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The Evolution of the Social Contract

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Abstract. Two transitions in the evolution of the social contract are considered, the first from the dominance hierarchies of the great apes (used as a proxy for our prehuman ancestors) to the egalitarian political structure of non-sedentary hunter-gatherer bands, and the second, to the reintroduction of hierarchical institutions of governance, primarily a result of living in fixed settlements after the inception of agriculture. The first transition was a product of biological and cultural evolution, which brought about big brains, language, higher consciousness, and a lower rate of time preference that enabled early man to sustain an egalitarian social contract and thereby escape the domination that confronted his prehuman ancestors. The second transition was a product of cultural evolution alone. The high costs of enforcing the hunter-gatherer social contract caused it to break down and be replaced by hierarchy when the domestication of plants and animals gave rise to a sedentary existence and increased populations. However, it is shown that the very biological and cultural adaptations that made hunter-gatherer egalitarianism possible were a necessary foundation for the spontaneous creation of complex culture and the evolution of institutions that would once again eventually make freedom possible and economic prosperity possible.

JEL classification: D23, H41, Z13.

1. The Evolution of the Social Contract[2]

The evolution of cooperation between animals is often explained as a product of kin selection (inclusive fitness) and reciprocal altruism (see, Hamilton (1964), Trivers (1971)). Though one or both mechanisms can explain cooperation between individuals from one-cell clones up through chimpanzees, there is a very large gap between the degree and type of cooperative behavior observed in *Homo sapiens* and that seen in even our closest cousins, the chimps. The proximate cause of this gap can be explained by the difference in human and ape cultural evolution. Specifically, human cultural evolution has been responsible for the dramatic change in human circumstances over the last 100,000 years, and though chimpanzees and some other animals display a form of culture (see Whiten et al. (1999) and de Waal (1999)), there is little evidence of significant ongoing cultural evolution in nonhuman animals. Explaining the ultimate causes of the difference between human and ape cultural-evolution growth paths, I believe, is interesting in and of itself, but also for what it suggests about the nature of human cultural institutions, including social contracts.

Three stages of the evolution of the social contract are considered, which I will call the Pigouvian, the Coaseian, and the Hayekian social contract stages. The focus will be on: 1) the factors that made the transition from the Pigouvian to the Coaseian contract possible; 2) a detailed analysis of the nature of the Coaseian contract; and 3) a the discussion of the transition to the Hayekian stage, with some discussion of aspects of the early Hayekian contract made possible by the biological and cultural adaptations examined in the context

of the Coaseian social contract. The progression from the Pigouvian to the Coaseian social contract was made possible by a significant reduction in the transactions costs associated with social organization, facilitating cooperation. Revealed preference suggests that the transition from the Pigouvian to the Coaseian social contract was beneficial to the individuals involved in and of itself. The transition from the Coaseian contract to a Hayekian one was the result of subsequent increases in transactions and enforcement costs. Furthermore, unlike the earlier transition, this transition was very likely not initially beneficial, but rather was a necessary by-product of continued cultural evolution. In other words, the move from a Coaseian to a Hayekian social contract itself imposed political costs on most of the individuals involved, though the move made possible economic gains that outweighed those costs. These social contract types will be examined in the following contexts: Pigouvian, the dominance hierarchies of the nonhuman great apes; Coaseian, the egalitarian political structure of non-sedentary hunter-gatherer bands; and Hayekian, the reintroduction of hierarchical institutions of governance, primarily as a result of living in fixed settlements after the inception of agriculture.

The first transition was in part the product of biological and cultural evolution, and the simple explanation for the reduction in transactions costs which facilitated the transition from the Pigouvian to the Coaseian social order was the emergence of language and evolutionary changes that made language possible. The second transition, from a Coaseian to Hayekian order, was the product of cultural evolution. In a Pigouvian system, order is maintained by a system of Pigouvian taxes in the form of punishments or threats of punishments for transgressions that are meted out by the dominant male. This Pigouvian social contract is presumably similar to the social contract of the common ancestor of apes and early hominids.[3] In the Coaseian system, ex ante conscious voluntary agreements exist stipulating appropriate behavior, and transgressions tend to be dealt with by the band as a whole. In a Hayekian[4] order, much of the enforcement of rules comes from above, but the social order is much more complex and spontaneous than in the Pigouvian system.

This paper could have as easily been titled "The Evolution of Social Cognition." The transition from the Pigouvian social order to the Coaseian order was made possible by and simultaneously brought about the evolution of big brains, language, higher consciousness and a lower rate of time preference. The transition from the Coaseian order to the Hayekian order had, as an accidental by-product, the spontaneous evolution of complex social constructs. This allowed for the off-loading of much human cognition associated with social interaction, thereby freeing up cognitive resources for entrepreneurial and other activities. This view is consistent with Hayek's understanding that "*. . . mind and culture developed concurrently and not successively*" (emphasis original, Hayek (1979:156)).

The next three sections will examine of the biological and cultural mechanisms that made the Coaseian order possible and will also examine that order in some detail. Furthermore, a separate discussion of the Pigouvian order will not be presented—rather, the reasons for the lack of significant ape cultural evolution will be examined in the context of the discussion of the Coaseian order presented in the next few sections. The Coaseian order was made possible by the emergence of big brains, language, foresight and the ability to recognize others as intentional agents. These traits facilitate the formation of long-term voluntary agreements among members of a group. Apes lack these traits and

this deficiency prevents them from forming intentional forward-looking social relationships. Lacking big brains, language, foresight and the ability to recognize others as intentional agents has meant that the formation of voluntary social contracts is prohibitively costly for apes. On the other hand, for *Homo sapiens*, possession of these traits lowered the transactions costs associated with the creation of voluntary intentional social contracts and facilitated their formation.[5] However, the cost of maintaining the Coaseian social contract was quite high per capita, and it increased rapidly with group size, making the Coaseian social contract infeasible when population size significantly increased with the sedentary lifestyle associated with agriculture.

1.1. Indirect Reciprocity and Nepotism: The Foundation of the Coaseian Social Contract

Cooperation between mammals, including nonhuman primates of a given species, tends to take the form of repeated pair-wise interactions between the participants, even though the interactions very often take place within the context of larger groups.[6] Alexander (1987) has suggested that a much more extensive system of cooperation can be facilitated by indirect reciprocity. Reciprocal altruism involves direct reciprocity (DR), where an individual cooperates with a conspecific who has cooperated with him in the past. Indirect reciprocity (IDR) includes cooperating with those that the individual has observed cooperating with others in the past. ''Indirect reciprocity develops because interactions are repeated, or flow among society's members, and because information about subsequent interactions can be gleaned from observing the reciprocal interactions of others'' (Alexander 1987:77). Social relationships are much more complex in an order in which indirect reciprocity takes place than in one involving only direct reciprocity. With DR, the individual need only keep track of his obligations to each of the other individuals in the group and theirs to him. With IDR, the individual must not only keep track of these, but the behavior of all of the other group members in transactions involving the others. The complexity of the cognitive task is several orders of magnitude greater with IDR than with DR, but more importantly, the very nature of the problem is different.

Indirect reciprocity has been studied from both a theoretical and an experimental perspective using the concept of image scoring (see Nowak and Sigmund (1998) and Wedekind and Milinski (2000) respectively). Each individual has an image score that measures the degree to which the individual cooperated with other group members in the past and that we may assume is known by all players, though not perfectly. The image score reflects the reputation and status of the individual and is subject to continual assessment and reevaluation. Cooperation occurs in the context of repeated nonsimultaneous exchange, meat sharing, for example, which was an important component of the social contract of hunter-gatherer bands. Nowak and Sigmund find that ''[c]ooperation wins in a computer simulation of indirect reciprocity'' (Nowak and Sigmund 1998:573), but that individual cooperation ''depends crucially on the ability of a player to estimate the image score of the opponent'' (Nowak and Sigmund 1998:575). The evolution of reciprocal altruism—direct reciprocity—requires that individuals have sufficient cognitive capacity to recognize other members of their group, distinguish between cheaters and

cooperators, and maintain appropriate mental accounting that reflects its obligations to each of the others and theirs to it. A mental account based on an image score used with IDR is much more cognitively sophisticated than the accounts necessary to facilitate DR. In particular, the formation of mental accounts necessary to facilitate indirect reciprocity requires that the agent understand that other players are intentional agents.

After an extensive review of the evidence, Michael Tomasello argues that "... nonhuman primates are themselves intentional and causal beings, they just do not understand the world in intentional and causal terms" (Tomasello 1999: 19). In other words, nonhuman primates do not perceive conspecifics as intentional agents, nor are they capable of understanding cause and effect. "... [T]hey do not view the world in terms of the kinds of intermediate and often hidden 'forces,' the underlying causes and intentional/mental states, that are so important to human thinking" (Tomasello 1999: 19). Nonhuman animals, and especially primates, have very impressive problem-solving strategies and social skills, including the ability to predict the short-term behavior of conspecifics in particular situations. These abilities reflect an impressive ability to discover correlations, not an ability to discover or understand causation. The human ability to understand that others are intentional beings and to understand that the mental states of others—their beliefs and desires—determine their behavior, is necessary for the image scoring that facilitates indirect reciprocity.[7] The mental accounts used in indirect reciprocity are accompanied by an understanding that the scores have causal implications about the behavior of others. However, some investigators, de Waal (1996) for example, argue that some higher primates do see conspecifics as intentional (also see Heyes and peer commentary (1998), for an extensive discussion on whether there is convincing evidence supporting the proposition that nonhuman primates have theory of mind). The fact that the evidence for nonhuman primates understanding the world in intentional, causal terms and for their possessing theory of mind is inconclusive, suggests that if they in fact possess these cognitive abilities, the abilities pale in comparison to those of humans.[8]

Alexander (1987) also suggests that indirect nepotism may have been an important force in the evolution of the social contract. Direct nepotism in biology is driven by inclusive fitness, and follows from Hamilton's rule. An individual will make sacrifices that benefit another if $rB > C$, where B is the expected benefit in terms of fitness to the other individual, r is the coefficient of relatedness between the two individuals, and C is the expected fitness loss to the individual performing the altruistic act. For sexually produced siblings, $r = .5$, so an individual will perform an altruistic act that yields a benefit to a sibling that exceeds twice the cost it bears in performing that act.[9] Indirect nepotism allows the individuals involved to take advantage of the fact that among three or more siblings, for example, helping another is a non-rival good. If sibling 1 provides benefit B to sibling 3, sibling 2 receives the same expected gain as sibling 1, without having to bear the direct cost C. Genes that bring about altruistic behavior satisfying Hamilton's rule will be favored by natural selection. Hamilton's rule determines the limit of altruist cooperation driven by inclusive fitness.

Recognition of the non-rivalness of altruism among individuals carrying the same genes allows for a relaxation of the Hamiltonian constraint, thereby expanding the extent of possible altruistic cooperation. Of course, as with all public-goods situations, free riding is

a distinct possibility, because the free rider gains a benefit without bearing a cost. However, since we are dealing with small numbers, the Coase theorem should be operative and siblings, for example, should be able to attain an optimal outcome. Jones (2000) presents several models of indirect nepotism, and here I will briefly discuss the simplest case he considers, one involving three brothers. First of all, notice that the free-rider problem, if not solved, can result in a lower level of altruism than that predicted by Hamilton's rule. Jones suggests that the free-rider problem can be solved by "conditional nepotism," where two of the brothers will agree to help a third using the simple rule: I will contribute "*if and only if*" you contribute. Use of this rule requires that each individual understands the other as intentional, and, unlike direct nepotism, requires conscious calculation on the part of the participants.

Jones considers the brothers Karamazov: Ivan and Alyosha agree that each will contribute to Dmitri if the other one does. Assume that each donates fitness benefit B to Dmitri, and each directly bears fitness cost C. This process can be sequential, where the brothers donate in alternate periods, or it can be simultaneous. From the perspective of Ivan, the fitness benefits he receives is given by $2rB$, since he benefits from both his and Alyosha's contribution to Dmitri. The cost Ivan bears is given by $(1 + r)C$, where C is the cost of his direct contribution; he also bears the cost, rC, which reflects the cost to him of Alyosha's reduced fitness resulting from Alyosha's contribution to Dmitri.[10] The modified or conditional nepotism rule in this case is $2/3B > C$. "In other words, this argument suggests that it would be adaptive for Ivan to treat Dmitri *as if* their coefficient of relatedness were 2/3 rather than 1/2, provided that Alyosha is willing to do the same" (Jones 2000: 782). By increasing the effective coefficient of relatedness, indirect nepotism should result in an increased amount of altruistic cooperation. For indirect nepotism to work, the individuals involved must understand the causal nature of each other's behavior and, as in the case of indirect reciprocity, keep mental accounts reflecting not just their own obligations to others and others to themselves, but also obligations *between* the others. Below we will examine the cognitive constraints on complex cooperation as well as the nature of that cooperation.

A case of indirect nepotism important for the success of *Homo sapiens* is the combination of maternal and paternal parental investment.[11] Furthermore, indirect nepotism blurs the distinction between reciprocity and nepotism. Not only does providing a benefit to a non-kin increase an individual's image score and hence the likelihood of receiving benefits in the future, providing a benefit to a non-kin may increase the likelihood that that individual will provide a benefit to a kin in the future. Jones (2000: 787) provides indirect coefficients of relatedness from a sample of nine tribal societies, ranging from .991 to .231 with a median of .822.

1.2. The Hunter-Gatherers and the Coaseian Social Contract[12]

The dominant political feature of recent hunter-gatherer societies, and presumably that of Paleolithic hunter-gatherer (H-G) societies as well, was egalitarianism. Although a dominant tendency among recent H-G societies was to share large game, this egalitarianism was political, not economic.

> The term *egalitarian* does not mean that all members have the same amount of goods, food, prestige, or authority. Egalitarian societies are not those in which everyone is equal, or in which everyone has equal amounts of material goods, but those in which everyone has equal access to food, to the technology needed to acquire resources, and to the paths leading to prestige. The critical element of egalitarianism, then is *individual autonomy* (Kelly 1995:296).

Aside from meat-sharing, which will be discussed in more detail in the next section, the egalitarianism of hunter-gatherer societies was based on equal opportunity, not equal outcome, and a strong desire for individual autonomy. Interestingly, Hayek believes that "[*m*]*an has not developed in freedom*. The member of the little band to which he had had to stick in order to survive was anything but free. *Freedom is an artefact of civilization* . . ." (emphasis original, Hayek (1979:163)). Hayek is wrong in saying that man in his little band was not free, however his freedom was costly to maintain and could not in general be sustained after the transition to a sedentary existence that accompanied the domestication of plants and animals. Hayek is right that freedom is an artifact of civilization, but civilization brought a reemergence of freedom, a freedom that is a product of a very different set of cultural forces than those that gave rise to hunter-gatherers' freedom.[13] However, the product of the biological and cultural evolutionary processes that made possible the H-G social order was a necessary foundation for the Hayekian spontaneous order that followed.

To maintain their egalitarianism, H-G societies form a moral community in which a significant amount of effort is expended in social control aimed at preventing or modifying antisocial behavior. For several reasons (discussed below), band size tended to be around 25 individuals and the per capita cost of maintaining the social contract was probably quite high. According to Boehm (1999), the social arrangement was a reverse-dominance hierarchy, where the group as a whole used various methods to prevent upstarts from gaining dominance, as well as to enforce other components of the social contract. It was this high enforcement cost per capita that made it difficult to extend egalitarianism to the much larger groups that came into existence with the domestication of plants and animals. The high enforcement cost was a product of the active nature of the mechanisms of control: it was necessary for each individual, in essence, to continuously consciously monitor every other individual, which required that they all more or less directly share experiences.

Hunter-gatherers form an intentional moral community, the maintenance of which requires the biological and cultural evolution of several closely interrelated adaptations: 1) the ability to recognize others as intentional beings; 2) a significant reduction in the rate of time preference; 3) the ability to plan for a much more distant future than could the great apes; 4) the ability to maintain sophisticated mental accounts; and 5) the evolution of what Boehm (1999) calls actuarial intelligence. It is the lack of these characteristics that prevents the great apes from overthrowing the dominance hierarchy under which they live and from generating any form of sustained cultural evolution.

The ability to recognize others as intentional beings is a prerequisite not only for the formation and maintenance of a moral community but also for significant cultural

evolution. In order to understand the importance of this evolutionary adaptation to the formation of the social contract, it is necessary to briefly examine Michael Tomasello's theory of the cultural origins of human cognition and cultural evolution. As mentioned above, Tomasello argues that apes do not see their conspecifics as intentional. He reviews a significant amount of experimental evidence that suggests that apes are not capable of the type of learning from others that makes human cultural evolution possible. Tomasello's "... hypothesis is that the uniquely human ability to understand external events in terms of mediating intentional/causal forces emerged first in human evolution to allow individuals to predict and explain the behavior of conspecifics and has been transported to deal with the behavior of inert objects" (Tomasello 1999:24–25). This ability allows "humans to solve problems in especially creative, flexible, and foresightful ways...[and played a] powerful transforming role in the process of social learning" (Tomasello 1999:25). Although chimpanzees learn to use simple tools—for example, sticks for fishing for termites and rocks for cracking nuts—and thus have a simple form of culture, they learn their culture in a very different way than humans, even humans as young as nine months old.

Chimpanzees are good at learning to manipulate their environment to acquire rewards by watching others,

> but they are not very skillful at learning from others a new behavioral strategy per se. For example, if a mother rolls a log and eats the insect underneath, her child will very likely follow suit. This is simply because the child learned from the mother's act that there are insects under the log—a fact she did not know and very likely would not have discovered on her own. But she did not learn from her mother how to roll a log or to eat insects; these are things she already knew how to do or could have learned on her own. (Thus, the youngster would have learned the same thing if the wind, rather than her mother, had caused the log to roll over and expose the ants.) This has been called *emulation learning* because it is learning that focuses on the environmental events involved—not on a conspecific's behavior or behavioral strategy (Tomasello 1999:29).

Human children, by nine months of age, can understand that an adult will intentionally instruct them, and will focus on the behavior of the adult as well as on what the adult's attention is focused on. Chimps focus on the manipulation of the environment to secure a reward. Human children focus and copy the behavior and intentions of an adult without the necessity of an immediate reward. Furthermore, children can accurately copy a process demonstrated by an adult, say, the use of a rake to secure an out-of-reach object; and whereas apes can learn to use the rake to secure the object, they do not closely emulate the technique of the instructor (see Tomasello (1999:30)). The fact that human children are able to focus on the processes or strategies of an instructor and, in general, accurately copy them, is important for the process of cultural evolution since accurate transmission is necessary for cultural evolution to take place. In addition, by focusing on the action rather than on a reward, humans are able to discover better processes or strategies for attaining rewards. Humans intentionally teach their children, which does not appear to be the case

with apes, though the social interaction between the mother ape and her child allows opportunities for the child to learn from the mother. The fact that humans intentionally teach their children, that children intentionally learn, and that children focus on the process or strategy rather than rewards, greatly facilitates cultural transmission and evolution.[14]

Another important stage of the social contract and cultural evolution was a reduction in the human rate of time preference compared to the relatively present orientation of the other mammals—chimpanzees, for example, do not save their tools. Gifford (1999) argues that the lower rate of time preference in humans was made possible by the evolution of language, which, of course, also facilitates cultural transmission. Understanding others as intentional agents and the ability to think about and plan for the long-run future underlay the ability to maintain sophisticated mental accounts—accounts that allow for the much more generalized and complex cooperation made possible by indirect nepotism and reciprocity.

A final trait that facilitated the formation of the social contract is what Boehm calls actuarial intelligence, which is an outgrowth of the abilities to maintain complex mental accounts, make complex plans about the future and view the world in a causal way. Actuarial intelligence is "...the intuitive human capacity, seen abundantly in hunter-gatherers, to think stochastically and to understand rather complex systems on an intuitive but statistically valid, predictive basis. Regardless of what drove human brains to be so large, one product was the generalized capacity to understand and manipulate complex systems of various types" (Boehm 1999:183). Actuarial intelligence, when applied to the social sphere, allows individuals to compute the long-term costs and benefits of complex social systems and to maintain the complex forward-looking mental accounts necessary for the system to function. The Coaseian social contract is an intentional system that works because the members understand the net benefits of the system and consciously maintain the relatively costly enforcement mechanisms necessary for it to function. The mechanisms of governance used by hunter-gatherers were relatively costly per capita, however, total costs were kept relatively low because group size was small.

Adult band members used their elaborate mental accounts and active monitoring of other band members to maintain their social contract.[15]

> Social control involves far more than an outraged group's suddenly deciding to employ dramatic sanctions. In any small group anywhere, people keep track of one another's behavior and try to read underlying motives. Types of deviance that all human groups watch for, gossip about, and react to, include murder within the group, heavily self-interested verbal deception, theft, and stinginess or failure to cooperate when this is appropriate. On the positive side, foragers talk about generosity, cooperativeness, honesty, and other prosocial behaviors that involve good will. In effect the band keeps a dossier on every individual, noting positive and negative points (Boehm 1999:73).

Sanctions range from coolness of behavior toward those who violate social norms to ridicule, shunning, ostracism, and even execution. To the extent that the bands had formal or informal leaders, those leaders were individuals who had a great deal of knowledge and wisdom, were good at dealing with people, and were persuasive speakers, but not boastful,

arrogant or overbearing (see Boehm (1999:69)). "A *sine qua non* for leadership is above-average competence in economic pursuit" (Boehm 1999:71). Leaders did not have the power of coercion over other members of the band and had to rely on their powers of persuasion to influence the group. Control of upstart leaders also involved the use of everything from coolness to execution. Furthermore, band members could leave and join other bands. Boehm argues that the reverse-dominance hierarchy political arrangement of the hunter-gatherer band was maintained by threats of coercion and actual coercion by all the members of the band to control attempts at dominating by upstarts, whether the upstarts were leaders or others.

Weapons were also important in maintaining egalitarianism in the band. Among apes, the dominant one tends to be the biggest and strongest in the band, and he maintains his position via that strength and loses it when a stronger individual comes along to take his place, but among human beings, weapons were a great equalizer that allowed the group as a whole to constrain or eliminate a domineering leader (see Boehm (1999:82–83)). Moore argues that weapons may have played a key role in the maintenance of more egalitarian societies among our ancestors. Attacks by coalitions of individuals bearing stone weapons were likely to be fatal, whereas, in similar attacks by unarmed coalitions of chimpanzees, the victims often survive. "[C]oalitions and weapons greatly increase the difficulty of achieving despotic power in a nonstate society" (Moore 1994:632).

Language allowed humans to organize a coordinated response to a domineering upstart, and weapons allowed the group to dispatch the upstart at much less risk to themselves than a chimpanzee faces when challenging a dominant male. Another important constraint on potential dominants is the human foresight that accompanied the evolution of language and larger brains. Humans can observe the fate of upstarts and project into the future a similar fate for themselves if they try to usurp the power and autonomy of the group. This ability to calculate future consequences of particular behaviors is simply another component of the moral community that reinforces the deterrent aspects of the moral code. Apes are good at calculating the short-term consequences of their social behavior, but they lack the ability and foresight to calculate possible long-term consequences of their actions.

The great apes—with a brain size approximately one-third that of modern humans, lacking language and weapons, and having a very high rate of time preference—can maintain order only by using a dominance hierarchy. Though apes may feel empathy and sympathy for other apes (see de Waal (1996)), they are not capable of understanding the long-term abstract nature of their social contract and consequently they are unable to bring about a system of voluntary social group enforcement, making hierarchy necessary. Like humans, if they cannot be dominant, apes and presumably our hominid ancestors, would at least prefer not to be dominated—but they do not have the cognitive capacity to bring about such a state of affairs.[16] Increased cognitive capacity lowered the cost of the move to and the maintenance of political equality. Language, increased memory, and foresight made possible the type of social organization and coordination that allowed the group to suppress attempts by upstarts to dominate. Weapons lowered the cost of intimidating and eliminating intractable upstarts. Along with these mechanisms of equality that fall under the heading of voice, non-sedentary hunter-gatherers could also choose the option of exit—they could simply leave, and join or form another band.

The biological adaptations and cultural evolutionary processes that made political egalitarianism and increased cooperation possible are not available to nonhuman great apes, who in essence face the "high transactions costs" of organizing a sophisticated voluntary moral community. However, the hunter-gatherers maintained their egalitarian community only because each member invested significant conscious mental resources in monitoring all of the others, maintaining mental accounts, and continuously updating those accounts with information gathered by direct and indirect observation. Moreover, decisions were made by consensus, allowing individuals to present their opinions, and consent was achieved by persuasion, not coercion.

> It is interesting that people living in egalitarian societies must work so aggressively to keep their political order in place. Earlier ethnographic tendencies "beautified" such societies by exaggerating their overall harmony.... [T]he general hypothesis is that egalitarian bands amount to "intentional societies." Band members regularly create and maintain egalitarian blueprints for social behavior, "plans" that are implicit or (in part) explicit in the ethos and well understood by the rank and file who implement them (Boehm 1999:60).

The conscious attention required of each band member to maintain freedom meant that, although the egalitarian solution was made possible by biological and cultural adaptations that lowered transaction costs, the costs of maintaining political equality per capita were quite high—and in fact these costs expand non-linearly as group size increases. Five to seven families was roughly the maximum number of social units that could be accommodated without a hierarchy to coordinate activities (Kelly 1995:211). The expanded mental capacity that made possible the egalitarian H-G social contract was in part the product of various biological adaptations that resulted in a significant expansion and alteration in the human brain structure; among other things, this capacity facilitated the detection of those who cheated or violated that social contract. This approach is consistent with that of evolutionary psychology, which argues that human behavior and culture can only be understood in the context of evolutionary biology and that humans have built-in mechanisms (e.g., cheating detectors) that make possible complex social interaction (see, Tooby and Cosmidies (1992) and Cosmidies and Tooby (1992)).

In sum, in this section it was argued that the hunter-gatherer social contract was maintained by almost constant monitoring on the part of the participants. It is, however, very likely that the various components of the contracts themselves were products of spontaneous order.

1.3. Meat Sharing

Language and the large brain necessary to support the human social contract came at an extremely high cost. Big brains are very expensive: "When the body is resting, the nervous system consumes about 20 percent of the body's oxygen supply, which is the lion's share, considering that the brain accounts for only about 2 percent of the body's

mass'' (Churchland 1986:36–37). ''[B]ig brains are expensive organs, requiring a lot of energy to maintain—22 times as much as an equivalent amount of muscle requires when at rest'' (Mithen 1996:11). Brain tissue is so costly that ''. . .[t]he fact that an organism has a large brain means that it really must need it very badly, otherwise the forces of natural selection will inexorably favor individuals with smaller brains simply because they are cheaper to produce. Animals that have to spend a lot more time feeding to provide fuel for their big brains (or mothers that have to do even more to provide for the infant's brain as well as their own) expose themselves to proportionately greater risks of predator attack, not to mention starvation when things get tough in famine years'' (Dunbar 1996:58–59).

For a given body size, energy production is relatively constant, and in order for more energy to be made available for a larger brain, other organs must use less. There are not significant substitution possibilities with the heart, lungs, kidneys or liver; the cheapest means of freeing up energy was the evolution of a smaller gut (see Dunbar (1996:125)). Though a smaller gut will itself use less energy, it will, other things equal, absorb less energy from ingested food. In order to maintain sufficient energy input with a smaller gut, an animal must eat foods that are higher in nutrient content or that contain nutrients that are more easily absorbed (see Dunbar (1996:125)). This brain-gut substitution is sometimes called the expensive tissue hypothesis. An important additional cost is the significantly increased prenatal and postnatal nutritional contribution by the mother, which is necessary for the development of our large brain. '' . . . [This] maternal investment hypothesis proposes that most of the extra energy comes early in life—from Mom, through the placenta during pregnancy and through breast milk between birth and age 4, when the human brain reaches 85% of its adult size'' (Gibbons 1998:1345). The expensive tissue hypothesis claims that big brains are costly for the individual to maintain, while the maternal investment hypothesis claims that big brains are costly for the mother to develop. There is support for both theories, and both suggest that a diet with an increased energy content was necessary to support the increase in brain size.

Consequently, as brain size expanded, our hominid ancestors turned to meat with its high energy and nutrition content (see, Dunbar (1996:127) and Mithen (1996:103)). It is within the expensive tissue/maternal investment context that meat-sharing takes on its importance in human biological and cultural evolution. Meat-sharing was a form of cooperation that is much more sophisticated and complex than the simple one-on-one cooperation seen in nonhuman primates. Further, it was a hybrid form of indirect reciprocity and indirect nepotism, since the bands of 25 people contained from five to seven families (Kelly 1995:211). Meat-sharing is a sophisticated cooperative activity that required significant cognitive capacity, as it entailed complex mental accounts and forward-looking actuarial intelligence that far exceeds the abilities of chimpanzees; furthermore, meat-sharing was necessary for such cognitive evolution to take place.

Although meat-sharing reflects a willingness to cooperate built upon evolved adaptations of indirect reciprocity and indirect nepotism reflected in the conditional nepotism rule, to work it requires a significant amount of conscious intentional mental processing, in contrast to the lower forms of cooperation that require little or none. Kelly points out that

"[s]tudents new to anthropology . . . are often disappointed to learn that these acts of sharing come no more naturally to hunter-gatherers than to members of industrial societies . . . . Sharing . . . strains relations between people" (Kelly 1995:164–165). Although other food resources are shared in various circumstances (e.g., when food is very scarce or some band members are down on their luck), the meat of large game is always shared (Kelly 1995:165). There are significant variations in the daily returns to hunting in the hunter-gatherer environment, and where food storage is not an alternative, meat-sharing represents an efficient way of reducing the variance in access to meat facing any one family. In the absence of adequate storage technology, a successful hunter faced rapidly diminishing short-run marginal value with the large quantities of meat yielded by large game. Meat-sharing was a form of insurance that allowed hunters who were successful on a given hunt to trade lower-valued surplus meat for claims to high-valued meat in the future when their hunting was not successful. Finally, Kelly reports that a band size of 25 would contain seven to eight full-time foragers and hunters, which is sufficient to minimize the variance associated with the uncertainty of food acquisition.

Other forces influenced group size. For example, a group of ". . . 25 persons (with a mix of men and women) is also the minimum number that could withstand short-term fluctuations in fertility, mortality, and sex ratio for any length of time. That is, groups smaller than 25 persons have a low probability of being reproductively viable" (Kelly 1995:211). The carrying capacity of a foraging area also constrains group size. A band size of 25 seems to be a magic number. Finally, another factor that plays an important role in the transition to a Hayekian order is that a significantly larger group would, by sharply increasing the cost of maintaining the egalitarian social contract, necessarily become hierarchical, with a dominant individual coordinating the group's activity.[17] This size constraint has several implications. First, it limits the amount of specialization possible in the band. Second, it constrains the defense capabilities of the group—which takes on added importance when the group is sedentary, since sedentariness increases the cost of the option of leaving the area when threatened by another group. Third, it limits the use of exit to constrain appropriation by leaders. "Most foragers have other alternative bands they can join, but the number is limited" (Boehm 1999:72–73).

1.4. The Transition to Hierarchy

The first transition from a dominance hierarchy to a reverse-dominance egalitarian social contract was a product of both cultural and biological evolution. The second transition, back to hierarchy, was a purely cultural phenomenon that was a product of the shift from mobile bands to sedentary agricultural communities. Several forces pushed agricultural communities into adopting non-egalitarian hierarchical social control mechanisms. The most obvious factor is population size, which very quickly exceeded the size of the average mobile band. This led to significant increases in both the cost associated with conscious active social monitoring by all members of the community necessary to maintain a voluntary intentional social contract, and the cost of attaining consensus about the nature of that contract. As group size expands, voluntary group control of free riding becomes increasingly costly. "With the enlargement of society and its advancing

impersonalization, it suffices if a creative individual realizes the potential benefits of cheating and starts to free ride . . . . If a sufficient number of other cheaters imitate him, then a group of free-riders will become established . . .'' (Mantzavinos, 2001:135).

Other components of the H-G social contract broke down as well, as domestication of plants and eventually animals, coupled with sedentariness, lowered the cost of food storage, thus providing an alternative to food sharing as a mechanism for reducing the variance of food access. Mobile hunter-gatherers have little capacity for accumulating large quantities of physical assets since they have to be able to carry all their possessions with them when they move—and before the domestication of pack animals this meant they had to carry them themselves.[18] Individuals in settled communities accumulate significantly more physical durable goods than mobile hunter-gatherers; this, coupled with the acquisition of homes and farms, led to the existence of much more property than in mobile hunter-gatherer societies. Sedentariness and more property increased the benefits of cheating, opportunism and outright theft, which, when combined with the increased cost of deterring these behaviors and with increased specialization, increased the demand for formal specialized hierarchical control mechanisms or at least an increased the willingness to tolerate such mechanisms. In addition, more property makes settled communities attractive to outside groups who may decide to use coercion to appropriate the community's property. Increased internal property disputes and outright theft, as well as increased threats of warfare, increased the demand for a specialized hieratically organized state to take over the job of protecting property rights and of generally enforcing many of the social rules and conventions that would then become laws.

Sedentariness, coupled with costly to transport and illiquid property, also increased the cost of simply leaving when threatened by a hostile group or appropriation by leaders. Tribes attempted to maintain egalitarianism with a sedentary lifestyle, and though some were successful, a significant problem they faced was the increased warfare and internal disputes that accompanied that lifestyle. Increased warfare raised the status of successful warriors and, according Boehm, increased the value of personal honor, and: ''. . .men who are concerned about honor readily come to blows with their fellows'' (Boehm 1999:95–96). The heightened concern with honor increased the number and severity of feuds between families, which tended to become more protracted and violent because the option of exit was foreclosed. When honor, which required that a family must kill a member of another family to avenge a previous murder, was coupled with costly exit, blood feuds often became prolonged. Suppression of blood feuds through allowing the state to take over the sanctioning function helped to break the cycle of revenge. There is evidence that a coercive hierarchy was in part tolerated for this reason, as well (Boehm 1999, ch. 5).

Interestingly, the move from hierarchy to egalitarianism was made possible by the evolution of the cognitive capacity to understand the value of the social contract and to be willing to invest resources in maintaining it without the necessity of a higher-level coercive authority. The move back to hierarchy was necessitated by significant increases in the size of the population and accompanying complexity of the social system, reducing the effect of the behavior of any one individual on the value of the social system and

thereby increasing the likelihood of free riding, theft and other violations of the social contract. Unlike the great apes, sedentary humans can understand that they live within a moral system and they can understand the value of that system; they just have a reduced incentive to voluntarily invest resources in the maintenance of the system, thereby necessitating a return to hierarchy. Apes are incapable of understanding their social system, post hunter-gatherer humans may have understood their system, but such understanding was not enough to bring about a functioning social system absent hierarchy.

In the next section I focus on changes that resulted from the transition to a sedentary lifestyle and hierarchy, changes that were important precursors to the evolution of Hayekian spontaneous orders. The acceptance of order imposed from above meant the sacrifice of equality, but it also reduced the necessary costs individuals bore to maintain that order. The move toward specialization of social control could free up time and mental energy that could then be devoted to productive activity and innovation, and a stable environment facilitated the formation of social habits and routines.

1.5. The Foundation of the Hayekian Social Contract

The Coaseian social contract of the mobile hunter-gatherer bands was costly to maintain. In fact, the evolution of "big brains" was a product of these high costs of living is social groups.[19] The move back to a hierarchical structure reduced the decision and monitoring costs borne by the individual but it increased his exposure to exploitation by the coercive power of dominant individuals. The demand for constitutional mechanisms that would successfully constrain the coercive powers of those in control and allow individuals the autonomy enjoyed in egalitarian H-G societies probably commenced with the move back to hierarchy. It is also an incomplete, ongoing process, and a topic that has received a great deal attention elsewhere. Here I want to consider other consequences of the move to a sedentary existence, consequences that were almost certainly not planned or anticipated.

Decision making in the standard neoclassical model assumes that the individual has knowledge about available goods and prices and is able to rank alternative bundles of the various goods. To the extent that the environment is represented as part of the decision-making process, it is reflected in these assumptions; implicitly the decision maker has perfect knowledge about his environment and can access that environment at zero cost. Actual decision making is grounded in the decision-making environment, which includes the physical environment, economic and other cultural institutions, various cultural artifacts such as tools, institutional background, and the capacity for personal and social rule-following. These manmade as well as natural components of the environment can, in fact, significantly reduce the complexity of deliberation, planning and social interaction. For instance, "[w]e keep 'pointers' and 'indices' in our brains and leave as much of the actual data as we can in the external world" (Dennett 1996:144). Furthermore, physical aspects of our environment, in conjunction with our behavior, serve to trigger habits and routines. Take the example of an individual who, on arriving home, always leaves her keys in the same place so that she can easily find them; seeing

the usual location will unconsciously trigger the automatic behavior. The importance of environmental cues in day-to-day decision making of both types is illustrated by the fact that:

> It is commonly observed . . . that old folks removed from their homes to hospital settings are put at a tremendous disadvantage, even though their basic bodily needs are well provided for. They often *appear* to be quite demented—to be utterly incapable of feeding, clothing, and washing themselves, let alone engaging in any activities of greater interest. Often, however, if they are returned to their homes, they can manage quite well for themselves . . . . Over the years, they have loaded their home environments with ultrafamiliar landmarks, triggers for habits, reminders of what to do, where to find food, how to get dressed, where the telephone is, and so forth (Dennett 1996:138).

We all use our environment in this manner, but when younger individuals are removed from their usual environment they maintain the mental power to function in the new environment by increasing the resources devoted to deliberation.

An important part of our social institutional constructs consists of solutions to various coordination games that lower the transactions costs of social interaction. This coordination component of culture may most closely fit Hayek's model of cultural evolution.[20] The ability to create institutions that lower the cost of social interaction is the product of the evolution of language, big brains, and a lower rate of time preference that allowed hunter-gatherers to solve the social coordination problem. But whereas the H-G solution involved a significant amount of conscious attention and monitoring, the coordination mechanisms of the sedentary post hunter-gatherers were, in part, social habits and routines that spontaneously evolved and operated at a non-conscious level.

The stable sedentary post hunter-gatherer lifestyle allowed decision makers to off-load cognitive processes onto the environment to a much greater extent than could mobile bands. Perhaps even more importantly, the stable environment made possible the evolution of social conventions and institutions that could not develop in mobile bands. Just as mobility made large accumulations of physical capital impractical, mobility made large accumulations of social capital impractical. Significant institution building required a stable environment within which to construct those institutions.

Institutions are a social construct that depend upon a collective reality or a shared social intentionality; in this sense institutions are a form of shared human capital, and the value of the individual's social capital depends upon the actions and social capital of others. A significant part of our shared social intentionality is in the form of cultural habits. These habits reduce the costs of social interaction, since they represent a set of shared mental expectations. Much of this institutional capital is background—we are not consciously aware of it. This capital can dissipate through lack of use or through imposed institutional constraints, and once it is gone it is difficult to recover. Here, I argue that institutions are much more complex and important than they appear, because the problem of navigating through our physical and social world is much more difficult than it appears. In other words, these institutions represent shared social habits and routines that reduce the cost of

social interaction and cognition. For the most part these institutions are spontaneous orders. A sedentary existence provided a stable environment that facilitated the evolution of a much more complex institutional structure that became the foundation for further institution building up to the present.

Philosopher John Searle argues that our symbolic language ability allows humans to create a socially constructed reality. This social reality is, in fact, a prerequisite for the evolution of all complex culture. Our symbolic mental ability allows us to create such mental constructs as promises, obligations, contracts, marriages, property, money, elections, governments, presidents, corporations, universities and football games (see, Searle (1995:97)). Importantly, "...a system of collectively recognized rights, responsibilities, duties, obligations, and powers added onto—and in the end able to substitute for—brute physical possession and cohabitation [allows for] a much more stable system of expectations..." (Searle 1995:81). These institutional arrangements allow for the formation of long-term expectations and constraints that lower the cognitive cost of making long-term plans. As Searle points out, "[w]e learn to perceive and use [our socially constructed products] without reflecting on the special features of their ontology and without being aware that they have a special ontology" (Searle 1995:4). Children simply come to function in accordance with social reality as part of their growing up in a social world. "The invisibility of the structure of social reality also creates a problem for the analyst...because money, property, marriages, lawyers, and bathtubs do not seem to have a complex structure. They just are what they are or so it seems" (Searle 1995:5). The invisible nature of the ontology of our social reality is a main reason why it works so well—we do not have to consciously think about it to make use of it in our thinking, choosing, and social interacting. A large number of our social facts are just background and they function automatically. For this very reason the complexity of our social reality, in the form of background, is easy to overlook. This view is similar to that of Hayek (1960), who argues that we are often unaware of the importance of our social institutions.

Hayek contends that spontaneous orders do not stand on their own: "A functioning market economy presupposes certain activities on the part of the state..." (Hayek 1960:222). Think here, for example, of support for the institutions that maintain the function of the common law and property rights. Institutions evolve nested within other institutions, some of which may be at least partially planned and others spontaneous. A central issue, than, for the evolution of social institutions is the nature of the first institutions within which all the others could evolve. The first institution and all subsequent ones required the evolution of the shared social intentionality that made possible the egalitarian H-G band.

Collective intentionality allows us to create social facts, but what is important to recognize is that most social facts are spontaneous orders. Gifford (1999) traced the evolution of the symbolic and linguistic capability of *Homo sapiens* that allowed for the evolution of higher consciousness, and described how our ability to construct complex social institutions rests entirely upon these attributes. Though language and conscious reasoning are necessary for the construction of institutions, given the limits of reason, the institutions themselves are for the most part not consciously planned.

2. Conclusion

Contra Hayek, Paleolithic man in his small band was free, but the hunter-gatherer social contract that made that freedom possible was costly to enforce. Higher primates—including *Homo sapiens*—prefer to dominate, but if they cannot, the second best state of affairs is not to be dominated. Biological and cultural evolution brought about the big brains, language, higher consciousness, and lower rate of time preference that enabled early man to maintain an egalitarian social contract and thereby escape domination. The high costs of maintaining the H-G social contract caused it to break down and be replaced by hierarchy when the domestication of plants and animals led to a sedentary existence and larger group populations. However, the very biological and cultural adaptations that made H-G egalitarianism possible were a necessary foundation for the spontaneous creation of complex culture and the evolution of institutions that would facilitate prosperity and once again make freedom possible.

Notes

1. Contact Address: Department of Economics, California State University, Northridge, CA 91330-8374, U.S.A. Voice: 818-677-2462; Fax: 818-677-6264.
2. "Social contract" is used here in a loose, informal sense to stand for all informal social rules, norms and conventions as well as formal rules, laws and written constitutions.
3. The term "Pigouvian," used to describe the first contract stage, should not be taken too literally. It is used here to somewhat crudely characterize the ape and presumably common ancestor hierarchical social order where that order is maintained in part by punishment and treats of punishment by the dominate male, which stand in for Pigouvian taxes.
4. This should really be referred to as a potential Hayekian social order, since what I am arguing is that the second transition resulted in what might called some preliminary spontaneous mechanisms that made possible but not inevitable full Hayekian spontaneous orders in the distant future.
5. Invoking Coase (1960), it is argued here that multiple biological and cultural adaptations resulted in a significant reduction in the transactions costs of forming and maintaining voluntary agreements that reduced the "externalities" associated with social interaction.
6. This is not to deny that some mammals, including primates and carnivores such as wolves and lions, hunt in groups larger than two. However, in these situations the payoff to all is the immediate product of a successful hunt. Here I am primarily concerned with non-simultaneous exchange situations.
7. The ability to understand that other individuals have mental states and that these states determine their behavior, and furthermore the ability to use knowledge of other individuals' beliefs and desires to predict their behavior, is referred to as theory of mind.
8. Further, chimps do follow the gaze of others and can in limited circumstances use that information to predict the behavior of those others. They know what others see in certain circumstances and can use that information in limited situations to predict the behavior of others. While this does not imply that they possess theory of mind, it may be a precursor of that ability (see, Hare et al. (2001)).
9. Note that inclusive fitness produces genetically programmed automatic behavior, that is, behavior that is not a product of conscious calculation. However, inclusive fitness can produce high levels of cooperation. In eusocial insects, such as bees, for example, the coefficient of relatedness between siblings is three-fourths. This high level of relatedness has produced highly complex, cooperative, but merely automatic, behavior.
10. This example suggests that economists who model certain types externalities by assuming that an individual gains utility when another individual consumes more of a good, should consider the possibility that the first individual's utility is reduced when someone else must pay for that good.

11. That *Homo sapiens* is the only species that successfully combines male-female pair-bonding and multi-male groups (see Geary and Flinn (2001), and Gifford (1999))—thus allowing the benefits of paternal-maternal indirect nepotism within a cooperating group—is a significant accomplishment of the Coaseian social contract.
12. Some of the discussion of hunter-gatherer societies is based on the extensive reviews by Boehm (1999:6), who has "... surveyed hundreds of egalitarian band-level and tribal societies", and Kelly (1995), who has also examined a over a hundred hunter-gatherer societies, along with discussions in Jones (2000), De Waal (1996) and Ridley (1996).
13. Although the cultural mechanisms that facilitate freedom are different in the Hayekian order, the fundamental human desire for freedom that is so dominant in hunter-gathers was surely not altered by the transition to the Hayekian order.
14. There is extensive debate about whether apes have the ability to learn by imitation (see Byrne and Russon (2001)). Here, again, the evidence is inconclusive and depends, in part, on the definition of imitation. What is true is that even the great apes do not have the ability to accurately imitate hieratical behavior sequences anywhere near as complex as those that young human children can imitate. Importantly, apes do not have the ability to "learn to use" the complex abstract social constructs that form the foundation of human culture.
15. On the other hand, it is very likely that nonhuman cooperation among non-kin is associated with direct reciprocity supported by simple one-on-one mental accounts stored in implicit memory systems that are not accessible to conscious introspection and that generate motivational drives.
16. Grady and McGuire (1999:232) list some of the means that subordinate nonhuman primates employ to resist domination.
17. This is not to argue that larger groups have not been able to maintain egalitarian societies; they have. They tend, however, to give way to hierarchy as the group size increases significantly (see Boehm (1999, ch. 5)).
18. It is possible that dogs, which were domesticated in many places approximately 100,000 ybp (see Vila et al. (1997)), were used as pack animals, though their carrying capacity would have been limited.
19. See, Byrne and Whiten (1988) and Gifford (1999).
20. See Vanberg (1994).

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