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Human social origins: Oh please, tell us another story

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This paper aims at a rigorous comparison between accounts of the origins and evolution of society. Since the paper is a collaboration between a sociologist and a primatologist, the list of accounts includes political philosophers and social theorists as well as modern sociobiologists and anthopologists. In order to make the comparison possible, a questionnaire was devised which clearly spells out the basic elements necessary to account for the origin and evolution of society. This questionnaire was then applied to several well known philosophical and biological texts (Rousseau, Hobbes, Dawkins, Axelrod and Hamilton, Trivers, and Leakey and Lewin). The results of the inquiry are reviewed. The discrepancies between accounts are equalled only by those within the accounts. Since more coherent views are found in the least informed texts, some propositions are made to increase the constraints put on the accounts of our social origins.

Today, the political scene of most industrial countries includes a debate aimed at redefining the duties of the Welfare State and deciding who should pay for what.† Simultaneously, a major controversy threatens to reshape the study of animal and even human societies. On one side of this controversy, the focus is the individual in society. In sociobiological theory they are individual units of some sort that act as if they calculate their selfish and altruistic strategies, based on how advantageous those strategies are in spreading genes from one generation to the next (Wilson, 1975; Caplan, 1978; Gregory, Silvers & Sutch, 1979). The debate about socialness occurs within the context

† The world economic crisis has simultaneously produced these debated in different countries and simultaneously at different levels: they have a strong impact on both economic theory (for instance monetarist vs. Keynesian) and on popular movements (for instance Proposition 13 in California). These debates are readily detected even in small instances, as in this editorial of the Los Angeles Times that opposes Reagan administration budget cuts: 'This is a ridiculous extension of the gospel of rugged individualism that is preached in Washington these days (. . .) Some of the President's advisers defend deep cuts in funds for urban transportation by saying that there is no reason for people in South Dakota to help bus riders in Los Angeles pay their fares. That stretches the concept of individualism to its breaking point, as would a suggestion that if the people of South Dakota felt threatened they should raise their own army' (3 May 1981).

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of a wealth of new data on animals, data revealing our previous view of animal societies to be too simplistic, and the application of these theoretical and empirical discoveries to human societies continues to rock more than one department of social science. A third set of debates is occurring in sociology, but here the attempt is to understand how actors build societies (Garfinkel, 1975; Turner, 1974). A growing number of ethnomethodologists claim that actors are constantly performing or achieving society instead of entering the roles, classes, and structures determined by classical macrosociologists (Knorr & Cicourel, 1981).† Although these three sets of debates are not always formally related, they have a strong bearing on each other; all suggest that people are regenerating what society is about (as we shall demonstrate in another paper) and how it came into existence. They do this when they fight about budget cuts, when disputing the Darwinian evolution of co-operation in ants or when showing how 'competent members' repair the decaying social structure that surrounds them.

In this essay, we seek to clarify the debates by approaching the issues from a new angle. In order to do this, we must point out a fourth set of debates: the renewed interest in the nature of the scientific process itself. Recently, the social history of the social as well as the natural sciences has been investigated (Merton, 1973; Knorr & Whitley, 1980; Lemaine, 1976; Knorr & Mulkay, 1983). It would be impossible to clarify the debates previously outlined without an idea of how scientific disciplines are created and how consensus on facts and theories is achieved. For reasons that will be clear later, we will map the debates about the origin and nature of socialness from a reflexive point of view. As a consequence, this is not an empirical effort, since it will not provide new facts about this issue. Our contention is that too many new facts have been made to fit into a structure that has been little studied.‡

Our emphasis was on devising a questionnaire that could be applied to any text and that would allow us, or anyone, to go from one text to another. Our selection of texts was not a random or stratified sample, but one containing well known examples of different genres of accounts used as an initial test of the value of our questionnaire. The reader can extend it by applying the questionnaire (see below) to other origin accounts. The text of the corpus will be referred to by an abbreviation of each title and the relevant page numbers in the edition listed at the end. For the present paper we used:

1. Robert Axelrod & William D. Hamilton (1981). *The Evolution of Cooperation* referred to in the text as E.C.
2. Sigmund Freud (1913; 1950) *Totem and Taboo*, referred to in the text as T.T.
3. Richard Dawkins (1976) *The Selfish Gene*, referred to in the text as S.G.
4. Thomas Hobbes (1951, 1982) *The Leviathan*, referred to in the text as Lev.
5. Richard E. Leakey & Roger Lewin (1977) *Origins* referred to in the text as O.
6. Jean-Jacques Rousseau (1755) *A Discourse on the Origin of Inequality*, referred to in the text as O.I.
7. Robert L. Trivers (1978) *The Evolution of Reciprocal Altruism* referred to in the text as E.R.A.

† It is no coincidence that ethnomethodology originated in California. Much like the political debates in California and in the U.S., ethnomethodology is marked by a strong diffidence toward 'macro-actors'. Ethnomethodology disputes the construction of macro-actors, much like California tax-payers want Big Government 'off their backs'.

‡ This article is the result of an unusual collaboration between an anthropologist, who has specialized in the naturalistic study of baboon societies, and of a sociologist who has specialized in the naturalistic study of scientists at work (including those who study baboons). There seemed to be a common problem encountered by the anthropologist trying to make sense of baboon society and to redefine the distinction between animal and human societies, and by the sociologist who investigated and redefined the distinction between science and society. In a second article entitled 'The Meanings of Social' (Strum & Latour, 1984) we continue to develop this common interest.

1. Story telling and story tellers

To understand our argument, the reader must begin with some sociology of science. An explanation, no matter how convincing it is, can first of all be taken as a written account (Latour & Woolgar, 1986) published in learned journals (we are not looking at popular accounts in this essay). Going one step further, we can say that, for the purpose of this essay, there is no difference between scientific stories (falsifiable) and mythical stories (unfalsifiable); an explanation is always a *story*. We need this starting point to give us *comparable* accounts: all our sources are texts and will be treated by means of textual analysis (Greimas & Courtes, 1979; Latour & Fabbri, 1977). This is not as strange as it may seem at first. When E. O. Wilson, Nietzsche, Freud, or Dawkins tells us how social bonds first originated, they are not describing something that happened in front of their eyes. They are at best inferring, at worst inventing, since they are always creating fictive or speculative accounts. But telling stories about the origin of society did not start with Dawkins or even with Hobbes, since it is recognized that in most societies myths are the best equivalent of these learned accounts (Levi-Strauss, 1958). Once we began to consider all the material as texts, we could gather a large corpus without the necessity of making *a priori* distinctions between the scientific and the non-scientific ones, between the post-Darwinian and the pre-Darwinian ones, or between the convincing and the less convincing ones. For us, they all belong to the same genre, that is 'accounts about the nature and origin of socialness', and have to be treated with the same analytical tools no matter 'what really happened'.

It does not suffice to say that accounts about origins are written stories because, no matter how relativistic we are, some accounts *appear* to be *more satisfactory* than others, even granted the speculative nature of them all. We may shrug off the invention of society out of the Giant Tortoise as an absurd myth while finding Ardrey's (1961) account of a human socialness that emerges from the hunting adaption quite convincing. Here again, the sociology of science is helpful (Barnes & Shapin, 1979; Knorr & Mulkay, 1983). The reader's satisfaction of dissatisfaction depends not just on the quality of the tale, but also on the type of audience and the institutional setting where the story is read or told. The Tower of Babel story will be quite satisfactory in creationist circles, while human societies composed of 'memes' (Dawkins, 1976) will be a plausible hypothesis in a limited number of professional circles. E. O. Wilson's (1975) explanation of the origins of sex roles will meet with jeers at a feminist rally, whereas Rousseau's *Discourse on the Origins of Inequality* (1755; 1967) might be followed by banishment or a social upheaval. The sociology of science suggests that to understand the acceptance of one account over another will depend upon the nature of the audience, the institutional setting and the professional status and resources of the story teller (Knorr, 1981).

It is true that in many scientific fields, the usual strategy is to limit the audience to peers with special credentials, but when discussing the origins of socialness this is obviously much harder. On this topic, as in many others with obvious political implications, not only do other audiences consistantly intrude into academic discussions, but sometimes the scientists themselves appeal to the public at large when controversy rages inside academic circles.† Neither Wilson, nor Hobbes before him, succeeded in limiting their discourse to colleagues; in fact, none of them tried very hard to do so.

† Although closure is a necessary feature of professions (see the exemplary study of D. J. Kevles, 1978), the interplay between 'contingent forum' and 'constituent forum' is frequently present as shown by H. M. Collins and T. Pinch (1979).

Even in the hard (natural) sciences, where the nature, quality, and lists of facts have been determined, there is always more than one way to account for the same set of facts.† In origin stories, by contrast, little is a matter of consensus and the 'scientific' account cannot be defined as the one which best fits *all* the facts. Debates about which scientific discipline is relevant or not, which facts should be believed or excluded, how many of them are reliable, precede the debate about which account best explains the facts that have been accepted. This does not mean that scientific inquiry into the origin of society is impossible, but rather, that this inquiry needs to consider among its scientific constraints both the specificity of the audiences admitted to the debate, and the corpus of facts which are to be accounted for. We suggest that on this issue, in particular, a degree of reflexiveness can achieve better scientific standards.

Now that we have defined our data as texts interpreted by specific audiences inside specific settings, we need to consider what makes us favour one account over the next. Why are some so pleased with René Girard's (1977) story of the sacrificial victim as the source of all social bonds? Why are some delighted with Axelrod and Hamilton's story (1981) that co-operation results from prisoners playing 'tit-for-tat'? What is so compelling about the contractual strategy of Hobbes? These hidden preferences must reveal something about the nature of the accounts, since the story tellers and settings are part of societies that are, themselves, constantly searching for a rationale of their own origins. Every time a story of the origins of society is told, a genealogy of the society is built (Nietzsche, 1887; 1967). Each story tells who is ancestral and who is noble and who is commoner, what comes from nature and what comes from culture, what is rooted in tradition and what can be modified. After Hobbes's account, no King could innocently view his power as predestined by God; after Leakey and Lewin's account, urban deviancy can no longer find justification in primeval instincts, but instead must be explained by the facts of modern life. This is true not only of popular uses of scientific accounts, but of all scientific accounts, since in these the discussion also concerns the society in which the discussants are embedded (Brush, 1978; Forman, 1971). Every item in an account of society will be scrutinized closely by each audience if their status, rank, role or past is modified by the account. This is one of the sources of their hidden preferences for an account. This is why the reactions to origin stories may be ignored or repressed but cannot be stopped. Only if scientists could insulate themselves, or force consensus, or definitively select one origin story would the debate cease.‡ Whatever the strategy of scientists, we know that when they reach consensus on one account of the origin of society, this is due to the allies they choose to satisfy.

The starting point of our argument, then, is that the science of our social origins should be extremely careful to acknowledge, understand, and discuss its own social construction.

2. A small questionnaire for the story teller

Considering the various works on the nature and origin of society as *accounts* produces chaos at first sight. Hobbes begins his model of society by using individual automata

† This is especially true when the newly developed sciences permit every group the right to redefine what the socialness is about. Social historians have shown that sciences are most often the main resourse in politics (see B. Barnes and S. Shapin, 1979).

‡ It is unusual for a group of scientists to be able to impose a tight lid on discussions except under Lysenko-like circumstances. Short of such extreme solutions, it is hard to limit the number of dissident voices with claims to the discussion, especially when these voices pertain to the other scientific disciplines.

(Lev. p. 130), Dawkins begins with selfish genes (S.G. p. 49), Leakey and Lewin with small groups of families (O. p. 159), and Freud with hordes (T.T. p. 141). No common starting points seem to limit the extreme variation in these stories. Agreement is no better about what the elements of each model are able to do; Dawkins' genes have no foresight, but have powerful computer-like abilities (S.G. p. 61), whereas Hobbes's individuals, also endowed with ruthless selfishness, gain foresight from their computing abilities (Lev. p. 110). Freud's young males have nothing to move them but hate and envy against their father (T.T. p. 142, p. 152), while Rousseau's primeval man is full of independence and endowed with pity, but he is harmless primarily out of stupidity (O.I. p. 189). Add to this the many disagreements about the data (which fossils, dietary habits, ecological mechanisms, anatomical features, genetic traits, etc.) that the story tellers choose to use and the confusion seems absolute.

We soon realize, however, that while the disagreements were numerous, the actual number of questions which authors were addressing was not infinite. It was possible, in fact, to limit the main lines of disagreement to a dozen items. Slowly, we constructed a small questionnaire to be answered by each account. The picture that emerged from these answers is not the true account of origins, for we have not struck a happy medium through the different accounts of 'what really happened out there'. It is, however, a clear *map* of *what the authors have said* about the origins of socialness. First, let us examine the items of this questionnaire, and later we will illustrate how it was applied to specific texts.

Question One: In all accounts of the origin of socialness, we need to identify the initial *units*. If you begin with the body politic as a whole, as does Aristotle (*Politics* 1252, b, 1982) or Parsons, (1967) you will not produce the same account as when smaller units, like that of the family or like Hobbes' selfish individuals or Dawkins' selfish genes are used. These units have to be defined by textual or semiotic analysis.† They can be anything that fulfills the functions of the elementary building blocks of the social order in the story. Contrary to expectations, this obvious question is not always answered consistently by our authors.

Question Two: With which *qualities* do the authors endow their units at the start of their account? Given a body politic endowed with a potential for self regulation and harmony, the account will be different than one which begins with selfish individuals that stop at nothing to reach their only goal, that is to get more for themselves (Lev. p. 184). On the other hand, if primeval man is endowed with an extreme diffidence for other men, as in Rousseau (O.I. p. 198), the origin of society cannot be explained in the same way as when beginning with kinship groups endowed with benevolence and kindness (O. p. 60, 162, 299). The same problem arises when an author grants foresight to the units, or computer power, or ignorance, or aggressive drives, or whatever is deemed necessary to generate a specific model of society.

Question Three: Once units are defined and endowed with certain qualities in the stories, they enter into relationships and it is important to make explicit the *form* that these take. Sometimes they appear as trade-offs, at other times as asymmetrical relationships where one gains when the other loses. They can be parasitic or exploitative as in Engels's (1889; 1972) or Rousseau's models. The form is only a *qualitative* definition of the relationships,

† This is an essential difference since these items are not intellectually or conceptually defined. We studied the text in all its dimensions and with all its contraditions, without glossing it like *intelligent* readers who frequently add to what they read to make it more intellectually coherent or reasonable (see A. J. Gremias, 1976).

but many authors also give a *quantitative* definition and propose a *currency* with which to assess these. Accounts can vary enormously on the issue of a currency. The relationships can be assessed using a gene currency, as in sociobiology, or a money currency, as in economics, or an energy currency,† or in measures of pleasure and pain, as in Benthamian theory (Bentham, 1789; 1982), or using any quantum that an author finds appropriate. Most authors, as we will see, use a mixture of currencies and go from one to another as expedient. Often the values are changed without notice in the course of a story.

Question Four: What is the acceptable *time delay* for the various currency exchanges and calculations. For instance, if the time delay for the assessment of human behavior is a day, most behavior may seem purely altruistic since everyone appears to be giving things away. But if a month or a year or a generation or two generations is the period of calculation, most of what seems altruistic behavior might appear selfish. This suggests the obvious, that the discussions about 'selfishness' and 'altruism' are fruitless exercises when the units and the time delay are not made explicit. The *degree of reciprocity* in the story should also be clarified. If the only acceptable exchange is a simple one-to-one bartering, the account of the origin of society will be different from that which admits many degrees of reciprocity. For example, contrast Mauss' potlach (1967) with Hobbes' war of all against all and it becomes obvious that it is not the morality of men that is different, but rather the time delay and degree of reciprocity that each author finds acceptable. For Mauss, reciprocity is transitive and the time delay is as long as a year, while Hobbes' actors need only repay those from whom they have received and must do so instantaneously.

These first four questions permit us to outline a structure and set the stories at their starting point. Most stories, as we will see, are not consistent within this minimal structure.

Question Five: What is the *method of measurement* that the authors are ready to acknowledge in answering the first four questions? While this question is important, it is less straightforward than the others. It is one thing to state that a baboon behaves as if to improve his reproduction success, but quite another to decide how he can implement this directive when he does not know who his offspring are (Hausfater, 1975; Strum, 1982). In contrast, when Rousseau says men want to make comparisons with each other, he does specify how they come to have a common scale that makes such comparisons possible. Some authors do not answer this question at all, while others answer at great length. Trivers, for example, manages to deduce both human psychology and the large human brain from the necessity of making complicated calculations about self interest, aimed at detecting cheaters. This question tries to understand several related issues: how do the observers or the authors calculate and how can they be sure that the units with whom they are concerned are calculating in these ways? Depending on the method of measurement chosen, the account will appear more or less scientific, more or less empirical or more or less testable.

† This question allows us to compare the many efforts made to define a currency. For instance Marx's quantity of labor and Georgescu-Röegen's (1971) quantum of entropy are very much comparable. To legitimately subvert society, these authors needed to show that, on balance, society's account is negative or skewed. But in order to show this negative balance they had to change the quantum in which all previous accounts in society had been made. The revolutionary impact of sociobiology can also be seen in this way, as a new way of counting societal rights and duties shifting from a monetary currency to a gene cuurrency (see R. D. Alexander, 1980).

Question Six: Once the starting point is defined by the answers to the first four questions, a new question becomes relevant. What is the *framework of events* that the authors build to tell their story of origins? To answer this question requires the skills of semiotic analysis, and it provides the *real* tempo, rhythm, sequence, and direction of the events. This framework of events is important because most authors tell a *logical* story and not a *historical* one. For example, Axelrod and Hamilton (E.C. p. 1391) start with the prisoner's dilemma and unfold a computer-like model which has no chronological dimension. Rousseau claims he is not reconstructing the past (O.I. p. 137) but provides us with a sequence of events, nonetheless. Freud, by contrast, describes a mythically recurrent structure, but insists on its historical reality (T.T. p. 132 note). Dawkins provides a few dates at first (S.G. chapter 2), but then skips to a logical framework.

Question Seven: For each event in the *framework of events*, some *agents* or *causes* are made to play a role in the origin of socialness. For example, the shift from forest to savannah may be seen as the trigger to the evolution of socialness. This is an *external* discontinuous agent. In Hobbes, the Leviathan emerges solely from the pressure of long term computations by men of their selfish interests. This is an *internal* continuous agent. Other agents can come from mysterious realms to influence or direct the stories about the origins of socialness.

It is important to recognize that some authors modify the answers to the first five questions in response to the sequence of events described in questions six and seven. For instance, Trivers begins with selfish individuals with small brains and limited foresight—questions one and two—but ends up with extremely polite, self-conscious, large-brained individuals because of the psychological sophistication needed to cope with the calculations of reciprocal altruism. To accommodate such feedback mechanisms, the questionnaire works most usefully when addressing the first four questions at the start, whatever that may be. As new units, qualities, currencies and methods of measurement are generated from the events authors describe in their stories, the earlier questions should be re-addressed (see an example with Rousseau, below). Because these feed-back mechanisms were relatively rare, the questionnaire could usually be answered in a linear fashion.

To these seven core questions we added others that facilitated comparison between accounts.

Question Eight: What is the *explicit methodology* the authors state they use in building their accounts? This is important because some authors, like Rousseau or Hamilton, explicitly talk of 'models' or 'fictions', while others, like Leakey and Lewin, Ardrey, or Engels, purport to summarize what really happened 'out there'. Although no story can unfold without stating rules, surprizingly few authors present them. The same is true of the use of scientific disciplines in the stories. Although authors may claim to use one discipline or another (zoology or biology, for Axelrod and Hamilton), in reality they may not utilize anything of that discipline (E.C. p. 1394). Others, like Aristotle, claim to use law, but really use comparative history, or like E. O. Wilson (1978), claim to use sociology but employ only a summary of one American school of sociology.

Question Nine: What are the *explicit political lessons* that the authors draw from their accounts? Very often the explicit lessons are clear enough. Leakey and Lewin end on the sidewalks of São Paolo (O. p. 258) and Aristotle purports to regulate a bygone Greek society.

The answers to these nine questions define the detailed *structure* of the debates concerning the origin and nature of socialness.† Yet, to use the questionnaire, it is critically important to retrieve what the text really says, with the skills of semiotic analysis rather than intelligently glossing a meaning and structure. In our experience, a reader often makes the text more realistic or more reasonable than it actually is.

3. The questionnaire applied to Rousseau's Origins of Inequality

To show how the questionnaire works and to encourage others to use it, we will first analyse one text, Rousseau's *Origins of Inequality* (O.I.). We will then extend the analysis to include other texts and end by summarizing what we consider to be our findings about origin stories and their tellers.

Rousseau starts with nothing but naked bodies, similar in every respect to animals (O.I. p. 179). Dispersed at random and far apart (question 1, units), these bodies are nothing but ingenious machines endowed with self-preservation, free will, and perfectability. They can feel pity, but this is nothing but the extension of self-love. They have no language, no general ideas, no morality, no reasoning, even in the short term. They do not recognize each other and feel the sexual urge only in order to reproduce the species. With no fixed place, they roam ignoring each other (question 2, qualities). How do they measure—*and* how does Rouseau measure—relations between these naked bodies (question 3)? The answer is original: at the start of the model there is no measure whatsoever, since they do *not* relate to each other at all (id. p. 199, 204). The necessary act of reproduction is brief and mated pairs disperse. Not even the mother–infant bond lasts (id. p. 193). Rousseau's is the only one among our accounts which begins with absolute asociality. There is no time delay (question 4) at the starting point, since humans just flee from the sight of each other. Unable to recognize one another and having no relationships with each other, primeval men cannot even make *comparisons* between individuals (question 5, measurement). They may be brute and solitary, but they are also happy and without envy (id. p. 204).

The framework of events (question 6) is of unusual precision. Rousseau gives a 'very long' time, although he does not measure it. He states clearly that the events are logical and not historical (id. p. 177, 189, 211), nevertheless they are all sequentially ordered. The tempo of his story is peculiar; it is made of several stable plateaus, separated by sudden and fortuitous catastrophes. Rousseau is not a gradualist. His account is punctuated by 'fatal accidents' (id. p. 220) and 'extraordinary chance' (id. p. 211). The direction of the time framework is simple enough; *things always go from better to worse.* If we summarize the rhythm of the events, as they can be retrieved from the text, the story goes as follows: there is an absolutely asocial stable condition; to change from this stable state you need an external catastrophe which, in thise case, is a demographic one (id. p. 213). Too many naked bodies are roaming around; they cannot ignore each other any more (id. p. 214). New units appear (the families) and new qualities too, the ability to

† A few minor questions can be added to provide a more complex picture. Most authors, from Aristotle to Trivers, take a stand on the distinction between the Body Politic and the Body (see D. Haraway, 1978: 21-60). They all try to explain the insect societies and to show how different they are from primate societies; most stories include a set of distinctions like that of animal vs. man, primeval man vs. modern man, pre-agricultural man vs. agricultural man, pre-industrialised man vs. industrialised man and cannot help using the age-old set of distinctions between children/beasts/savages/madmen. Finally, they all lean towards one of the basic metaphors of war, or market, or machine, or language, or game, in order to explain society. These metaphors are much like Aristotle's categories: the meaning of each can be determined only be using one or several of the others.

make tools and weapons (id. p. 215). Since men are now close to one another they can constantly compare and measure themselves: 'everyone began to notice the rest, and wished to be noticed himself; and public esteem acquired a value' (id. p. 218). The consequence of comparison, tool and weapon use, and extended intellectual ability, is a rivalry which allows a new plateau to be reached. Although it is no longer a state of pure nature, it is stable again and is described by Rousseau as 'the least subject of any to revolutions, the best for man' (id. p. 220). But, a new catastrophe disrupts this second stable state: 'metallurgy and agriculture' (id. p. 221). The qualities of men are modified and they become long term calculators, smarter and more wicked. The measurement of their relationships becomes modified: 'differences among men become more noticeable, more permanent in their effects' (id. p. 223) due to the new wealth. 'The new state of society became the most horrible state of war' (id. p. 227). To stop the continuous degradation, men try a voluntary invention, the 'sovereign power' to stabilize the situation. They generate a society which acts under the law to stem the wealth of the rich and the poverty of the poor. Thus, once again, a relatively stable plateau is reached, but it too is soon ruptured by the destruction of the social contract and a continuous set of revolutions: 'at last every thing would be swallowed by the monster; and the people would no longer have chief nor laws, but only tyrants' (id. p. 243). The degradation is complete, from the first stable state of pure asocialness to a modern tyranny.

There are external causes to the sequences of events (question 7), like demography, chance, floods and agriculture, but the main agent of change is an internal transformation of man himself, that occurs as he enters society. We cautioned earlier that an author may modify the answers to the first five questions depending on the events described in the sixth. This happens with Rousseau. In his model, beginning with only naked but perfectable bodies, he ends with nation states where thousands give their lives for the prestige of a crowned child (id. p. 246). The social qualities are defects generated by the perverse influence of society. At the start, man is just asocial, brutish and strong. Language and reasoning increase with wickedness and at the end we find selfish, avaricious, and intelligent individuals. The form and currency of the relations also change in the course of the story. There are no relationships at the beginning. Then, in the intermediary stage, individuals continuously compare strength, beauty and elegance. But later, wealth becomes the currency, and the relations change their forms; they are now totally asymmetrical. Instead of the first golden rule, 'Do good to yourself with as little prejudice as you can to others' (id. p. 204), Rousseau eventually arrives at 'always a secret desire of profiting at the expense of others' (id. p. 225). The constant degradation comes from a feedback mechanism whereby a bad social order creates animals of more complex sociability who, in turn, create a worse social order.

Rousseau's answer to our question about explicit methodology (question 8) is quite straightforward. 'Laying aside facts' (id. p. 177), he reads directly in nature only what seems logical in the generation of the social bond, or in his case, social bondage. Using a hybrid genre between primeval myth and logic, he is compelled to go beyond history in order to modify the genealogy of European societies. The explicit political lessons (question 9) are also clear. The final paragraph would appear an appeal to revolution even if the French revolution had not followed. The account deprives the king of the 'law of nature' that had established his power. In this manner, Rousseau's account of the origin of society modifies the rights and duties of those living in society.†

† On Rousseau's influence see R. Derathé (1978). On Rousseau's relation to sociobiology see R. D. Masters (1978: 93-106).

The conclusion of Rousseau's argument in *Origins of Inequality* can be summarized as follows: if you can avoid entering society, do not enter; if you must enter society, then avoid entering civilized societies with states and sovereigns (i.e. prefer the primitive societies of Africa and the New World); or at the very least, if you cannot help entering a civilized society with a state, avoid tyranny and enter a small community governed according to the 'general will'. There is no good *reason* to enter society, since reasoning powers are the *consequence* and not the cause of social life. Furthermore, reasoning is a mark of degeneration for Rousseau; he who calculates is ready to cheat. At best, the hope is to restore the social contract and avoid the final stage of absolute slavery. 'The forgotten road which man must have followed in going from the state of nature to the social state' (id. p. 243), can be traced back only for a few steps.

4. Evolutionary Stable Strategy and Leviathan

Applying our questionnaire to Rousseau, a historical intellectual figure, may not appear very helpful, but applying it in an identical fashion to a 'modern' Darwinian zoologist allows a comparison that is *independent* of what the authors themselves believed they were doing. Some might protest that a comparison of a Darwinian and a pre-Darwinian treatise is unfair to the latter. However, if we take a closer look at a Darwinian text, such as *The Selfish Gene* by Dawkins, within the framework of our questionnaire and then draw some comparisons with the *Leviathan* by Hobbes, we find no such inequity.†

Dawkins initially proposes a clear and original answer to the question of the units (question 1): the gene is the unit, not the body, the group, or the species. However, when the text itself is scrutinized the definition drifts rapidly. The gene becomes a 'fading out definition' (S.G. p. 31) or even an 'indivisible particulateness' (id. p. 35), that is a differential and not an atom anymore. But later in the text the unit changes once again, this time from the field model to a statistical definition. The gene is now a 'distributive agency' (id. p. 55). These changes of definition matter less than they might, since the gene is soon replaced entirely, 'as a matter of convenience' (id. p. 71), by individual bodies which are now said to have 'an individuality of their own' (id. p. 49). In practice, however, even these new units are not put to use as Dawkins constantly works with explicitly fictional characters like Grudger, Sucker, Philanderer and so on. Thus, one aspect of the usefulness of our questionnaire is illustrated in the analysis of Dawkins' work. Although an author may claim to use one type of unit consistently, (i.e. the gene) the answers *in the text* may be entirely different.

Dawkins' various units are all endowed with the same qualities (question 1), however, qualities that aim at reproduction, copy fidelity, and longevity. The key to the argument is that the units are unrestrained; to achieve this they stop at nothing. Yet, as ruthless and devoid of foresight as they are, they can compute and simulate interests that may lead to restraint (id. p. 60). With these qualities, the units enter into some relationships (question 3) defined primarily by conflict and asymmetry. Each unit wants an edge on the others (id. p. 3); they cannot agree and cannot be forced to harmonize by a common sovereign. The currency (question 3) Dawkins uses in these calculations is, again, subject to change. All relations are counted as a 'change of frequency of a gene in a gene pool' (id. p. 48). This is different from other currencies, like money, energy, pleasure and pain,

† Our discussion of 'The Selfish Gene' is not a critique of Dawkins' ideology. Ideology is a concept which has been invented to separate the hard facts of science from the illegitimate uses of these facts (see L. Althusser, 1974), but new social studies of science have invalidated this distinction. It is the very nature of the hard facts which is now in question and the notion of 'ideology' is much too crude to reveal how science is 'politics pursued by other means'. For a discussion see B. Latour (1982).

or value, but in practice, since 'no realistic numbers' (id. p. 81) can be assigned to the calculations, Dawkins uses this currency much like tokens in games. Thus, this Darwinian explanation, while couched in terms like genes, and the frequency of genes in the gene pool, in practice, is little different from explanations lacking a gene currency.

The closest equivalent to Dawkins in our corpus, at least for the first questions, is Hobbes' *Leviathan*. Hobbes is more consistent than Dawkins, beginning and ending with the same unit, individual animal machines (question 1, units) that stop at nothing to reach their goal, a goal defined as a 'restless desire for power after power that ceaseth only in death' (Lev. p 80). In Hobbes' view, the only quality that the units have (question 2), is a simple computation ability for addition and subtraction. The currency (question 3) he chooses to adopt is the worth of a man: 'the value, or worth of a man, is of all other things, his price; that is to say, so much as would be given for the use of his power, and therefore is not absolute; but a thing dependent on the need and judgment of another' (id. p. 73). All the pay offs in relationships between units are calculated according to this market definition.

Dawkins and Hobbes, giving roughly similar answers to the three first questions, are trapped by the same problem when they get to the fourth. These restless, ruthless, computing units end up exterminating each other in a 'war of every one against every one when they make only short term calculations. Hobbes' description of pure selfishness is famous; no one can ensure the ownership of anything since he can always be overpowered by many others. 'The life of man, solitary, poor, nasty, brutish and short'. Both authors' solution to this state of affairs is the same. They increase the *time delay* (question 4) of the calculations and, in some cases, the *degree of reciprocity* (question 4). In Dawkins the answer is as follows: cheaters foster more cheaters and, after a few generations, lose the comparative advantage of cheating. Rising to the occasion they become longer term calculators for whom settling for less is better than settling for nothing. The same happens with Hobbes' units. Although the first law of nature in his model is 'every man has the right to every thing, even to one another's body' (Lev, p. 103), two consequences are drawn from it: one is to 'endeavour peace, as far as one has hope to obtain it'; the other is that 'he may use all helps and advantages of war' when he cannot obtain peace (id. p. 104). The contradiction ends if one takes a longer term decision, settling for less so that at least something is acquired and protected. For both authors, peace is generated by conflicts so violent that in order to deflect it, longer term selfish calculations are necessary. Paradoxically, the more violent the selfishness, the more cohesive will be the associations.

Hobbes and Dawkins do not part company, as we would expect, at the 'framework of events' (question 6), for in both accounts this is devoid of evolution. There are, indeed, a few chronological elements in Dawkins' text, but only in the chapters on the primeval soup, and when Dawkins cites 'billions of years', this is the equivalent of the literary 'once upon a time'. There is an event, not a historical one, that organizes the text with a recurrent logical structure: the emergence of an Evolutionary Stable Strategy (E.S.S.). The text produces a well ordered body of balanced strategies that cannot be bettered from what were selfish, ruthless, atomic units computing their self interest. Thanks to artificial units, arbitrary tokens and simplified game models, an E.S.S. emerges in the text in areas as diverse as the origin of the sexes, parent–offspring relations, aggression, and reciprocity.

Not since the eighteenth century's first economists, has any 'invisible hand' erected such order from such disorder. There is only one date in *The Selfish Gene*, that of 1859 (S.G. p. 1) and it cuts the time into two parts with the implication that nothing written before is of any value. While Dawkins writes that 'the E.S.S. will enable us for the first

time to see clearly how a collection of independent selfish entitites can come to resemble a single organized whole' (S.G. p. 90), the E.S.S. process conforms closely to what Hobbes calls the generation of the Commonwealth. A selfish, agitated calculating mob becomes an organized whole that cannot be bettered by any other, even though it is suboptimal for everyone since they lose their former right to own everything. In Hobbes' text, as in other philosophical texts of the time and in all social contract theories, the emergence of the Leviathan is also a logical and not a historical event. Dawkins' critique of the social contract theorists (id. p. 71), or the 'notion of conspiracy' (id. p. 77), is also in accord with Hobbes. Society is not built for any positive or long term reason; it is a suboptimal calculation of selfish interest that binds actors in it. The Leviathan is constructed so that no power superior to the mere *addition* of selfish interest can be generated.† What Hobbes couches in legalistic terms of contracts or persons, Dawkins phrases in statistical terms. But they both often slip into other metaphors so that the words 'Leviathan' and 'E.S.S.' can, in practice, be exchanged. Dawkins describes a type of majority rule when he argues (S.G. p. 183) that one unit should not engage in a strategy, except if everyone else does the same thing at the same time. The same quandary appears several times in Hobbes and even provides the definition of the social contract (Lev. p. 115). Dawkins also comes close to describing an E.S.S. as a Leviathan when he states that 'An E.S.S. is stable not because it is particularly good for the individual participating in it, but simply because it is immune to treachery from within' (S.G. p. 78). This is exactly Hobbes' conclusion.

For Hobbes and Dawkins, the conditions necessary to reach a stable organized state are to increase the time delay (question 4) which produces enlightened selfish individuals, and to stabilize the currency (question 3), so that calculations can be made. In Hobbes and Dawkins' stories the result is the same: the whole is *nothing but* a provisionally stable interlocking of selfish calculations, which takes into account all the other selfish calculations and in which everyone settles for less. While the logical structure of both origins accounts is exactly the same, Dawkins succeeds in applying this model not only to the Body Politic, like Hobbes, but also to the Body since he begins with genes that build the body through a yet earlier social contract or E.S.S.; and it is quite remarkable, when considering the 'truth' of the social contract, that zoologists can create computer models that generate Leviathans. It is surely useful finding that the same pattern emerges in a seventeenth century political thinker, disputing the Church and the Kings' divine powers, and in a twentieth century zoologist, opposing group selection and perhaps also the Welfare State.‡

We examined another modern origins account. Axelrod and Hamilton's 'Evolution of Cooperation' (E.C.) is an explicit exercise (question 8, methodology) to build a model based on game theory that can account for the evolution of co-operation. The framework of events (question 6) is slightly more detailed than in *The Selfish Gene*, since there is a succession of events which, although devoid of dates, has an interesting tempo. The story starts with one stable strategy which is to cheat. This strategy, as in Rousseau's

† This similarity between Hobbes and Dawkins is only superficially in accord with C. B. MacPherson's classic intepretation of Hobbes (1962). The market place does not explain Hobbes's model, but the computer simulation in Dawkins certainly helps in understanding Hobbes's explanation.

‡ Every time the attribution of rights, duties and debts creates dissatisfied individuals, there is a flurry of activity on the political scene, in theories of the Body Politic and sometimes in the streets. This is clear in the Nouvelle Droite movement in France that has translated and utilized the sociobiological literature. The aim was—and still is—to shift the legitimacy of the social order from the republican tradition to a biological one. When the laws of the Republic appear absurd (as when they promise equality), it is useful to appeal to a higher order of laws, the biological ones, that make inequality appear legitimate.

model, cannot be bettered. Then a 'mutation' (E.C. p. 1334) in highly aggregated individuals already linked through kin selection, triggers a new invading strategy that soon reaches another stable plateau. This strategy is invasive and irreversible as in Hobbes' model: 'the gear wheel of social evolution' write Axelrod and Hamilton 'has a ratchet' (id. p. 1334). The ratchet here is dubbed Tit-for-Tat and is a calculation with artificial units (question 1). This time we are not taken back in time, but into a timeless period: Tit-for-Tat is the computer translation of the Golden Rule: do to others as they do to you. The morality (question 2, qualities) that is imposed on the artificial units, in fact two mythical prisoners, is rather stringent. They are asked to do to others as they do to them, and always to reset at zero by forgiving the other after one bad deed. These selfish animals are endowed with an endless patience. Given this starting point, Tit-for-Tat leads to a stable and moral society. While this modern exercise supports the idea that the golden rule may be the foundation of society, the conclusion is not novel, nor is it specifically biological or Darwinian. Furthermore, the endeavor seems no closer than the earlier versions to a naturalistic, historical and precise account about the origin of society that utilizes evolutionary principles and actual physical, anatomical and social traits of real animals.

5. A modern Origin of Inequality

Our goal at the outset was to compare, without prejudice, various accounts concerning the origin and nature of socialness. We felt that the information gained from the questionnaire would yield comparable and consistent, plausible accounts. In fact, the reality was quite different, since even the simplest questions were either not answered at all or were modified without notice, or worse, were self-contradictory. Hobbes, Rousseau and the modern sociobiologists are among the most coherent of the accounts we reviewed. This coherence stemmed from the same process: they rid their accounts of most of the facts, chose one currency and based their argument primarily on logical consistency. When the questionnaire is applied to authors who claim to summarize what 'really happened', the results are still more troublesome.

R. Leakey and R. Lewin's book *Origins* (O.) is a representative anthropological account. It covers most of the same ground as Rousseau's *Origins of Inequality*, but facts (which did not exist during Rousseau's time) are much more numerous. Data on comparative anatomy, demography, sociology, and ecology of primates, hunter–gatherers and social carnivores are emphasized. Although the facts are numerous, the structural framework to which they are attached is weak by comparison with Rousseau's. Leaky and Lewin never make explicit what the units are (question 1), although these seem to be small kin groups which are widely dispersed and have equal rights. Leakey and Lewin solve the problem of generating socialness by endowing their units with socialness from the start (question 2). The units have 'group wisdom' (id. p. 64), a broad sympathy for their fellows (id. p. 162), a passion for socializing (id. p. 169), and a 'deep seated urge for co-operation' (id. p. 229). Their intellectual abilities are in accordance with these qualities since they can make mental predictions (id. p. 189) and even have an aesthetic sense. Leakey and Lewin claim: 'We can now be sure, that the Neanderthalers led a complex, thoughtful and sensitive existence, surviving somehow in the extremely harsh conditions of an ice-gripped Europe' (id. p. 125). The 'somehow' is not quite Darwinian, but it does not matter since the story aims at showing that we have no ingrained tendency for arrogance, profligacy (id. p. 15), dominance, aggression, or territoriality (id. p. 158). All these asocial behaviors are presented in *modern* society only

because the biological self-restraint is inhibited by a wicked education, wretched living conditions and a reckless population explosion.

The Leakey and Lewin account has a sequence of events organized along a time scale (question 6). It is the only text in our small corpus that bothers dating the story of our social origins. But a closer examination reveals a textual time frame that is quite different. The tempo of the story is a slow gradual change, punctuated by three major catastrophes. The first catastrophe is the environmental change which created the savannah and drove human ancestors out of the forest (id. chapter 4); the second is the division of labor that forced an increased sociability to offset the consequences of this specialization (id. p. 468); the third is the terrible drama of the invention of agriculture and industry (id. chapter 6). This last event has all the characteristics, in this text, as in Rousseau's, of a mythic catastrophe; it expels man from a hunter–gatherer paradise which was the most equilibrated and happy time and triggers a disastrous change in tempo. From now on, change is not stable or linear but exponential. The authors, at the end of the story, draw an ominous and ever-expanding spiral that may force us to extinction (id. p. 193). Unlike Rousseau's *Origin of Inequality*, the direction of the story is not always from better to worse, but the structure is quite similar after the agricultural revolution. Man will never be the same happy, social and equilibrated creature. In both texts, the defects of man are not based on biology, but rather on the modern, artificial condition of existence.

There is an interesting and rare feature in Leakey and Lewin's account. It is a feedback mechanism, as in Rousseau, but in this case it is not only the strength of the body and the quality of the mind of man that is transformed by the actions of society, but his own anatomy. The body is social in its very shape and for Leakey and Lewin the large brain and its intellectual qualities must be fed back into the model, once events increase socialness (O. p. 66). Since the emergence of socialness is never described, the scenario does not specify what bodily traits have evolved under which constraints to make us more or less social. The final aim of the book is explicitly moral (question 9) and tries to convince the reader that no one has the right to use biology to explain drug addiction, ghetto violence, racial discrimination, or war. In this text, evolutionary history is used to dispute the source of our modern rights. Nowhere is the 'mythical' character of an origin account so obvious. It is not the information, or the morals, or the style that makes the book seem mythical; it is the functions of the story. The narrative enlists the past, the environment, other species, and other races to create a genealogy of present day society or, literally, *A Genealogy of Ethics*.

6. Still more discrepancies

We have just considered a variety of accounts about the origins of socialness. Although a superficial comparison of such disparate presentation produced chaos, a closer look at the structure of origin accounts through the application of our questionnaire revealed fascinating similarities and equally fascinating discrepancies.

Before reviewing these it is worth mentioning that there is a uniform lack of explanation for the initial aggregation of individuals in all accounts. Hobbes solves the problem by beginning with many men crowded into a small place; although Rousseau starts with a few dispersed individuals, he also ends with crowded conditions and the same state of war as Hobbes (O.I. p. 226). Freud needs a horde of people who cannot escape from each other's emotions for his scenario to work (T.T. p. 125), and Axelrod and Hamilton, and Trivers all need pre-existing aggregates of individuals so that they can derive co-operation.

Once aggregated, plausible accounts of how units become more social can be made. Socialness is seen by most authors as a way of getting by in an already bad situation. Hobbes', Rosseau's, Dawkins', Trivers' an Axelrod and Hamilton's units would flee from society if they could. But some unexplained force limits the choice, so that flight is not possible. This can result from the work of an external agent like an island in Rousseau, or it can result from an unlimited (and often unspecified) list of advantages. What follows in their accounts, then, is an explanation of socialness as a secondary adaptation to aggregation, not an explanation of the original source of socialness.

The discrepancies we found between and within various origin accounts might have been artifacts of the questions we were considering: the units (question 1), the qualities (question 2), and the time framework (question 6). It might be that no one can agree on the original units of society, and on the sequence of events, because no one was there to observe them. But in the situation did not improve when questions 3, 4 and 5 were considered.

In our texts, the advantages of living in society (question 3) are a long list of miscellaneous items. These range from finding a mate to defense against predators, from better foraging strategies to better socialization. The currency to calculate these advantages is never firmly determined and loose qualitative words like 'more' and 'less' are often used. For example, in Leakey and Lewin's text 'more' mates are acquired when living in society, but *how many more* is never discussed. Only in Hobbes and the sociobiological models are all the advantages and disadvantages summarized using only one currency. In fact, the weighing of costs and benefits is seen by these authors as the cause of society.

There is little agreement about the possibility of calculation (question 5), even when different authors agree that the 'units' can become more and more social.

Two traditions are visible in our sample. For example, Hobbes and Dawkins consider that every selfish unit can convincingly conclude that the costs of living in society are offset by the gains. In this sense, these authors can be considered as part of the same liberal, optimistic tradition.† By contrast, in another tradition, the social bond is created so that *no* such calculation is ever possible. Freud, for instance, binds his hordes with so much guilt that even if they could calculate they would always feel an infinite debt to the powers-that-be. The same is true of Mauss' (1967) primitive economics; the slightest impression should never be given that a calculation is reciprocal, if society is to continue (see also Serres, 1980). In this pessimistic tradition, social links are possible only as a result of a horrifying sacrifice. Freud's murder of the father, Girard's (1982) sacrificial victim, and Nietszche's (1887; 1967) tortures make it forever impossible to calculate who owes what and how much to whom. Even the mere proclivity to calculate is drowned in a flood of guilt and self punishment.

Within the optimistic tradition which supposes that each unit *should* calculate its own interest, there is still disagreement about how these interests *could* be calculated. Modern sociobiologists use reproductive success as the ultimate currency that enables actors (question 3) and observers alike (question 5) to calculate the pay offs of socialness. In the texts we studied, however, no realistic numbers or proximate mechanisms were considered and understandably so, since this creates a new problem. How do the units, whatever they are—animals, primeval man or zoologists—make calculations that should encompass many generations? Sometimes, a complete mechanism is said to evolve to take care of this calculation (E.R.A.), but most often the problem is just avoided.

† By optimism we only mean that each individual can make a calculation of his/her interest, a calculation that will reveal an optimum. For the emergence of this tradition see MacPherson (1962).

Even when the currency and the calculating mechanism are agreed upon, there looms an even larger problem. Some authors believe that the advantages and disadvantages of living in society can be calculated in a way that allows everyone to break even. The golden rule is quoted by Trivers, 'in short, do to others as you would have them do to you' (E.R.A. p. 215), as well as by Hobbes, 'and this law of all men *quod tibi fieri no vis, alteri ne feceris*' (Lev. p. 104). In the Hobbesian and sociobiological traditions, where everyone wants the edge on everyone else, the result is nevertheless a social contract, be it legal or statistical, that grants basic equality for everyone. However, this is not the *basis of socialness* for other authors. For Rousseau, Engels, Freud or Nietzsche the striking feature of society is that the golden rule is never applied and that some individuals constantly gain at the expense of others. Here, socialness is not the same calculation of cost and benefit, but rather a skewing that makes some calculate and always win, while others, infinitely the larger number, never calculate and have to pay the whole bill. It seems the social 'song' has a quite different melody depending on the tradition you choose.

There is a special issue related to the advantages and calculations of socialness. Are individuals to be considered selfish or altruistic? Our treatment of origin accounts not only illustrates the disagreement between authors, but highlights the difficulty of the debate. As a first step, the units must be explicitly defined. If the unit is the nation, then a soldier that gives his life at war acts selfishly; if the unit is the gene, then the body can be asked to sacrifice itself so that the gene, the only unit to be counted, will survive. A further encumbrance is the time delay (question 4). How long must the time be to determine whether a behavior is selfish or altruistic? If we speak in terms of an evolutionary framework, the time delay may be at least a few generations, but for other schemes it may be months or only days. It is also impossible to clarify the distinction between selfishness and altruism when the payoff currency is not defined. What are the units after? More money, more pleasure, more offspring? And this qualitative 'more', how is it to be measured? Where is the standard with which to compare it? If this is left unspecified, the debates are unresolved.

A second set of problems result from the inconsistent use of elements, as defined by the questionnaire, in the argument. Obviously, any change in any of the answers to the questions is enough to make the story proceed in a completely different direction. A simple shift in the standard that allows calculations to be made and the whole society goes towards another goal. A surreptitious jump from individual to kin as the 'unit' and a whole range of behavior that was altruistic becomes selfish. An infinitely small change in the interpretation of the word 'person' in Hobbes' *Leviathan* either creates a totalitarian state or creates a whole that cannot in any way be superior to the parts.†

Discussion

Towards more scientific accounts

Our textual analysis led to the creation of a questionnaire that would permit comparison between a variety of origin accounts. Yet, ultimately, we think we have accomplished more. In the process of comparison we were able to identify two sets of interesting issues important to future explanations of social origins.

† Experts on Hobbes have always hesitated betwen Hobbes as the inventor of modern democracy or Hobbes as the inventor of modern totalitarianism. The whole debate hinges upon the meaning of the word 'person', since the sovereign is the actor of the people but not the 'author' of what he or it says. For a discussion of this dual feature and of the issues discussed here see M. Callon and B. Latour (1981).

The first set of issues revolved around how closely related modern, scientific, and older, non-scientific, origin accounts are. The success of our questionnaire implies that any account must address the same set of questionnaire implies that any account must address the same set of questions, and that there may be an inherent internal constraint in any explanation of society.

The questionnaire

Most of our texts failed in some aspect of their answers to the questionnaire, yet our efforts suggest (perhaps for the first time explicitly) that there are a minimal set of elements necessary in any social origins account. These are the logical conditions without which no scenario is complete. The coherence of the account thus becomes a direct reflection of the logical consistency within the account in relationship to these elements.

We had assumed that the knowledge and introduction of better 'facts' about the origin of socialness would produce better accounts. Yet this seems not to be the case. More particularly, there appears to be an inverse law at work in our examples: the more facts exist and are incorporated, the less attention is paid to the coherence of the framework within which those facts are placed. As a result, the number of facts appear to be almost irrelevant, since the most coherent accounts in our corpus were those, like Rousseau's which laid aside all facts, and the least coherent were those with the most facts.

To our further surprise, the scientific texts were no more concerned with, and provided no further means to make themselves refutable than the non-scientific accounts. This finding supports our earlier decision not to distinguish between the two types of accounts and also points to a serious shortcoming of accounts written in the current 'scientific genre'.

These points suggest, if taken seriously, that future accounts must clearly and explicitly address the elements listed in our questionnaire, for example, the units (question 1), the qualities of these units (question 2), the currency used to measure relationships (question 3), etc., using *available facts* and applying the same rigorous standards appropriate to scientific explanations not concerned with social origins. In all cases, explanations of origins are speculatory and scientific predictions are possible only when all the premises are clearly defined and logically linked. Applying these criteria means that any change in the structure/scenario must be explained and justified, and cannot be surreptitious or *ad hoc*.

Social genealogy

If we take a reflexive stance and attend to the lessons of the sociology of science discussed in the introduction, the discrepancies between accounts become important empirical data. The debates about social origins suggest that people are negotiating or renegotiating what society is about by means of origin accounts. When we talk about insect societies, baboon troops, lion prides, hunter–gatherers, primeval violence or the quest for fire, we are also speaking about ourselves, our history, our limits and our opportunities. It is prescriptive as well as descriptive.

Defining the units of society, endowing these units with specified qualities, inventing methods to measure the relationships of these units, tracing the event that generated socialness, all are essential to the building of our societies *and to the construction of 'hard' facts*. These problems are so essential that they cannot be held inside the narrow constraints of what people often think is the 'scientific' discourse. Facts play a peculiar role. They are easily pared down and just as easily built up by authors, be they political philosophers or Darwinian zoologists.

Thus it appears that accounts of the origin of society, even when written in a scientific genre, are functionally equivalent to the myths of origins as we understand them. Myths are created precisely in order to handle these timeless structural problems; to define who we are, what our relevant units are, what our relationships with animals are, what the source of our guilt is and what the purpose of living in society is.

Our examples also suggest that when scientists are either unaware of the mythic character and function of origin accounts and their role in social genealogies, or are ideologically committed to a particular position, the coherence of the scientific account suffers.

Because reactions to origin stories reflect hidden preferences for the consequence of an account as it modifies the existing statuses, roles, and rights of the audience, the science of our social origins must be particularly cognizant of its own social construction. Our critique of past origin accounts persuades us that future scientific accounts must meet certain criteria to be both convincing and an improvement on previous efforts. Future accounts must be more explicitly concerned with and consistent in their treatment of the elements highlighted by our questionnaire. The mythic character of origin accounts also requires a better understanding of the effect on audiences and the political lessons that will be extracted, since this is an inevitable part of the process, whether conscious or uncounsious, whether desired or not.

Thus, the difficulties of tracing human social origins goes beyond the mere speculative nature of the endeavor. Scientists have not yet come to terms with what makes an account scientific or convincing nor with the larger issues. Future scientific discussions of origins are destined to repeat the pitfalls of earlier political philosophy without gaining additional benefit, either from the new facts or the lessons already learned in the history of philosophy unless better criteria are used. It has been quite hard to reach the 1859 Darwinian Rubicon and still harder to cross it! It will not be uninteresting to hear, at last, origin accounts that are both informed and coherent.

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