. Envisioning human evolution as integrated within a context of social coordination and facilitation affecting the human niche, one can model cooperative interactions between males and females in such complex activities as child rearing, foraging, and toolmaking and material collecting (among others). For the majority of human evolutionary history, there is no direct evidence to suggest that females raised children alone, that males and females defended resources or foraged as independent units, or that one gender dominated in tool construction and manipulation. It is not far-fetched to envision males and females as members of groups and populations, with varying biological parameters (sex differences), acting in similar and overlapping social contexts, and jointly engaged in aspects of niche construction, cooperation, and even conflict. This context would not place a primacy on the contest between a female’s need for access to resources and a male’s need for access to females (basal anisogamic principles). Rather, it would place both genders within a complex and context-dependant biocultural system wherein multiple factors enter into negotiated sexual relationships and nonreproductive interactions (challenging the exclusivity of a Trivers-based battle of the sexes; see Trivers 1972).

CONCLUSION

It is not always clear how to go about asking questions about cooperation and competition from an evolutionary perspective. Studies of human behavior in the social and biological sciences have tended to model the role of competition and the appearance of aggression, trying to explain why humans fight, go to war, and otherwise engage in large-scale competitive contests. But there is also a large body of literature that indicates that cooperation within groups was, and is, an important aspect of human behavior and societies. However, this focus on intragroup cooperation is frequently combined with a focus on intergroup competition. Rather than assuming that early human groups engaged repeatedly in competing with other groups in their area for resources and survival, I suggest that we think about populations and other forms of cultural clusters as potential

arenas for vast and intricate ranges of behaviors including cooperation (but not just cooperation for more effective competition).

This approach requires comparative studies across multiple levels of social interaction, which incorporate insights from ecology and evolutionary theory. We should engage in a complex interpretation of evolutionary processes, incorporating premises of DST and taking care when proposing specific, discrete adaptive scenarios for humankind that rely on strong selection and individual-fitness models. And we need cultural, behavioral, physiological, and archeological details to establish measures that go beyond assumptions of the primacy of competition and that enable us to add cooperative patterns to competitive ones in our toolkit for assessing our past. Finally, we need to retheorize both competition and cooperation in ways that move beyond dichotomous thinking. Studying the complex relationship between cooperative patterns, competition, and dynamic organism–environment interactions is an extremely important component of anthropological inquiry, an important place on which to focus our collective gaze.

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NOTE

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