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## Conclusion: Human Cooperation and its Evolution

This is the gist of human psychology...what the hero does all feel that they ought to have done as well. The sophisms of the brain cannot resist the mutual aid feeling, because this feeling has been nurtured by thousands of years of human social life and hundreds of thousands of years of pre-human life in societies.

Peter Kropotkin, *Mutual Aid*, (1989[1903]) p. 277.

### 11.1 Introduction

About 60,000 years ago, the descendants of a band of hunter-gatherers living (some genetic evidence suggests) in the Upper Rift Valley in the center of Africa began to move eastward along the shores of the Indian Ocean, eventually crossing hundreds of kilometers of open ocean before reaching Australia. We do not know if they encountered or simply bypassed communities of *Homo floresienis* who persisted in what is now Indonesia almost to the end of the Pleistocene. Others crossed the Levant and occupied Europe, quickly driving the Neanderthals to extinction. Though the possibility of multiple human origins cannot be eliminated, it is now widely thought that the descendants of this small group eventually peopled the entire world and are the ancestors of all living humans (Klein 1999, Foley 1996).

This second great exodus from Africa is remarkable for its speed and eventual spread. One cannot resist speculating about the capacities that made these particular individuals such lethal competitors for the (also large-brained) Neanderthals or that allowed the construction of ocean-going craft. Some attractive candidates can be ruled out. The physiological innovations allowing for more effective speech—rearrangement of breathing and digestive tracts for example—had occurred much earlier. Likewise, the dramatic expansion of hominid brain size had occurred before two million years ago. Richard Klein suggests a “selectively advantageous mutation” that facilitated the cultural transmission of behaviors as a possible cause.

Arguably this was the most significant mutation in the human evolutionary series for it produced an organism that could radically alter its behavior without any change in its anatomy and that could cumulate and transmit alterations at a speed that anatomical innovation could never match (Klein 2000):18.

But, Klein (1999) points out, the only evidence for such a super-mutation are the facts it is intended to explain. Whether the source was a single revolutionary innovation or, as many now think (McBrearty and Brooks 2000) the result of a long process of incremental changes, the linguistic capacities and the cultural transmission of norms of social conduct that supported cooperation were a necessary part of the human repertoire that made the peopling of the world possible. These same capabilities must be part of any account of the remarkable success of humans as a species since.

## **11.2 The Origins of Human Cooperation**

Humans became a cooperative species because our distinctive livelihoods made cooperation within a group highly beneficial to its members and, uniquely among animals, we developed the cognitive, linguistic and other capacities to structure our social interactions in ways that allowed altruistic cooperators to proliferate.

Cooperation among chimpanzees, thought by many to be our closest relatives, is instructive in this respect. They jointly engage in defensive patrols and occasional raids against neighboring groups. Cooperative hunting of red colubus monkeys is also observed in some chimpanzee populations, but not in others (Boesch 1984). In the Tai forest of the Ivory Coast, hunting in large groups is very effective compared to hunting alone or in pairs, and it is widely practiced. By contrast at Gombe in Tanzania chimpanzees rarely cooperate while hunting, and there is no relationship between the number of hunters and hunting success. Two facts account for the difference. The first is ecological: the trees in the Tai forest are about three times taller than those at Gombe, and so escape is far easier for the colubus in the former, making cooperative hunting more effective. The second difference is social. Dominant Gombe males routinely take the prey from successful hunters. By contrast, among the Tai chimpanzees, the primary claim on meat is based on participation in the hunt, not social dominance. When dominant Tai chimpanzees do not hunt they are barely more successful in acquiring meat than

are lower status cheaters. Male hunters generally give substantial amounts of meat to females, who in turn support them in contests against dominant cheaters. The cooperative Tai chimpanzees, but not their Gombe relatives, have developed a “hunting bark” that indicates the hunter’s location and facilitates coordination of hunting parties which may be as large as seven or more.

Thus, cooperation is sustained among the Tai chimpanzees because it is both effective in acquiring prey, and it is individually rewarding given rules of access to meat. We think it likely that similar differences in the ecological niches occupied by early hominids along with differences in evolved rules for sharing the gains from joint activities may account for the origin of cooperation and its eventual proliferation of forms and geographical spread.

Human reliance on the meat of large hunted animals and other high quality, large package size, and hence high variance, foods meant that our livelihoods were skill-intensive and characterized by increasing returns to scale. Deploying skills that require years to acquire favored the evolution of large brains, low time discount rates, and long lives (Kaplan, Hill, Lancaster and Hurtado 2000, Kaplan and Robson 2003). Organizing and sharing the returns to successful hunting additionally favored groups that developed practices of sharing information, food, and other valued resources (Boehm 2000). Moreover, the long period of dependency of human offspring on adults, in part the result of the prolonged learning curve associated with hunting and gathering, generates a net food deficit for families with adolescent children, greatly increasing the benefits of food sharing among unrelated individuals and other forms of social insurance (Kaplan and Gurven 2005). Our experimental evidence, presented in chapter 3, shows that in today’s small scale societies, those that are especially reliant on big game—like the Lamalera whale hunters that we studied in Indonesia—and those for whom livelihoods require either joint efforts in acquisition or sharing in distribution, are especially likely to exhibit the social preferences that underpin altruistic cooperation.

One of the reasons for the connection between the potential benefits of cooperation and the prevalence of cooperative behaviors that we discovered in these experiments is that where the benefits associated with cooperation relative to the costs are substantial, it is more likely that the evolutionary processes of gene-culture coevolution will support populations with large numbers of cooperators, whether altruistic or mutualistic. This is true of all of the models used here. A high ratio of benefits to costs makes cooperation

an ‘evolutionary likely outcome’ (to use Robert Boyd’s phrase) because, as our models and simulations (Chapters 4 and 5) confirmed, in virtually any plausible evolutionary dynamic in which stochastic shocks to payoffs and to behaviors play an important role, the likelihood that a population will develop and maintain cooperative practices is higher, the greater are the net benefits of cooperation.

But the fact that cooperation was group-beneficial in the environment of early humans does not explain why it evolved, for individuals bear the costs of their cooperative behaviors, while others enjoy the benefits. Thus, the distinctive human livelihood and associated cognitive capacities and longevity are not sufficient to explain the extent and nature of human cooperation. While benefits of cooperation accruing to the cooperator may offset the costs, this is not likely to have been the case in many situations in which cooperation was essential to our ancestors, including defense, predation and surmounting environmental crises. In these situations, involving large numbers of individuals facing their possible demise, people with self-regarding preferences will not cooperate, irrespective of their beliefs about what others will do. As a result, if cooperation is to be sustained, other-regarding preferences must motivate at least some of those involved.

The distinctive human capacity for institution-building and cultural transmission of learned behavior allowed other-regarding preferences to proliferate. Our ancestors used their capacities to learn from one another and to transmit information to create distinctive social environments. These institutional and cultural niches reduced the costs borne by altruistic cooperators and raised the costs of defection. Among these socially constructed environments, three were particularly important: group-structured populations with frequent inter-group competition, within-group leveling practices such as monogamous reproductive pairing and the sharing of food and information, and developmental institutions that internalized socially beneficial preferences.

These culturally transmitted institutional environments created a social and biological niche favorable to the evolution of the social preferences on which altruistic cooperation is based. We can only speculate, of course, about the initial appearance and proliferation of these preferences. But, there are two reasons why their emergence was highly likely. The first is that the preferences that constitute strong reciprocity and some other social preferences could appear *de novo* as the result of only a small behavioral modification of either kin-based altruism or reciprocal altruism, behaviors that support

cooperation on the basis of self-regarding preferences. In the case of kin altruism, those behaving altruistically toward kin may have simply ceased discriminating against the non-kin members of their groups. Likewise, a reciprocal altruist could become a strong reciprocator by simply deleting the proviso that one should condition one's behavior on expectations of future reciprocation.

The second reason why the emergence of social preferences among early humans would be highly likely is the small size and vast number of foraging bands during the Late Pleistocene and earlier. Even if strong reciprocity initially emerged in very small fraction of the human population, it is highly likely that over ten thousand generations and more than a quarter of a million of foraging bands, it would have occurred that the strong reciprocators or other altruistic cooperators were prevalent in one or more such groups at some point. These bands would have done very well in competition with other bands.

We have sought to explain how humans came to develop these unique social preferences and the cooperative social practices that supported them, taking the distinctive nature of human ecology, diet, and life course as given. This analytical simplification is almost surely historically inaccurate. The distinctive nature of human livelihoods—the importance of hunted and extracted as opposed to collected foods—apparently does not predate and is not the cause of the emergence of cooperation. Rather, it appears that the two developed in tandem.

Though we have not addressed this question, we think it likely that the models presented here, suitably amended, would illuminate the coevolution of human cooperation along with our distinctive diets, life histories, and livelihoods. The presence on the African savannah of large mammals vulnerable to attack by cognitively advanced predators must have given substantial advantages to the members of groups that developed means of coordinating the hunt and sharing its sporadically acquired prey. Correspondingly, groups that had learned how to cooperate in these ways would benefit from preferentially targeting large animals, as opposed food acquired in smaller packages, and thereby enlarging the place of hunted meat in their diet. Winterhalder and Smith (1992):60 write:

...only with the evolution of reciprocity or exchange-based food transfers did it become economical for individual hunters to target large game. The effective value of a large mammal to a lone forager ...probably was not great enough to justify the cost of

attempting to pursue and capture it, ...However, once effective systems of reciprocity or exchange augment the effective value of very large packages to the hunter, such prey items would be more likely to enter the optimal diet.

The distinctive aspects of the human livelihood thus coevolved with the distinctive aspects of our social behavior, most notably cooperation.

Two modeling approaches have constituted the workhorses of our explanation, multilevel selection and gene-culture coevolution. Could it be that altruistic cooperation became common among humans in the absence of these two processes? We think it unlikely.

### **11.3 Reputation, Retaliation and Relatedness**

Some have advanced the view that strong reciprocity, fair-mindedness, and other altruistic behaviors are the legacy of an evolutionary past in which individuals and their genetic relatives behaving in these ways had higher fitness than other members of their groups. Thus Robert Trivers (2007) reasons that “unfair arrangements...may exact a very strong cost in inclusive fitness. In that sense, an attachment of fairness or justice is self-interested...(p. 77)”

If Trivers is correct, fair-mindedness could have become common among humans by a combination of inclusive fitness maximization and individual fitness maximization in repeated interactions allowing fair-minded individuals to gain reputations that advanced their genetic interests. As we saw in Chapter 5, this is the explanation of the evolution of fairness norms given by Binmore (2005). The same reasoning may be applied to generosity, bravery on behalf of ones' associates, and punishing those who transgress social norms.

According to this view, Pleistocene conditions would have favored kin altruism and what we have termed (Chapter 4) the “enlightened self-interest models” of cooperation. Dawkins (2006) advances exactly this view, having outlined kin altruism, reciprocal altruism, indirect reciprocity, and costly signaling as the four models likely to explain the origins of modern human altruism:

Throughout most of our prehistory, humans lived under conditions that would have strongly favored the evolution of all four kinds of altruism....most of your fellow band members would have been kin, more closely related to you than members of

other bands...plenty of opportunities for kin altruism to evolve. And...you would tend to meet the same individuals again and again throughout your life—ideal conditions for the evolution of reciprocal altruism. Those were also the ideal conditions for building reputations for altruism and the very same ideal conditions for advertising conspicuous generosity.” (p. 220)

Thus, it could be that humans became cooperative because in our ancestral environments we rarely engaged non-kin in short-term interactions and instead interacted frequently with the same group of individuals, among whom tit-for-tat and other self-regarding strategies consistent with Trivers’ reciprocal altruism were sufficient to support cooperative outcomes. Cooperation thus emerged as a form of mutualism. Others (Tooby and Cosmides 1992) share this view of the evolutionary origins of social preferences, but in contrast to Trivers hold them to be fitness-reducing (that is, maladaptive) in modern settings. Though the cooperation extended to family and reciprocating fellow group members enhanced the fitness of cooperators during this period, according to their interpretation, in the modern world of more ephemeral social contacts its expression is a maladaptive legacy of the distant evolutionary origins of human motivation. Dawkins explains it this way: “the lust to be generous and compassionate...is the misfired consequence of ancestral village life.” (p. 222)

There is little doubt that reputation building and a tendency of genetic relatives to interact frequently is part of the explanation of cooperation. But, we think it unlikely that inclusive fitness maximization and reputation-building or retaliation against defectors in repeated interactions is sufficient to explain the evolutionary origins of human cooperation.

The problem with this view, in brief, is that it fails to explain many common forms of human cooperation for which there exist more plausible models based on gene-culture coevolution and multilevel selection. First, neither inclusive fitness nor Trivers’ reciprocal altruism and related explanations based on repeated interactions explain what needs to be explained. Recall that both in controlled laboratory settings and in real life people act generously towards unknown and unrelated others, and acts of costly punishment of those who transgress social norms, even when no material benefit can be gained thereby. It is clear that kin altruism cannot explain these behaviors among non-relatives. Moreover, in chapter 4 we provided some empirical evidence that even within families, inclusive fitness maximization provides only a partial account of helping behavior. Nor can

reputation-building explain helping behavior in one-shot experiments, or in natural settings where the likelihood of continued interaction is small or reputation-building is impossible for other reasons.

Reciprocal altruism is an especially poor candidate for explaining the characteristic of human cooperation that most clearly distinguishes us from other animals (other than eusocial insects): the large numbers of individuals among whom cooperation is often sustained. As we have seen in chapter 4, repeated interactions will support cooperation in dyadic interactions and in larger groups if individuals have accurate and public information about the behaviors of others. But, many forms of cooperation do not conform to these assumptions. Often large numbers are involved, among whom information concerning what others have done is not shared among all members, and is difficult to interpret, and is inaccurate and subject to deliberate distortion.

Second, the suggestion that cooperative behavior in non-repeated situations in the laboratory and in real life are simply generalizations from past or present lives in which most interactions are repeated is not compelling. It could be that those who we have termed other-regarding experimental subjects simply applied in the laboratory a general rule of behavior that has positive payoffs in real life, on the average. Those prosocial experimental subjects may have acted out of habits that served in real life to establish beneficial reputations and to avoid retaliation. However, in Chapter 3 we pointed out that people distinguish rather acutely between long-term and short-term interactions. In the experiments, as we saw, behavior responds to whether the interaction is with an on-going partner or one with whom future interactions have been precluded by experimental design. Moreover, even in one-shot interaction, experimental subjects not only punish those who have treated them ungenerously, but also those who have treated others ungenerously. The first might be explained by Trivers' view of fair-mindedness: it may have been, and continue to be, on average fitness-enhancing to punish those who have treated one poorly, and subjects may believe that even in an anonymous experiment that this rule of thumb should be followed. But, punishing those who have treated others poorly is hard to reconcile with the self-interested cooperation paradigm.

The third problem is that there is good reason to believe that early humans did indeed engage in fitness-relevant interactions with non-kin and that many of these interactions were of sufficiently short duration that only extraordinarily beneficial cooperation could have been supported by tit-for-

tat and related strategies in these interactions. The evidence for this claim is necessarily indirect, but we think convincing.

Neither the likely size of groups, nor the degree of genetic relatedness within groups, nor the typical demography of foraging bands is favorable to the view that kin altruism and mutualism provide an adequate account of late Pleistocene human cooperation. Marlowe (2005) as we have seen, estimated the likely size of ancestral human groups to be about 27. The median size of the 235 hunter-gather groups recorded in Binford (2001) is nineteen, and even if we count the smaller number as, say, seven adult decision makers, Figure 4.1 shows that reciprocal altruism will evolve for groups this large only for implausibly low rates of error and extraordinarily high benefit cost ratios of the altruistic behavior. Moreover, if Boehm (2007) is correct in thinking that five hunters is the minimum for a viable group, then the number of adult decision-makers may be more like double this number.

Though parent-child and sibling altruism will be supported for plausible benefit cost ratios, relatedness within typical foraging bands will not support cooperation among band members generally unless the benefit cost ratio is extraordinarily high. Consider a concrete example of an exceptionally highly related band (of just seven adult members) with two parents and their two sons and wives and one unrelated ‘outsider’. If the spouses are unrelated, the average pair-wise degree of genetic relatedness in this group is 0.12. Hamilton’s rule (equation 4.1) shows that kin altruism would be supported among group members only if the benefit cost ratio were to exceed eight. The estimates of the fraction of the total genetic variance that is between demes reported in Table 7.3 suggests an average degree of relatedness in demes that would preclude the evolution of altruistic behaviors by kin selection unless the benefits were an order of magnitude greater than the costs.

The high levels of mortality and frequent population crashes and dispersals that probably characterized the late Pleistocene are also unfavorable to the evolution of reciprocal altruism, even in dyads. Paleo-demographic data suggest that the life expectancy at age 15 during the late Paleolithic may have been about 17 years and a bit less for seven contemporary hunter-gatherer populations (Weiss 1973). Assuming that cooperation requires the participation of adults (not those younger than fifteen) the relevant annual hazard rate is thus about 0.06, giving an upper bound on the discount factor of 0.94 even in the absence of myopia (§10.5), weakness of will and the like. If older members of the group are critical to the success of cooperation then the maximal discount factor will be even lower due to frequent group con-

flicts and extraordinary climactic instability reviewed in Chapter 7, group longevity also probably quite limited, so that even if members of a group survived, they were unlikely to remain together over very long periods. The very low rate of growth of the human population over the whole prehistoric period, plus the high rate of human population growth in even poor contemporary foraging societies in good times, suggests periodic crises occurred in the past.

The only small scale society on which we have adequate long term demographic records, the people of the isolated South Atlantic island Tristan da Cunha, provide a dramatic example (Roberts 1971). Three population crashes occurred in the course of a century and a half. The first was a conflict-induced fission that resulted in the departure of more than half the population while the second, a sea-faring accident, killed all but four of the island's male population. The final crash occurred with the dispersal of the entire population in 1961 prior to an eruption of the island's volcano.

Of fourteen groups studied in Papua New Guinea over a fifty year period by Soltis, Boyd and Richerson (1995), five ceased to exist. The expected duration of both the Yanomamo villages reported in Smouse, Vitzthum and Neel (1981) and of the Gainj groups reported in Long, Smouse and Wood (1987) is about three generation. It is unlikely that groups survived longer than this under the turbulent climactic conditions of the late Pleistocene. Summing up a pattern of demographic instability likely to have been faced by the foraging bands of the late Pleistocene, Gajdusek (1964) writes:

Migrations, murders and suicides, warfare, and massacres, splitting and fragmentation of communities and bands, or amalgamations and sudden mergers of groups, sudden social changes in mating practices and prohibitions and such natural accidents and catastrophes as earthquakes, floods, typhoons, volcanic eruptions, droughts, famines, and plagues all have a major influence in determining the genetic composition of small groups.  
(p. 121)

These are hardly conditions under which reciprocal altruism could be expected to flourish (Gintis 2000b).

Nor is it likely that fitness-relevant interactions were confined to intimates. Far more consistent with what is known is the view that individuals had frequent encounters, both friendly and hostile, with members of other groups especially during migrations.

We have already seen (Table 8.1 and 8.2) that group competition is likely to have been both frequent and lethal. As we saw in Chapter 1, as early as seventy-five to ninety thousand years before the present early modern humans in eastern and southern Africa traded over hundreds of kilometers. Using evidence from a large number of existing and recent hunter-gatherer peoples, Fehr and Henrich (2004) point out that individuals typically traveled hundreds of kilometers to sustain insurance networks, acquire livelihoods, and to find mates, encountering thousands of strangers as a result. In these environments those who failed to distinguish between long-term and short-term or one-shot interactions would be at a significant fitness disadvantage as a result.

Additional evidence that our ancestral hunter gatherers frequently interacted with those outside their immediate group comes from the studies of genetic differentiation among groups that we used in Chapter 7. Among aboriginal Australians, for example, distance is a very weak predictor of genetic relatedness, suggesting “that local groups traveled large distances and often came into contact with one another for the purposes of trade, which sometimes included exchange of people from each group” (Keats 1977) (p. 327) One can also infer that effective group size was substantial and that there was frequent between-group migration. Among small partially reproductively isolated sub-populations, drift tends to increase between group genetic differentiation for selectively neutral loci, while migration attenuates differences. The equilibrium level of differentiation, namely that which balances these two effects, depends on the migration rate and a measure of group size. Equilibrium differentiation among groups is enhanced by population crashes, group fission along lineage lines, inequalities in reproductive success within groups, and non-random migration. We have shown (Bowles 2007) that taking account of these reasons for elevated genetic differentiation, the observed measures of genetic differentiation in Table 7.2 are quite inconsistent with the view that ancestral demes were small and reproductively isolated. The genetic data suggest that our ancestors did not live in closed worlds in which interactions were confined to a small number of relatives or lifelong close associates.

## **11.4 The Future of Cooperation**

Thus while reciprocal altruism, kin altruism and reputation building no doubt played a role in early human cooperation, the view that Pleistocene condi-

tions were such that these mechanisms would have been sufficient for the emergence and proliferation of a uniquely cooperative species is not supported by what is known about that period.

By contrast, explanations of the emergence and proliferation of cooperative behaviors based on gene-culture coevolution and multilevel selection are quite plausible. The models and simulations of our evolutionary past presented in the previous chapters provide strong evidence that in the relevant evolutionary environments, selective pressures based on the positive assortment of behaviors arising from the group-structured nature of human populations could have been a significant influence on human evolution. We have also demonstrated the important contribution to the evolution of social preferences that could have been accomplished by the cultural transmission of empirically well-documented behaviors such as the internalization of norms, within-group leveling, and between-group hostility. Third, the nature of preferences revealed in behavioral experiments and in other observations of human behavior is consistent with the view that genuine altruism—a willingness to sacrifice one's own interest to help non-kin—provides the proximate explanation of much of human cooperation. These altruistic preferences seem unlikely to have evolved by kin selection or by means of the various models in which helping others is just self-interest with a long time horizon. Rather, these other-regarding group-beneficial social preferences are the most likely psychological consequence of the gene-culture coevolutionary and multilevel selection processes we have described.

These three reasons, along with the absence of a plausible alternative account, are sufficient, we think, to conclude that gene-culture coevolution and multilevel selection made important contributions to the evolution of human cooperation.

Conclusive evidence about the origins of human cooperation may remain elusive given the paucity of the empirical record and the complexity of the dynamical processes involved. As in many problems of historical explanation, perhaps the best that one can hope for is a plausible explanation consistent with the known facts. This is what we have attempted to provide.

The challenge of explaining the origins of human cooperation has led us to the study of the social and environmental conditions of life of mobile foraging bands and other stateless small scale societies that arguably made up most of human society for most of the history of anatomically modern humans. The same quest has made non-cooperative game theory (which assumes the absence of enforceable agreements) an essential tool. But as

Ostrom (1990), Taylor (1996), and other authors have pointed out, most forms of contemporary cooperation are supported by incentives and sanctions based on a mixture of multilateral peer interactions and third party enforcement, often accomplished by the modern nation state. It would be modest and perhaps even wise to resist drawing strong conclusions about cooperation in the 21st century on the basis of our thinking about the origins of cooperation in the Late Pleistocene.

But the fundamental challenges of social living and sustaining a livelihood faced by our distant ancestors are in many respects not fundamentally different from those we face today. Modern states and global markets have provided conditions for mutualistic cooperation among strangers on a massive scale. But altruistic cooperation remains an essential requirement of economic and social life. The reason is that neither private contract or governmental *fiat* singly or in combination provide an adequate basis for the governance of modern societies. Social interactions in modern economies are typically at best quasi-contractual. Some aspects of what is being transacted are regulated by complete and readily-enforceable contracts, while others are not. Transactions concerning credit, employment, information, and other goods and services where quality is difficult to monitor provide examples of quasi-contractual exchanges. Where contracting is absent or incomplete, the logic of Adam Smith's invisible hand no longer holds. Decentralized markets fail to implement efficient allocations. Governments typically lack the information, and often the motivation, necessary to provide adequate governance where markets fail or are absent.

We now know from laboratory experiments that subjects in market-like situations with complete contracts behave like the Adam Smith of *The Wealth of Nations*, while their behavior when their contracts are not complete resembles more the Adam Smith of *The Theory of Moral Sentiments*. Thus, where the invisible hand fails, the handshake may succeed. Kenneth Arrow wrote (1971 p. 22)

In the absence of trust...opportunities for mutually beneficial cooperation would have to be foregone...norms of social behavior, including ethical and moral codes [may be]...reactions of society to compensate for market failures.

For this reason one cannot hope that "how selfish soever man may be supposed" (to recall Adam Smith at the head of chapter 1) well-defined contracts exchanged on competitive markets in conjunction with well informed and

well intentioned states accountable to a democratic electorate would provide adequate governance of modern citizens. Thus, social preferences such as a concern for the well-being of others and for fair procedures remain essential to the process of sustaining society and enhancing the quality of life.

In a world increasingly connected not just by trade in goods but also by the exchange of violence, information, viruses, and emissions, the importance of social preferences in underwriting human cooperation, even survival, may be greater even than during the Pleistocene epoch that improbably produced this particular cooperative species.