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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 prehuman life in societies.
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> Pyotr Kropotkin *Mutual Aid*, (1989[1903]) p. 277.

> Any animal whatever, endowed with well-marked social instincts, the parental and filial affections being here included, would inevitably acquire a moral sense or conscience, as soon as its intellectual powers had become as well developed, or nearly as well developed, as in man.
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> Charles Darwin, *The Descent of Man* (1998[1873]) pp. 71–72.

About 55,000 years ago, a group of hunter-gatherers left Africa and began to move eastward along the shores of the Indian Ocean. They may have originated in the Upper Rift Valley in modern-day Kenya. They could have been the descendants of the cooperative early humans we described at the outset, living 30,000 years earlier at the mouth of the Klassies River far to the south. Wherever they came from, some eventually crossed hundreds of kilometers of open ocean before reaching Australia, just 15,000 years later. 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. As they spread northward, they also encountered the Denisovan hominins who inhabited parts of Asia as recently as 50,000 years ago. Another branch of the African exodus crossed the Levant and somewhat later occupied Europe, then home to the soon-to-be-extinct Neanderthals. 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 (Foley 1996, Klein 1999).

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, ornament-wearing and tool-making) Neanderthals or that allowed the construction of oceangoing craft. Some attractive candidates can be ruled out. The physiological innovations allowing for more effective speech, rearrangement of respiratory tract and esophagus, for example, had occurred much earlier. Likewise, the dramatic expansion of hominid brain size had occurred before two million years ago. Richard Klein (2000) 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 (p. 18).

But, as Klein himself points out, the only evidence for such a super-mutation are the facts it is intended to explain (Klein 2000). 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 then and since.

12.1 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, exceptionally among animals, we developed the cognitive, linguistic and other capacities to structure our social interactions in ways that allowed altruistic cooperators to proliferate.

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 risky, skill-intensive, and characterized by increasing returns to scale. Deploying skills that required years to acquire favored the evolution of large brains, patience, and long lives (Kaplan et al. 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, meant that there were substantial benefits to cooperative child-rearing practices extending beyond the immediate family. Prolonged juvenile dependency also generated 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 among 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 our models and simulations 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 altru-

istic or mutualistic. 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, for example Figures 4.6, 9.1, and 9.4 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 environments of early humans does not explain why it evolved, for individuals bear the costs of their cooperative behaviors, while it is often others who enjoy the benefits. Thus, the distinctive human livelihood and associated cognitive capacities and longevity are necessary but not sufficient to explain the extent and nature of human cooperation. While benefits of cooperation accruing to the individual cooperator may sometimes 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 would not cooperate, regardless of their beliefs about what others would do. As a result, for cooperation to be sustained, social preferences would have to motivate at least some of those involved.

The distinctive human capacity for institution-building and cultural transmission of learned behavior allowed social preferences to proliferate. Our ancestors used their capacities to learn from one another and to transmit information to create distinctive social environments. The resulting institutional and cultural niches reduced the costs borne by altruistic cooperators and raised the costs of free-riding. Among these socially constructed environments, three were particularly important: group-structured populations with frequent and lethal intergroup competition, within-group leveling practices such as sharing 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 their emergence was highly likely for two reasons. 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. In the case of kin-based 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 vast number of foraging bands during the Late Pleistocene and earlier. Even if strong reciprocity initially emerged in a very small fraction of the human population, it is highly likely that over tens of thousands of generations and something like 150,000 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 exceptional social preferences and the cooperative social practices that supported them, taking the distinctive nature of human ecology, diet, and life course as preexisting. 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 have benefited from preferentially targeting large animals, as opposed to food acquired in smaller packages, and thereby enlarging the place of hunted meat in their diet. Winterhalder and Smith (1992) 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 (p. 60).

We think it likely that the distinctive aspects of the human livelihood thus coevolved with the distinctive aspects of our social behavior, most notably cooperation.

Two approaches inspired by standard biological models have constituted the workhorses of our explanation, multi-level 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 empirically unlikely. By contrast, explanations of the emergence and proliferation of cooperative behaviors based on gene-culture coevolution and multi-level selection are quite plausible. First, 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. Second, 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 others, including those who are not family members, and not simply in return for anticipated reciprocation in the future, provides the proximate explanation of much of human cooperation. These altruistic preferences seem unlikely to have evolved by kin-based 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 multi-level selection processes we have described.

12.2 The Future of Cooperation

Conclusive evidence about the origins of human cooperation will 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 contracts) 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 thus be wise to resist drawing strong conclusions about cooperation in the 21st century solely on the basis of our thinking about the origins of cooperation in the Late Pleistocene. One may doubt, for example, that lethal intergroup conflict today contributes to the altruism, civic mindedness or other social preferences that could underpin the more cosmopolitan forms of cooperation required to address global challenges such as climate change and epidemics.

But the fundamental challenges of social living and sustaining a livelihood that our distant ancestors faced 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 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. But 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 marketlike situations with complete contracts tend to behave like the *Homo economicus* of Adam Smith

of *The Wealth of Nations*, but when their contracts are not complete their behavior fortunately resembles more the virtuous citizens of the Adam Smith of *The Theory of Moral Sentiments*. Thus, where the invisible hand fails, the handshake may succeed. Kenneth Arrow wrote (1971)

> 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 (p. 22).

Thus, social preferences such as a concern for the well-being of others and for fair procedures remain essential to 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 now be greater even than among that small group of foragers that began the exodus from Africa 55,000 years ago to spread this particular cooperative species to the far corners of the world.