1 The Evolution of Human Co-operation

Sometime at the end of the Pleistocene, a few groups of mobile hunter-gatherer-foragers in the greater Mesopotamia region started to build elaborate monuments on their landscapes using wood, stone, and earth. Over the millennia, more and more of these sites were constructed over an increasingly larger region. People periodically congregated at these special places for weeks or even months at a time. This phenomenon likewise spread and independently developed throughout the entire Eastern Hemisphere over the next few millennia. The tradition of building these special places likewise died out after a millennium or so in particular areas, only to reappear in the archaeological record in different forms in neighboring regions. This phenomenon occurred independently in Asia, Africa, and the Americas. It is this process, one that I argue develops out of sustained human social interaction under certain demographic and environmental conditions, that we will explore in this book.

I refer to the small-scale societies in which people build special places as a means of organizing their economic and cultural life as *complex stateless* ones. The key difference between stateless societies and complex ones is the degree to which people in the latter co-operate on a sustained basis with others who are distantly related or even not biologically related at all. Most hunter-gatherer bands – simple stateless societies – lived in groups that averaged approximately 25 people. Complex stateless societies supported substantially larger numbers of people who interacted with each other over long periods of time. While there is some evidence that hunter-forager bands were composed of some nonrelated people, complex stateless societies were characterized by numbers an order of magnitude larger. These large numbers created complex relationships between many people. This transformation in our lifeway from small, mainly kin-based mobile groups to larger groups of distantly related and nonrelated people who came together to create monuments where they could congregate and intensify social relationships represents the origin of "civilization" in colloquial terms. Empirically, it represents one of the most radical shifts in the social and cultural organization in the history of our species. It is the core problem of this book.

This book develops a theoretical approach to the origin, structure, and spread of such complex stateless societies using concepts from evolutionary game

theory, archaeology, and allied disciplines. Evolutionary game theory applies the principles of classic game theory to evolutionary questions. We understand the evolution of co-operation to be a type of collective action problem (Carballo 2013). That is, how do nonrelated people develop norms of co-operation and sustain these over time, particularly in social contexts in which political coercion is effectively absent? The key to the social co-operation in complex stateless societies is that they must effectively deal with the "free-rider" problems inherent in groups made up of ego-directed people. Overcoming these collective action problems is essential to understanding the evolution of social complexity in our species. These more successful complex stateless societies create social organizations that allow individual members of the group to benefit in ways that they cannot in smaller population sizes.

The lack of coercion in complex stateless societies is a key feature of this social phenomenon. Ethnographic data indicate that complex stateless societies certainly have social ranks and markers of prestige, but unlike leaders in state societies, those in stateless ones do not possess *coercive* power over others. This is an extremely important observation: the emergence of complex stateless societies was not a costly process in which the vast bulk of people were forced to give up resources or labor to ego-directed aggrandizers, as is argued in many more traditional cultural evolutionary models. Rather, under the appropriate conditions, an ad hoc managerial leadership will emerge to deal with the free-rider problems, on one hand, and the need to reward co-operators, on the other. This is a kind of leadership created by the group; it is not forced on the group either by aggrandizers or by environmental stresses.

These free-rider problems, if not properly and forcefully dealt with, threaten group co-operation and collective action. It is critical to note that informal social coercion exists in all stateless societies (as well as in state ones, of course), and it is manifested in taboo, black magic, and so forth. However, stateless societies are notable for their absence of institutionalized elites with power to obligate others without a substantial consensus among the community. That is, power in stateless societies by leaders is ad hoc and granted or withdrawn by the community at large. This is a critical point, and I spend the entirety of Chapter 4 addressing this issue. People who take on the organizational tasks are referred to here as managerial leaders. Leaders assume costly, prosocial roles and are rewarded with prestige and other resources. Unlike classic cultural evolutionary models in which nonstate or chiefly elites develop into coercive, hierarchical classes by taking advantage of resource and/or social stress, managerial leaders in contrast garner prestige and wealth by hosting elaborate social events such as feasts, potlatches, and other ceremonial activities. They also serve as the key mediators in structuring co-operative group activities through persuasion, not force.

The framework developed in this book is based on theoretical innovations in various kinds of evolutionary game theory in the social sciences over the past 30 years. Most significantly, we have learned that the traditional rational actor theory used in economic game theory and in the "canonical" explanations of the origins of complex society in archaeology is inadequate to understand the structure of the small groups that characterize stateless societies. Rather, we turn to newer insights into human sociality predicated on various types of prosocial behavior characteristic of small-group interaction. I refer to "irrational prosocial behavior" as "social rationality" to distinguish it from classic game theory's rational behavior. That is, a behavior that may seem irrational from an economic perspective can be quite rational from a social one insofar as that behavior is ultimately benefiting the actor. The opposite is also true. Social rationality is the cornerstone of human sociality, as we will see in the following chapters.[1] An explosion of research in the study of human co-operation in small groups over the last few decades shows that sustained co-operation between ego-directed individuals can be maintained under the appropriate conditions. The appropriate conditions include a minimal level of population density and resource availability, on one hand, and the creation of cultural norms that deal with free-rider and other collective action issues, on the other. This concept is called "homo reciprocans" or "conditional co-operation" and has been extensively developed by scholars such as Sam Bowles and Herb Gintis (Bowles et al. 1997; Bowles and Gintis 2011), to name just two of the many theorists who have worked on this theoretical issue.

We can therefore reformulate the question in a more nuanced way: how do people create complex, mutually beneficial co-operative economic organizations in small-scale societies that are not structured by markets or states and that lack money, policing power, contracts, courts, and other forms of social coercion? In collective action terms, we can ask, how did people solve the free-rider problems inherent in group behavior in these societies, and how were co-operative individuals rewarded for both co-operating with and not defecting from the group? How was non-co-operation punished? How did individuals in the group benefit more by working together than they would have by working in small, family-based units or even alone? In short, what conditions led to a few groups creating social systems of sustained co-operation at the beginning of the Holocene, and what conditions kept them co-operating for millennia up into the ethnographic present?

My analysis of ethnographic and historical data indicates that people in small groups create rules and norms to govern the production and exchange of resources, behaviors that makes sustained economic co-operation possible. These norms and rules are structured through various kinds of ritual and taboo. These rituals schedule tasks, reward co-operators, and enhance payoffs

for prosocial behavior by all members of the group. They maintain fairness and punish non-co-operators. Feasting and potlatching events are an integral part of the range of reward strategies to promote co-operation. This "ritualized economy" is the means by which the emergent properties inherent in human social interaction that lead to co-operation are transformed into institutionalized norms and beliefs, sustained by costly, prosocial behaviors. In fact, these rules develop in any group of people who interact over any period of time, no matter the larger sociopolitical context.

I also contend that work in evolutionary game theory indicates that the social dynamics of small groups are significantly different than those in large ones. This is an undertheorized point in anthropology in particular and social science in general. Small-group dynamics are different for a number of reasons, not the least of which is that the role of reputation in long-term social interaction is so important to maintaining co-operation. If people in fact behave in socially rational ways based in part on their knowledge of other people's likely reaction to their actions (see Chapter 3), then small groups provide a context in which most people know each other. The ability to create social histories of most people and to use these reputations in future interactions is possible in small-group contexts in ways not possible in large groups. As Sergey Gavrilets (2015:2) nicely phrases it, "the evolutionary roots of human cognition are in our capacity to form shared goals, be committed to them, and collaborate in pursuing them and that this capacity evolved within the context of small-group cooperation." I will argue that prosocial behaviors, such as costly punishment, work in small groups but that as societies become larger and the stakes of certain behaviors increase, people's behavior trends toward being more economically rational. This process parallels the shift from stateless to state societies in deep history and archaeology – a topic for another book.

In effect, the economic anthropology of small groups and the nature of co-operation in small groups are different than in larger ones. Succinctly, we behave differently in a village than in a city due to the continual face-to-face interaction that permanently exists in the former. Small-group contexts elicit co-operation more than large-group contexts for a number of reasons, not least of which is the differential cost of enforcing and rewarding norms of co-operative behavior in each context.

Anthropology is uniquely situated to take on this theoretical challenge because it has traditionally focused on small groups that do not use modern economic mechanisms in their daily lives. Certainly, from an archaeological perspective, up to the early Bronze Age in the Old World and the later Pre-Classic periods in the Americas, all people lived and interacted in small groups in stateless societies. The principles that developed during the evolution of social complexity among our species were products of these demographic contexts. If my contention that socially rational behavior is more pronounced in small groups

than in large ones is correct, then to understand the emergence and evolution of co-operation among our species, we must precisely understand the rules and logic underlying small-group behavior.

We can summarize the logic of this argument so far as to note that people living in small groups where coercion is largely absent are *conditional co-operators*, creating complex co-operative arrangements under the appropriate conditions. Conditional co-operators are *ego-directed social agents who can be induced to co-operate under the right social and material conditions*. People are intelligent and adaptive agents, but they are not always "rational" in a classic economic sense of the term. They are, however, perfectly rational in the colloquial sense, as captured in the term "social rationality." These underlying conditions center on the degree to which group co-operation benefits individuals in the group, that interaction is fair, and labor by individuals is reciprocated or rewarded in some tangible manner. The material conditions center on the degree to which the physical environment provides the means to maintain specialized labor organizations that make co-operation in a group worthwhile to individuals in that group.

Research has demonstrated beyond much doubt that people in small-group interactions engage in costly prosocial or altruistic behaviors and are willing to forgo temporary advantages to prevent cheaters from threatening group cohesion. They will co-operate to achieve goals, and they use various social tools to keep co-operation alive and well. People in successful groups recognize both the individual and collective advantage of co-operation, and some individuals in the group are willing to absorb some costs onto themselves to maintain norms of fairness in exchange for prestige.

The Economics of Small-Scale Societies as a Question of Co-operation

The work in what I call anthropological game theory provides the theoretical basis for the understanding of the formation of socially rational co-operation among ego-directed individuals in small groups and in small groups embedded in larger societies. For evolutionary biology, evolution of "irrational" or altruistic behavior is not a difficult problem to explain in groups of biologically related organisms.[2] Creatures as simple as ants and as complex as chimpanzees can imprint patterns of behavior that lead to large-scale and evolutionarily stable patterns of co-operation that are in the self-interest of each member of the co-operative group. The well-theorized concepts of reciprocal altruism and kin selection explain these phenomena. In humans as well, the tools of evolutionary biology explain in part co-operation among related individuals. However, Kim Hill et al. (2011:1286) found that even in small contemporary hunter-forager bands, most people in residential groups were not strongly genetically related.

While the degree to which modern foragers' residential patterns are similar to those of our Paleolithic ancestors is debatable, it is clear that co-operation in simple societies cannot be completely explained by evolutionary biology alone. As Hill et al. note, even in these societies, there is a large social network of individuals who are not genetically related. This empirical pattern has been noted elsewhere. This reality then explains in part the development of co-operative norms via our evolved capacities for cultural learning.

In this light, human co-operation is different from that of other social creatures in two key ways. As Sergey Gavrilets (2015:2) notes, "humans are also unique in their innate ability and willingness to cooperate at a variety of different scales." First, we co-operate with nonkin on a massive scale. Second, when one adds the unique capacity for traits like speech, symbolizing, and cultural transmission by humans, the emergence and spread of co-operative behaviors occur on an order of magnitude faster than among any nonhuman species. To restate the primary discovery in game theory of the small group – conditional co-operation – one need not invoke a Hobbesian Leviathan to explain this apparent Rousseauian co-operation among humans (Shalizi 1999). Rather, we have a theoretical framework that recognizes that emergent properties in human social interactions can create stable and complex co-operative societies in the absence of coercion but that still satisfies the evolutionary requirement that people act in their own self-interest by increasing their individual payoffs and selective advantages.

Once we understand these principles, much of what used to be considered the "exotic" and "irrational" behavior of non-Western cultures becomes eminently socially rational and intelligent, as we will see in the next chapter. Furthermore, it is a very short and easy intellectual leap to see the signal importance of this insight in modeling the emergence of complex society in the deep historical past of our species.

Making a Living in Stateless Societies: The Ritualized Economy

And here we come to the core of this book. How do people create complex, co-operative economic organizations in small-scale, stateless societies where coercion is largely absent? What rules, emerging from repeated interactions of individuals and transmitted through generations (Carballo, Roscoe, and Feinman 2014:103), allow for successful co-operation? How are these rules converted into social norms and customs that members of the group implicitly understand and support? Why do some rule-bound co-operative organizations survive and thrive while others are absorbed or die out? If you can answer these questions, you can begin to understand the evolution of the first complex societies in the archaeological record and the continued evolution of these societies up the development of coercive states.

The key to these questions, as mentioned earlier, is what David Carballo, Paul Roscoe, and Gary M. Feinman (2014:115) refer to as "coupling the logic of evolutionary cooperation and collective action approaches" (see also Feinman 2000). The collective action dilemma lies at the core of this theoretical problem. Collective action is simply a group of people working for a common goal. However, there are two basic threats to sustained collective action. First, there is a cost of co-operation that has to be offset by rewards. Essentially, groups that successfully co-operate will provide higher payoffs to individuals within that group. Second, there will always be cheaters or free-riders who will avoid the costs of co-operation while trying to obtain the benefits of the group effort. There are many instances in which individuals in a group can acquire more resources by cheating than by co-operating. However, that cheating, if done by too many people, will ultimately destroy the group and possibly the resource base on which the group is dependent. This is also known as a "tragedy of the commons" problem in collective action theory. How groups deal with the twin problems of free-riding and rewarding co-operation is the core of how complex stateless societies develop and sustain themselves in the face of collective action dilemmas.

The ritualized economy as defined here is the key to understanding how people in successful stateless societies function in the absence of coercive political institutions. They create rules of co-operative economic behavior and encode them in a variety of *ritual* practices. This economy, structured by ritual, enculturated by habit, and culturally transmitted over generations,[3] is the means by which the emergent properties of co-operation inherent in social interaction lead to "strong" forms of co-operation. These rules are transformed into norms and beliefs and are sustained by prosocial or altruistic behaviors that reward co-operation and punish free-riders. These are societies that use the capacity of inherently ego-directed individuals to create co-operative social models through effective ritual practice. These normatively organized structures of social interaction are then subject to selective pressures. One look at the ethnographic and archaeological record of small-scale societies demonstrates how much ritual constructions and behavior permeated life prior to, and outside of, state organizations over the millennia.

Once we are attuned to this insight, many comments in the rich ethnographies of small groups or "tribal societies" make sense. The celebrated E. E. Evans-Pritchard, in his book *The Nuer*, described the roles of chiefs in the political lives of these cattle-raising people in the Sudan. He notes that a particularly important activity for chiefs is the mediation of disputes, particularly lethal ones, such as blood feuds. These feuds threaten the well-being of the community, and chiefs are indispensable actors in managing this conflict. In describing the numerous events and the taboos surrounding the management of these disputes, Evans-Pritchard says, "These affairs are like a game in which

everybody knows the rules and the stages of development: when one is expected to give way, when to be firm, when to yield at the last moment and so forth" (Evans-Pritchard 1940:175–176). There is no formal law code or systematic rule book in these kinds of societies. No such formalities are needed. These norms develop over time and become "second nature" to people, rules that are continually reinforced by daily social practice. In other words, these behaviors are structured by coded and ritualized norms that are instinctively understood by virtually all. These ritualized events structure people's lives, both political and economic. Once we understand them as a set of social tools that developed over time to deal with the difficulties of keeping distantly or nonrelated peoples co-operating with each other, we see evidence for such phenomena throughout the classic ethnographies of people barely touched by Western colonization.

What is the material basis of successful co-operative economic organizations in stateless society? My read of ethnography, history, and archaeology shows some very clear patterns. Co-operative groups create rudimentary economies of scale structured by ritual and taboo. Working together in specialized tasks, households can produce much more value in the aggregate than by working alone because of the efficiency in eliminating redundant tasks and institutional transaction costs, the latter term used in the sense defined by economic historian C. Douglass North. The result is that each individual in the group benefits by a much higher per capita level of resource availability. This kind of co-operation is also critical in maintaining defense against those who seek to raid villages. In a competitive environment, the profoundly non-co-operative intergroup strategy of organized violence against neighbors simultaneously creates conditions that promote intense intragroup co-operation. In such contexts, intensive co-operation to defend and to raid has a very high payoff for individuals in the group. Conversely, failure to develop strong co-operative norms places people in danger of being raided, captured, or killed.

This economic organization, however, creates a very big problem faced by all groups working in specialized labor organizations in a stateless society: the ownership of the final product in a multistage production process is not obvious, as it is in solitary production at the household level. This is true if the resources are created by specialized economies of scale or if they are obtained by raiding. This is a classic collective action problem, and it creates some very severe free-rider issues that have to be resolved if co-operation is to be maintained.

Imagine an autarkic model in which one family makes its own pottery. They can produce x amount of pottery per week. At the end of the week, they own all of these pots and can use them as they like, perhaps exchanging the pots for other commodities from other families. But if, say, five families work together in a more specialized manner, the families that make up this work group can now produce $(x)(y)$ pots per week with the same amount of labor. How does that work? The five families simply divide up the tasks and eliminate redundant

transaction and other costs. The amount of labor that is reduced is enormous, because each family does not have to replicate all the tasks. As a result, in the same amount of time, the five families are able to produce substantially more pots. There is a huge advantage, of course, one that provides a large material payoff for each participant in this group activity. Not only does the surplus benefit the individuals but a portion of it is used to reward managerial leaders to maintain their earned social prestige.

However, there is a potentially huge social cost as well. Once the pots are fired and ready, there is the question of who owns the pots. In state-level societies, with coercion and/or market mechanisms, this issue is resolved through a variety of mechanisms, including customary hierarchies that predetermine the flow of resources, contracts, supply-demand pricing, enforced taxation, and even the use of slave labor. But in a stateless society without coercive social hierarchies and with no economic ones to speak of, ownership of the final product becomes a critical issue that threatens group cohesion.

These problems are resolved by the use of ritual, feasting, and taboo – effectively, a series of culturally specific rewards and punishments to keep the group together under the leadership of people the community accepts. Stateless societies are able to maintain high levels of economic co-operation by creating cultural norms that reward co-operative agents via feasting and other activities and that punish free-riders. These are the rituals that nineteenth-century Western travelers saw as irrational and a waste of time – the potlatch being the quintessential example. However, we can now see how eminently intelligent and strategic these practices are. Certain kinds of rituals are almost always associated with economic activities that require coordination and some degree of risk. Leaders step up with prosocial behaviors that simultaneously keep the group functioning. Groups of people accord ad hoc authority to leaders to enforce norms of co-operative behavior. In return, these leaders gain prestige and enhance their material and social lives. These rituals function in many ways. They schedule labor tasks. They regulate the redistribution of goods in a way that is fair and understandable by the community. The religious taboos serve to punish free-riders and allow the community to exercise some order in the way in which work and trade are conducted.

But what about the dynamic, historic component to this? Let's return to the pottery production example. If successful, the five families can now produce much more pottery in the same amount of time than five individual families working alone can produce. Over time, this group will exchange their resources for other resources not available in their village. They will acquire exotic goods that can be recycled into a political economy that puts them at even greater advantage over their peers in the rest of the village or the region. Some of the other villagers, being intelligent actors, will most likely either join the successful group or imitate the norms of co-operation developed by the first group.

Or they might create new norms that are even more effective in evoking co-operative behavior. As this dynamic works out, the most effective normative strategies will grow at the expense of less effective ones. This scenario is not a just-so story designed to fit a model. Rather, as Chapters 5–7 show, these behaviors have been documented over and over in the archaeological and ethnographic records.

In short, in the absence of state mechanisms of coercive power, ritual, feasting, and taboo serve as the means by which social norms are encoded and provide the means to coordinate activities among autonomous households. The economic organization of stateless societies is therefore best seen as a "ritualized" one, a means by which social norms of co-operation can be understood and sanctioned in a society without formal codes of behavior. Individuals acquire prestige, ritual status, and greater access to material goods by sponsoring important events for the community. In the absence of coercive mechanisms, there simply is no other way to achieve group co-operation.

The Nature of Ourselves: Are Humans Inherently Co-operative?

In developing a theoretical framework to understand the evolution of co-operation, it is necessary to begin with some fundamental principles about the nature of human psychology and sociality.[4] This is due to the simple fact that if humans are inherently co-operative, then we must explain why we did not co-operate on any significant scale until the early Holocene, given that modern *H. sapiens* goes back at least 50,000 years and probably much longer. On the other hand, if humans are inherently ego directed or selfish, then this begs the serious question of why we as a species began to co-operate at all and why we are not still living in small hunter-gatherer-forager groups. Inherently social or inherently conflictive? Implicitly or otherwise, this dichotomy has been a fundamental question of Western philosophical, economic, and economic anthropological thought since the late eighteenth century. In many ways, it has been the most significant concept looming behind discussions of the origin of complex society in archaeology and related historical disciplines.

In Western political philosophy and social science, the debate over human nature most certainly begins with Aristotle, and his views have subtly affected social science into the present century. In his classic work *Politics*, written in the middle of the fourth century BCE, he opens with the surprisingly modern observation that humans are "more of political animals than bees or any other gregarious animals" (*Politics* 1.2). Aristotle in fact believed that the state or civil society was prior to the family or individual in the sense that humans cannot live in isolation. He claims that "a social instinct is implanted in all men by nature" (*Politics* 1.2) and that individuals are not self-sufficient. In a famous aphorism, he states, "He that lives alone" is either "a beast or a god" but not