The weakness of adaptive explanations.

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The concept of adaptation is fundamental in Darwinian theory, but even for biologists it is problematical. According to Lewontin, 'There is virtually universal disagreement among students of evolution as to the meaning of adaptation' (1957:395), and G.C.Williams (1966) wrote a well-known book, *Adaptation and Natural Selection*, to clarify some of these problems. Attempts by numerous anthropologists and sociobiologists to give adaptive explanations for a variety of sociocultural traits involve these difficulties to a far greater degree than in biology, and in this paper I argue that social scientists should avoid using adaptive explanations completely.

1. *Why adaptive explanations are peculiar.*

'Adaptation' is intended to explain the presence of some trait or feature of living organisms, or of human cultures, by showing how it contributes to the efficiency and survival of the organism or culture of which it is a part. But while it is easy to see that wings are for flying, and that committees are for taking administrative decisions, providing good adaptive explanations is often far more intellectually demanding and problematic than this. Some of these difficulties can be illustrated by a simple example from technology.

Many bricks have, on one face, a rectangular indentation in the form of an inverted roof, known as a frog. It is clearly there for a purpose, but what could this be? Some say that it is to economise on material, or to make the brick lighter and easier to lay, or to give it a better 'key' for the mortar, or that it makes it easier for the heat of the kiln to penetrate it during firing. These theories all have some plausibility, but the fact that many bricks do not, in fact, have frogs is a major objection to all of them. The real explanation is that when bricks are made in moulds, rather than being wire-cut, it is difficult to force the clay right into their bottom corners, resulting in a badly formed brick. The raised 'roof' structure in the base of the mould is therefore intended to distribute the clay more effectively when it is pressed into the mould, and the resulting frog has nothing to do with the actual laying of the brick. This teaches us that correctly deducing function from form can be impossible unless one knows, as in

this case, something about the process of manufacturing bricks, and its history – how the system works, in other words.

Traits, then, whether biological, technological, or sociocultural, do not exist in isolation, but as parts of complex systems about whose working we often know only too little, and these systems also have histories, about which we often know even less. In this context of ignorance, the adaptive explanation has to take a short cut, and fall back on the much weaker strategy of trying to see how the particular trait works in its present environment, and in what ways it might be useful. When a use is found it is then claimed to be the explanation of why the trait or feature exists, but this assumes that every trait must have a function (or else it would have been eliminated by selection), and that the function of the trait can be inferred from its form. Neither of these assumptions, however, is necessarily true at all. Form may be a most ambiguous guide to function, and a trait may simply be the result of productive processes, and have no use, or any uses or benefits may be quite accidental. It will obviously be difficult, then, to distinguish mere 'Just So Stories' from genuine adaptive explanations, as G.C.Williams has said:

> A frequent practice is to recognize adaptation in any recognizable benefit arising from the activities of an organism. I believe that this is an insufficient basis for postulating adaptation and that it has led to some serious errors. A benefit can be the result of chance instead of design. The decision as to the purpose of a mechanism must be based on an examination of the machinery and an argument as to the appropriateness of the means to an end. It cannot be based on value judgements of actual or probable consequences. (Williams 1966:12)

And

> I call that approach to evolutionary studies which assumes without further proof that all aspects of the morphology, physiology, and behaviour of organisms are adaptive optimal solutions to problems *the adaptationist programme*. It is not a contingent theory of evolution or hypothesis to be tested since adaptation and optimality are *a priori* assumptions. Rather, it is a program of explanation and exemplification in which the purpose of the investigator is to show *how* organisms solve problems optimally, not to test *if* they do. (Lewontin 1979:6)

In human technology, and sociocultural systems generally, we know that usefulness is normally the result of conscious human design, but biologists are trying to solve 'designer' problems of plants and animals without being able to appeal to an actual designer. They therefore have to base themselves on the complex theory known as 'Natural Selection', in which nature takes the place of the human plant and animal breeder. In Darwin's own account of natural selection,

> As many more individuals of each species are born than possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being,

> *if it vary however slightly in any manner profitable to itself* [my italics], under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be naturally selected. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form. (*The Origin*, p.4)

But as Fodor and Piattelli-Palmarini (2010) have pointed out, the matter is not as simple as it looks, because there are insuperable logical problems in claiming that nature could have selected 'for' any *specific* trait. Darwin compared nature to a human plant or animal breeder, who selects for some desirable trait, so let us imagine a plant breeder who selects a variety of shrub for a specific characteristic such as an abundance of blossom, because this commands a higher price. This, however, will also be accompanied in the constructive process by a large root system, but in which the customer is not interested. In other words, if the customer could be offered the counter-factual choice of a plant with an abundance of blossom but small roots, she would choose that instead. Here we can genuinely talk of plants being selectively bred 'for' a particular characteristic, abundant blossom, because breeders and customers have minds, which can select particular characteristics in the propagation process and distinguish them from associated, co-extensive characteristics.

Nature, on the other hand, by definition, has no mind at all, and so has no means of choosing some particular characteristic, like more abundant blossom, from a number of others with which it is also associated in the constructive process. Therefore we, in examining what nature has done, have no means of unequivocally deciding what it must have selected 'for' in any particular case either – it's all part of a bundle of traits.

Notice that we would be in a much better position to answer the question 'selected for what?' if there were 'laws of adaptation' to show that some traits always have more adaptive value than others. But there can be no such laws because the fitness of every trait is also relative to its environment as well:

> Is being green good for a creature's fitness? That depends on whether the creature's background is green too. Is being the same colour as its background good for a creature's fitness? That depends on whether the camouflage that makes it hard for predators to find also makes it hard for the creature to find a mate. Is it good for a creature's fitness to be big? Well, being big can make it hard to flee from predators. Is it good for a creature to be small? Perhaps not if its predators are big [and so on]. (Fodor and Piattelli-Palmarini 2010:123-4).

As they point out, this does not mean, however, that we can't give adaptive explanations in nature, but merely that they can't be based on any specific *laws* of evolution, only on the history of the particular causes that have led to each case:

> We think there are indeed some bona fide adaptationist explanations and that they are precisely what they seem to be on the face of them: they're *historical* explanations. Very roughly, historical explanations offer (not laws but) plausible narratives; narratives that purport to articulate the causal chain of events leading to the event that is to be explained. Nomological explanations are about (metaphysically necessary) relations among properties: historical narratives are about (causal) relations among events. (ibid., 132)

Causal explanations, then, are what we need when trying to understand how particular traits are produced by complex biological or sociocultural systems. But this is bad news for those who have an *a priori* commitment to the power of selection and the ubiquity of adaptation, who will therefore have an interest in playing down the significance of systems in general, and will prefer to think of organisms and sociocultural systems as *populations* of traits, each of which, ideally, might vary independently of the others. (Indeed, Behaviourist psychologists also thought of the individual as, from birth, simply emitting random behaviours that were then shaped by the forces of selection.)

So, in their ideal scenario for adaptive explanations, natural selection should preferably be able to operate on a *single* trait at a time, not on bundles of connected traits (and even better, in the case of organisms, each trait would be correlated with a single gene); every trait should have *some* effect on survival, meaning that no trait is neutral; there would be variation in the traits of each organism, individual, or society, and competition must be intense, so that there is minimal chance of two or more variant forms of a trait being able to get by in the struggle for survival; and there must be a clear distinction between organism and environment, between the forces of selection and what is selected. In general, then, the importance of endogenous sources of order should be minimal, and those achieved by the exogenous forces of selection should be maximal. In other words, the evolved features of whatever we are trying to explain – the organism, the society, learning by the individual – should owe the least to their innate properties and processes, and the most to those of their environment.

As we shall see, however, there are many reasons for believing that the real world is actually not like this at all. In the case of organisms it is now known that many different traits are interconnected via complex gene linkages, so we can have less assurance that specific traits were selected for at all; many traits may be adaptively neutral, or even maladaptive if they are linked with other traits that are adaptively positive; and developmental biology is showing that endogenous sources of order in the development of the organisms are much more important than hitherto supposed.

Mutatis mutandis, these qualifications apply to human societies as well, which are also much less rigorously organized than physical organisms, since they are composed of human beings pursuing their own interests, unlike cells of the body, so that it is also possible for maladaptive and dysfunctional variants, 'dead wood', to survive indefinitely, while low levels of competition, especially in primitive society, will also blunt the edge of selection. Sociocultural systems, moreover, are fundamentally different from biological systems because they do not have the basic biological distinction between organism and environment, so that variation and selection are linked together and can produce innate directional tendencies in evolution.

Obviously, we don't need adaptive arguments to explain those aspects of sociocultural systems that are the obvious result of deliberate design, to explain, for example, why clocks have pendulums, or why the American Constitution includes a Supreme Court. But there are many other areas of custom, and practice, and social organization where it is much harder to say why something is as it is. This is particularly true of primitive societies, where anthropologists often deal with customs and practices which seem to have no obvious practical value, and for which the people themselves can give no other explanation than 'It is our custom', and where there are no reliable historical data to indicate what may have preceded the trait in question.

In such cases, anthropologists have therefore been tempted to fall back on the law of natural selection, and assume that everything in a society must contribute either to the smooth functioning of that society, or to its adaptation to its natural environment, because if something did not, it would have been eliminated by natural selection, e.g.

> Countless studies of extant sociocultural systems and bio-organisms have been made to discover the functional status of sociocultural and biomorphic structures. In both realms the results of these studies indicate that bio-organisms and sociocultural systems are largely if not exclusively composed of positive-functioned, that is, useful traits. (Harris 1960:60-1)

And if a trait is very widespread in many societies this must be also be a proof of its adaptive value, e.g.

> It would be incomprehensible if the most widespread forms of organization would not at the same time be, *at least in their aggregate*, the most advantageous. How could they have maintained themselves under so great a variety of circumstances if they had not enabled the individual [organism] better to resist the elements of destruction? On the other hand, the reason for the rarity of the other characteristics is evidently that the average organism possessing them has greater difficulty in surviving. The greater frequency is, thus, a proof of their superiority. (Durkheim 1964:58)

In anthropology there has also been a strongly materialist flavour about these adaptive explanations because, as we have seen, the theory of natural selection is inherently biased to think that everything, ultimately, has survival consequences, which are necessarily material in nature. Furthermore, since only the Western observer knows how to apply the theories of natural selection and cultural materialism, the native people's own explanations for a practice or custom can be – should be – disregarded as superficial and unscientific. We can now take up these points in more detail, beginning with the forces of construction, as distinct from selection.

2. *The forces of construction and the forces of selection.*

One of the basic weaknesses of neo-Darwinian theory has been its emphasis on selection as the main agent of evolutionary order, and its disregard of construction, the causal processes by which organisms (or societies) are produced, which it trivialises as simply the source of random variation. The problem is that organisms have many thousands, or tens of thousands, of traits: must every one of these have been the result of selection, or may some simply be the result of constructive, endogenous processes with no particular adaptive value? How, then, are we to decide which is which?

In considering this, it is a useful thought-experiment to begin with the inorganic world. For example, celestial objects of more than a certain size are always round, just as snowflakes are basically hexagonal, despite their many other variations. Obviously, however, this cannot be the result of some selective process in which only round celestial objects, or hexagonal snowflakes, manage to survive, and other shapes are eliminated, because none of these other shapes is physically possible in the first place. Celestial objects of more than about 750 miles in diameter are inevitably pulled into a sphere by their internal gravitational forces, just as snowflakes are basically hexagonal because this is determined by the bonding properties of water molecules. Here, then, construction is fundamental, while selection is irrelevant because there is no competition for survival in the inorganic world.

But it may also be appropriate to explain some features of biological design by the forces of construction, rather than selection. For example, do men have nipples because at one time in the Lower Palaeolithic they used to suckle babies, but those that did were so distracted that they never noticed approaching enemies and were

wiped out? This intriguing prehistoric scenario turns out to be false: male nipples were never of any use, and are simply the result of embryological processes:

> Males and females are not separate entities, shaped independently by natural selection. Both sexes are variants upon a single ground plan, elaborated in later embryology. Male mammals have nipples because females need them – and the embryonic pathway to their development builds precursors in all mammalian fetuses, enlarging the breasts later in females but leaving them small (and without evident function) in males. (Gould 1992:127)

Male nipples are useless features, which Gould and Vrba refer to as 'non-aptations', but these are in fact very common and provide a source of future forms:

> …the enormous pool of non-aptations must be the wellspring and reservoir of most evolutionary flexibility. We need to recognize the central role of 'co-optability for fitness' as the primary evolutionary significance of ubiquitous non-aptation in organisms. (Gould and Vrba 1982:12).

Quite independently, I wrote in very similar terms about the evolutionary potential of non-aptations in human social evolution:

> Social evolution has therefore been possible partly because, instead of weeding out everything that is not immediately useful, societies carry a good deal of 'dead wood' that may be of no particular adaptive value at the moment. They operate rather like those people who never throw anything away, because 'you never know when it may be useful'. (Hallpike 2008:16)

Male nipples happen to be useless, but some characteristics that originated as mere by-products of the developmental process, may subsequently acquire uses. So, for example, the skull sutures of mammals clearly have the adaptive advantage of giving flexibility to the foetal skull, and aiding its passage through the birth canal, but they could not have been the result of natural selection, as Darwin himself pointed out, because the skulls of birds have them too, and they merely have to escape through an egg-shell. This type of design feature, which was not originally selected for and was merely a by-product of some other process, but which later acquired survival value, has been termed an 'exaptation' by Gould and Vrba (1982), and indicates that many features of organisms may not in fact have been selected 'for' anything at all, but may still have a fundamental role 'in both constraining and facilitating the path of evolution' (ibid.,14). Exaptive features are of great importance, and it is perfectly possible that the remarkable intellectual capacities of the human brain, which vastly exceed the cognitive demands that could have been made on them by the hunter-gatherer life in the Pleistocene, are predominantly exaptive in origin, and were not originally adaptive at all. (This is discussed at length in Chapter 11.)

Even in the case of consciously designed human artefacts, the forces of construction may be more important than selection in explaining the presence of

particular traits. Why, for example, is cast iron brittle? Is this property perhaps selected by the manufacturers as a form of planned obsolescence in order to sell more of their castings? The answer in fact lies entirely with the processes that produce it, and has nothing at all to do with selection. The cast iron is given a high carbon content (2% - 4%) because this allows it to be melted at a temperature around 570ºF lower than that of pure iron; for the molten metal to fill the patterns in the mould very closely; and for the casting to be easily machined and be fairly rust resistant as well. But the high carbon content also leads graphite flakes to form in the metal as it cools, and these establish planes of weakness allowing cleavages to travel through the metal relatively easily when it is struck. Brittleness is therefore not deliberately selected for at all, but is an unwanted and harmful property which comes with a whole bundle of otherwise useful properties produced by a high carbon content in iron. It survives simply because it is not so deleterious as to make cast iron useless.

The processes by which complex entities are constructed therefore make it extremely implausible to think of traits – physical, psychological, or social – as existing independently of one another, when in fact they must be closely interdependent, so that changes in one are likely to involve changes in others simply because of the developmental processes responsible.

As we saw, it has been suggested that widespread traits in human society must *ipso facto* be well adapted, as a result of natural selection. A good example of a universal feature of human society is linguistic diversity, which is certainly not the result of deliberate purpose, and some have tried to explain it as the product of selection. As we know, all languages typically diverge into different dialects:

> This variability is extremely puzzling given that a universal, unchanging language would seem to be the most useful form of communication. That language has evolved to be parochial, not universal is surely no accident. Security would have been far more important than ease of communication with outsiders. Given the incessant warfare between early human groups, a highly variable language would have served to exclude outsiders and to identify strangers the moment they opened their mouths. Dialects, writes the evolutionary psychologist Robin Dunbar, are 'particularly well designed to act as badges of group membership that allow everyone to identify members of their exchange group; dialects are difficult to learn well, generally have to be learned young, and change sufficiently rapidly that it is possible to identify an individual not just within a locality but also within a generation within that locality'. (Wade 2007: 204)

The fallacies here are obvious. First of all, an entirely bogus criterion of linguistic usefulness, 'a universal, unchanging language' is set up by the Darwinian theorist, who is then puzzled by the actual variability of language from group to group. This

multiplicity of dialects therefore becomes a 'problem' that has to be explained by its adaptive value, which is that 'dialects are particularly well designed to act as badges of group membership'. But why would a universal unchanging language be the most useful, the most adaptive form of communication, in the first place? People use language to converse with those whom they know in the ordinary course of daily life, and since primitive societies are small and relatively isolated from one another, certainly by comparison with modern societies, being able to converse with people they never had a chance to meet would have been of no use whatever. How would groups of Aborigines all across Australia, for example, have benefited from being able to talk to people they never actually had the chance of meeting in forty or fifty thousand years? Secondly, in primitive societies people know most of the members of their own social group, and if they do not – when meeting them at a local market, for example – they typically question them about their background and would easily be able to identify real strangers in this way even without any dialect differences.

Finally, there is a universal and obvious explanation for the development of different dialects (and of different languages, of course). Over the generations there is a steady accumulation of accidental variations in the speech patterns of each population, and linguistic diversification between groups is simply the result of the relative *lack of social interaction between them,* and increases in proportion to their mutual isolation from one another. This occurs even in modern cities, so that those born and bred in one part of London, for example, can identify slight differences in speech from those coming from quite short distances way. (Local divergences of this kind are not, of course, confined to language at all, but occur across the whole spectrum of human behaviour and custom, and also biologically as genetic drift in different populations that do not intermarry.) By definition, selection can only operate if there is variation in the first place, and cannot be invoked as an explanation for a universal trait. So attempting to explain the universal occurrence of dialect variation by a supposed adaptive value is therefore as fallacious as believing that celestial objects are spherical because this, too, must confer some adaptive advantage on them. In both these cases it is production, not selection, which provides the entire explanation.

Again, another very widespread characteristic of human society is seniority of birth, which has profound but unplanned implications for the emergence of the state, yet cannot be explained by natural selection:

In every family the eldest child is able to dominate his or her younger siblings, at an age when the three or four years' age difference that often results from birth-spacing and infant mortality, will mean a great deal. Among hunter-gatherers, eldest sons had no advantage because there was no property for them to inherit, and no authority for them to exercise, but all that changed with the agricultural revolution, and the development of property-owning descent groups. In all traditional societies males and not females are the leaders, so that the superiority of eldest sons that is generated by this very simple family dynamic has profound significance for social organisation as a whole. (The first-born child is also of special importance to its parents, because its birth transforms them from juveniles to adults.)

For all these reasons, birth-order is a very important basis of social status that is widespread throughout the world, and over many generations it can produce major inequalities within descent groups, because some people are descended from the founder through a long line of eldest sons, whereas at the other extreme some men's ancestry is entirely though junior lines. This has powerful social consequences, because it can produce an aristocratic class of men who are the lineal heads of their descent groups. Even without actual ancestor-worship, the spiritual potency of the founder in some cases may be concentrated in the head of the lineage, who typically has the power to bless its members, their fields, crops, and animals, settle their disputes, and may also have considerable control over their land as well.

None of this was the result of variation and selection; seniority of birth was neither adaptive nor maladaptive, but simply the natural result of a normal feature of family relations, while descent groups themselves were the easiest and immediate route for early farmers to take in organizing access to land and resources. But seniority and descent were essential foundations for the subsequent development of the state, and in the development of social inequality. (Hallpike 2008:70-71)

This illustrates again that there can be no law of selection which could be the basis of a link between frequency and adaptive value in social systems. Something may be frequent for a variety of reasons – there may be many factors that lead to it, which is why crime is universal, or it may be very easy like counting to ten on our fingers, or it may derive from some aspect of human nature, like facial expressions.

Divination, to take another case, is extremely common, like belief in magic and witchcraft, and when trying to explain the survival of such beliefs and customs that seem obviously useless and misguided, anthropologists influenced by Darwinian and materialist theory typically disregard the explanations of the people themselves, and claim that the real reasons why such practices survive is that they have been selected for their adaptive value.

For example, the Montagnais-Naskapi of the Labrador Peninsula in Canada locate game by divination: a shoulder-blade of the animal species to be hunted is placed in the fire, and the pattern of cracks and spots that are produced on the bone is believed to tell the hunters where to find the animals they want. It has been suggested, however, that this form of divination has survived because it is really a randomising procedure that often *prevents* the hunters finding their quarry. The adaptive value of doing this is that, by preventing over-hunting, it is therefore a means of *preserving* game-stocks.

But what is being proposed here is theoretically impossible. The Montagnais-Naskapi, like all primitive peoples, don't think in terms of chance and randomness at all, and they continue with their divination, not because it is instinctive, but because they believe it helps them attain their goal of successful hunting. If, in fact, it achieves the opposite effect, which

> *happens* to confer an adaptive advantage, but which they don't know about, this can have no bearing at all on the survival of the custom. If, for some reason, they stopped believing in divination, they would abandon it, regardless of the consequences which, in any case, they would not understand. (Hallpike 2008:49)

The basic weakness of the selectionist theory (besides lack of evidence), is that the comfort-value of beliefs, or their contribution to social solidarity, can't explain why people should actually find them credible in the first place. In the case of the Montagnais-Naskapi, it is the people's assumptions about reality that are fundamental, and we can only hope to explain them by looking more closely at how our understanding of the world is produced, at developmental psychology, not by speculating on the adaptive value of optimism and general self-confidence in the struggle for survival. The obvious conclusion is that these, and other primitive beliefs are universal, not because they provide some selective advantage, but simply because human beings find it very easy to think in this way, because it is difficult to refute them, and because they are not so destructive or so self-defeating that they are abandoned, or cause the extinction of the groups which hold them. In other words, they survive because competition is weak. The constructive forces here are certain features of the primitive mentality that make it easy for certain kinds of supernatural beliefs like divination to be accepted, and they are sufficient to explain the survival of the belief in a milieu which is cognitively undemanding.

3. *Human societies are actually very unlike biological organisms.*

So far, we have been discussing aspects of society and organism as though they were roughly comparable, but one of the most obvious differences between societies and plants or animals is that societies are 'organisms' of organisms, made up, that is, of separate people, each with their own points of view, aims, and interests that must frequently conflict, quite unlike the component cells of the biological organism, each of which is assigned its place and role in the organism by the genome. While, therefore, one can expect that the construction processes of the organism will normally generate a harmonious and efficient entity, there is much less reason to expect a similar outcome in the case of human societies. This is of particular importance as societies become more complex, and class hierarchies and political centralization develop.

Since societies are maintained by the separate physical individuals who compose them, it is surely quite likely that different communities, classes, and factions within a society will also pursue courses of action in the interests of their members which conflict with those of others, and with the efficient working of the whole society. There is therefore no reason in principle why all these individuals should somehow work in concordance so that they produce, unknown to themselves, practices and institutions that are adaptive either for the majority of individuals, or for the working of the whole social system. We know that in fact that as societies increase in complexity, harmony is only achieved with great effort, and institutions such as warfare and the feud may flourish unchecked. Efficient government of states, in particular, has proved extraordinarily difficult, because of the problems of administration, of preventing rebellion, and not least, because of the temptations of absolute power for rulers. It was not entirely without reason that Gibbon described history, not as the steady accumulation of increasingly well-adapted institutions, but as 'little more than the register of the crimes, follies, and misfortunes of mankind'. Indeed, it is extremely hard to understand how non-purposeful mechanisms that contributed towards social solidarity could be anything other than accidental.

For example, it was maintained by structural-functionalist anthropologists that cross-cutting ties exist in order to minimise social conflict:

> Up to a point…the principle of cross-cutting ties is indeed a very general and important aspect of all social life, so general and so important, in fact, that one is led to ask if it is not simply a necessary aspect of society as such. For if a society were composed of a number of groups which existed in complete isolation from one another, in what sense would they constitute a single society at all? Given that the very nature of 'society' involves the existence of relationships between the members of different groups, it also follows that some of these relations will be positive and others negative…The fact that cross-cutting ties *must* exist in all societies means therefore that we can never appeal to them for an explanation of any specific institutional form…There is, moreover, no guarantee at all that the mere proliferation of cross-cutting ties will in and of itself lead to social harmony…[W]here the groups so linked have no internal cohesion or effective leadership, and where the ethic of vengeance is important, the very proliferation of such linkages may actually be the basis for the extension of violence.(Hallpike 1986:93)

Cross-cutting ties, therefore, are a necessary feature of all societies, that are always constructed, but there is no adaptive law which we can invoke to show that they must always contribute to social harmony. Any such effect is purely accidental, as I have shown in the case of the Tauade (1977:136, and Chapter 7), where cross-cutting ties actually contribute to violence and social disorder. On the other hand, even where we

find that, as in Konso towns, lineages are dispersed throughout the different wards and do have some effect in mitigating potential conflict,

> …it is vacuous to claim that this feature of Konso society can be explained by the functional value of cross-cutting ties, since the people themselves can give a much more precise explanation. 'We do this', they say, 'because we do not like to be dependent on our kinsmen, and because our neighbours and friends are in some ways just as important as relatives'. (ibid., 93)

The existence of different groupings and hierarchical levels of organization also raises the question with regard to any proposed adaptation, 'adaptive for whom?' In the case of primitive warfare, for example, we may find that it preserves the survival of the inhabitants of particular villages, yet at the same time disturbs the peace of the wider region. Writing of the Yanomamo of South America, Chagnon, for example, claims that 'a militant ideology and the warfare it entails function to preserve the sovereignty of individual villages in a milieu of chronic warfare'. (Chagnon 1967:112) But it is clear

> …that social interaction takes place between a *number* of autonomous villages, and that there are forms of alliance varying from trade, to feasting, the exchange of women and the giving of refuge to allies worsted in battle, and that the villages are all integral parts of a larger social system…Thus while it can be argued that it is adaptive for any *one* village to engage in warfare, and be generally ferocious, in a situation where everyone else is equally ferocious, it does not follow that it is adaptive for that *group* of villages to engage in constant raiding and feuding among themselves – they would be much better off in terms of material prosperity if they lived at peace. (Hallpike 1973:454)

This multiplicity of organizational levels in human society means that, since one can always find some level for which a practice such as warfare is beneficial, it is quite vacuous to use the notion of adaptation to explain its survival. In my paper 'Functionalist interpretations of primitive warfare' (Chapter 7) I discuss a number of attempts by anthropologists to show that its prevalence has to be explained by such benefits as increasing social solidarity, or adjusting population/resource imbalances, and demonstrate that all such adaptive explanations are misconceived. Instead, therefore of trying to explain tribal warfare by some sort of adaptive value, we must look instead for the factors that produce it:

> The answer is clearly that there a number of very widespread factors that lead to [warfare]: the aggressive propensities of young males, lack of effective social control in acephalous societies, mutual suspicions between different groups, revenge, the self-maintaining properties of social systems, problems in developing mediatory institutions, religious associations between success in warfare and vitality in general, and so on. (Hallpike 1986:113)

Another obvious example of the problem 'adaptive for whom?' is the development of social inequality, in the form of social ranking and differential access to resources through inheritance in tribal societies, and then in the further development of political and economic inequality with the evolution of the state, with slavery as its most extreme form. Economic inequality is a universal feature of complex societies, but for whom can it be said to be adaptive when, say, 5% of the population own 95% of the wealth? The Darwinist might reply that this gives states a competitive advantage over hunter-gatherer societies, because they can build and organize great public works, and support powerful armies whereas foragers live in small and weak societies. This is perfectly true, but the fact remains that historically the ordinary peasant in the state did not benefit much from all this, and in terms of material welfare and personal dignity would probably have been rather better off living in small tribal societies. To use an adaptive explanation here one must therefore shift the whole focus from the individual to the organization, so that high taxes are clearly adaptive for the state, (and the small upper class of rulers), because they allow it to pay for a large army, for example, to maintain itself against external and internal enemies, but they are not adaptive for most individuals.

Indeed, there are some institutions such as slavery which are not only maladaptive for the slaves, but maladaptive for the state as well, because they are less efficient than free, paid labour. Nevertheless, slavery has been an extremely successful institution for thousands of years all across the world, and claiming that it must therefore be adaptive means completely abandoning the criterion of adaptation as *useful* for anybody, and thinking instead in terms of the survival and frequency of the trait itself. In fact, of course, when explaining social inequality and slavery, we look for the factors that produce them, not for some imaginary adaptive value that these institutions may be thought to possess.

Another major difference between organism and society is that, whereas physical organisms have extremely stringent requirements for the maintenance of life – think, for example, of the need for the accurate maintenance of blood sugar levels or temperature – the parameters of social survival are far laxer, and societies can sustain extraordinary levels of internal conflict and inefficiency without disappearing. Even if this is not the case, it is possible for primitive societies in particular to be organized in ways that have little to do with functional efficiency.

> The symbolic and religious significance of so many tribal institutions means that while they may be elaborate this may have little to do with any practical purpose…[as understood in modern industrial society]. The symbolic ordering of the Umeda hamlet, the age-grading system of the Konso, and the elaborate dances of the Tauade make sense as part of a cultural system of meaning, but they are also, in a sense, 'knobs that turn nothing', unrelated to the efficiency of their society. Each is what one anthropologist has called 'a dramatised philosophy, or a way of acting out a folk faith, rather than an instrumental organisation'…Once we realise that, within certain limits, a wide variety of customs and institutions will all be viable in primitive societies, it becomes clear that this search for adaptive explanations for them is the pursuit of a non-problem. Anthropologists who have spent so much time trying to give functional or adaptive explanations for tribal institutions, to show that each is beautifully adapted to the special needs of a particular society, have therefore been the victims of an illusion: that because societies like ours have many institutions that are genuinely functional, therefore this same degree of 'functionality' occurs in all societies, and that if only we were clever enough we should be able to detect it in primitive societies too. (Hallpike 2008:91-2)

In these societies there is, then, a rather low level of competition, but here we must remember the crucial fact that, as Darwin himself repeatedly emphasised, it is the assumption of relentless competition that gives even slight adaptive advantages the chance of being selected. If, however, conditions are undemanding then it will be possible for a trait to survive that has no positive value, and if there are a number of variant forms, and all are equally viable, then again selection cannot explain their survival and we must look to the factors that produced them. If this is so, then widespread customs or institutions, such as belief in magic and evil spirits, or the vendetta, may not necessarily have proved themselves in the rigorous struggle for survival – it may be that there are simply frequently recurring features of human nature and society that produce them. In fact, competition in a wide range of human activity and thought has not been a constant, but has dramatically increased throughout history: the development of conquest warfare, markets, debate and logic, dogmatic religion, rational administration of the state, capitalism, and scientific experiment are all examples of how the level of competition has increased as societies have become more complex.

> Functional efficiency of organization only becomes of major significance with political centralization and the emergence of the state. Once it becomes necessary to maintain a central government, to allocate official tasks, to prevent rebellion, to raise and distribute the necessary revenues, to organize truly effective military forces, to organize large-scale public works such as irrigation, and so on, we are in a very different world from that of tribal society, and one that we can genuinely call 'functionally organized'. (Hallpike 2008:92)

4. *Human culture as problem-solving and niche-filling.*

The final weakness of adaptive explanations that I would like to stress is that they encourage us to think of the environment as what does the determining, and human

beings as conforming to the environment's demands. I shall argue, however, that this is a radically distorted way of thinking about our relations with the physical world, and that we should instead think of human history as one in which we actively interpreted the environment's potential, and put it to our own creative uses.

No one denies that human groups have to adapt to their physical environments, in the sense that they can't survive in arctic conditions without some sort of clothing, or can only domesticate certain species of animals, or must cross a large expanse of water on some type of boat or raft. But this notion of adaptation does not take us far beyond the obvious – of having to conform to the limitations of nature, and the first problem with such a line of argument is that if the technology is simple, there may be many different ways of organizing production, all of which will work:

> In primitive society the material conditions of life are certainly restrictive – there is only a subsistence level of food production, a limited variety of building materials, a small workforce, and a simple technology, but for these very reasons there are many different ways of organising social life, all of which will work. As long as we satisfy our basic material needs, nature is indifferent to how we do this, and how we spend our spare time. For example, a group of men with stone tools can be organized to cut down trees and make planks out of them by clan, or by age-group, or by rank, or by where they live, or by who their friends are. The belief that in each primitive society there is a single optimum solution to every 'problem' of survival, that will inevitably be discovered by natural selection, is therefore a complete fallacy. What we find instead is that as social organization becomes more complex, the range of options becomes increasingly limited: there is only one way of organizing the workforce of a large modern saw-mill, for example, because this must operate at a profit to pay for the expensive plant, and therefore needs a high division of labour, good transport links, and so on. (Hallpike 2008:10-11)

The second fundamental objection is that the physical environment 'is not a stable, unchanging reality "out there", but is itself dependent on the way in which men understand it…' (Hallpike 1979:482). In Neolithic Europe,

> …the stone circles of the megalith builders involved and led to the development of a high degree of geometrical and astronomical knowledge, but the need for those stone circles was not a product of objective necessity, in the sense that they were a sine qua non of survival. Thus not only is the nature of the interactive environment itself dependent on the skill and understanding of men, but the very problems whose solution is considered essential are themselves decided by what are, in a particular culture, defined as needs. (ibid., 483)

The inherent bias in the selectionist model is to treat organisms as facing an environment filled with objective 'problems', locks to which the right adaptive keys are selected from a series of random trials and errors. So for man, the use of fire for cooking food, the adoption of agriculture and the domestication of animals, the discovery of metals, and so on, were like a set of fixed obstacles in some assault course, which were successfully overcome. Or, to change the metaphor, the

environment is seen as composed of empty ecological 'niches' waiting to be filled by organisms which become ever more exquisitely adapted to fit them by variation and selection. No one, of course, would deny that there are different sorts of environments – arctic tundra, tropical rain forests, underground caves with streams flowing through them, and so on – which offer different opportunities and constraints. But the concept of the ecological niche postulates a much more precise, adaptive fit between organism and environment than this.

The basic absurdity of thinking of an ecological niche as something objective 'out there' waiting to be filled, was brought home to me when on a family holiday in Algonquin Park in Ontario, where we had the opportunity of observing the dams and lodges constructed by the local beavers, and the very complex activities that make up the beaver way of life. But, apart from the obvious features of the natural environment, the trees and the streams, and so on, it was clear that there was no such thing as a pre-existing 'beaver niche' which the beavers had been clever enough to come along and fill. The 'beaver niche' was nothing else than what the beavers actually did, and was simply defined by that. As Lewontin has pointed out,

> To maintain that organisms adapt to the environment is to maintain that…ecological niches exist in the absence of organisms and that evolution consists in filling these empty and pre-existent niches. But the external world can be divided up in a non-countable infinity of ways so that there is a non-countable infinity of conceivable ecological niches. Unless there is a preferred and correct way in which to partition the world, the idea of an ecological niche without an organism filling it loses all meaning. The alternative is that ecological niches are defined only by the organisms living in them. . .(Lewontin 1984:237-8)

Similarly, primitive societies are also often conceived as having adapted to their ecological niche, and the explanatory technique is to consider a single society and show that its organization is consistent in various ways with the physical environment.

> All that such case studies can establish, however, is that in the societies concerned the people can in practice organize themselves to perform such subsistence activities as they actually perform. But what else would one expect to find? Necessary subsistence tasks that were left undone because the people could not organize themselves to carry them out? In which case, obviously, the people would all be dead, or the tasks would not be necessary at all. Or, might one expect to find people organized into groups for performing subsistence tasks that were never accomplished? Markets where nothing is sold, or fishermen who never use their nets, perhaps? Single case analyses of this type…are evidently pointless because they tell us nothing of *the alternative types of social organization that would be equally capable of performing the necessary subsistence tasks, and they also take it for granted that no alternative modes of subsistence are possible either.* (Hallpike 1986:147)

For example, the Tauade live in small, impermanent hamlets and practise the shifting cultivation of sweet potatoes, which necessitates making new gardens every three years or so, and also keep pigs, which are unfenced, and are prevented from running off into the forest by the women feeding them every evening with sweet potatoes. The purpose of the pigs is to be ceremonially slaughtered at periodic dances, and so bring prestige to the host groups. The gardens therefore have to be fenced to keep the pigs out, and this requires a great deal of wood, cut and brought from the forest, and erected with great labour. Even so, pigs often break into gardens and cause considerable damage to the crops, thereby causing major friction and sometimes violence between the owners of the crops and the pigs. The other important source of food is the pandanus nut, of which they grow many, and normally smoke to preserve them as ceremonial gifts, and which in the past also served as a food reserve. Traditionally, elaborate ceremonial feasts and dances were held, at which most of the pigs were slaughtered, and large and very elaborate dance villages constructed, which were then abandoned to rot when the ceremonies were over and the guests had departed. These ceremonies clearly had no adaptive value physically speaking, and in social terms were major sources of conflict both within and between tribes.

But this was not the only way they could have arranged their mode of life:

> In exactly the same environment it would be possible to fence the pigs, and so prevent their ravages of the gardens, to use their dung in combination with human faeces and vegetable compost as manure to allow more permanent gardens, to consume pigs in smaller numbers more frequently, and to preserve their meat by smoking to ensure a more regular and efficient use of protein, and to live in large settlements. This mode of livelihood would require harder work, less leisure, more planning, and a different attitude to large feasts, but to describe it as more or less adaptive than their present agricultural system would be mistaken; it would simply be differently adaptive. (Hallpike 1977:278-9)

This demonstrates very clearly that there is no such thing as a Tauade ecological niche. When the sweet-potato was introduced into Papua New Guinea two to three centuries ago, it spread because it could be grown at higher altitude than the indigenous yams and taro. But the increased production this made possible was used by the Tauade and many other peoples as the basis for a system of competitive feasting and pork exchange which was simply one of a number of possible options. There was no niche here, but a creative response to new opportunities, and to call this an adaptation adds nothing to our understanding of what was going on. In the same way, the Industrial Revolution was not an ecological niche either, but a prolonged exploration of new technology.

To think in terms of 'problem solving' and 'niche filling' is therefore a thoroughly unrealistic view of the relations between man and environment. None of the major innovations such as fire for cooking, agriculture, or the discovery of metals can be presented as problems or needs that were forced on early man by his environment. All the other primates, for example, survived perfectly well without cooking their food, or using stone tools, still less metal ones, or domesticating animals. It is therefore quite misleading to talk about needs or problems here, and we should instead be thinking in terms of human *discoveries about the new uses of things*.

Doing what one has always done, in a primitive technology, has to be the norm, because one knows that it works, and it is an effort to change. Technology, especially in primitive and village society, therefore tends to be very stable and conservative, and we can be sure that it satisfies the basic needs of the people, because if it did not they would be dead. I refer to this as 'the adaptive rut', and so the escape from it may well involve discoveries that come from some other area of life, such as ritual or play, love of pretty things, or from the multiple properties of something with which the people were already familiar. In other words, inventions or 'solutions' tend to come first, and people then discover the problems or uses to which they can be put.

In modern society, for example, the laser has solved innumerable 'problems' of practical daily life, from those of warfare to the check-out counters of supermarkets, but Arthur Shawlow, one of its co-inventors, said of it that 'We thought it might have some communications and scientific uses, but we had no application in mind. If we had, it might have hampered us and not worked out as well'.

Again, let us take the discovery of the use of metals.

> The gold, copper, and iron our ancestors would have found in their pure or 'native' state would have been useless for practical purposes, being softer and blunter than flint, and also required the development of a whole new technology. So why did our Neolithic ancestors bother with metals at all?…[I]t is only because gold and copper are beautiful and rare that people initially treasured them, and were sufficiently motivated to explore their properties further. In the words of R.J.Forbes, 'Metal made its first impression as a fascinating luxury, from which evolved a need.' (1971:10) It was man's aesthetic sense, his love of self-decoration, and his desire to own rare and precious objects that was responsible for the early development of metallurgy and…of glass as well, long before their practical possibilities became obvious. (Hallpike 2008:195)

Since technology, therefore, especially in pre-modern society, had a very powerful tendency towards conservatism – the history of the hand axe in the Palaeolithic is an excellent illustration of this – it was often the stimulus of *non-practical motives,* such as aesthetics, intellectual curiosity, magic and religion, pride and status, or

entertainment, that got people out of the adaptive rut by encouraging them to focus their attention on physical objects, and play around with them in ways that they would never have thought of in the ordinary work of daily life, or in relation to material needs. In the ancient literate civilisations, too, royal patronage supported the production of curiosities for the court and a wealthy clientele, gadgetry for temples and theatres, and astronomical observatories. These were all very important parts of those environments that foster creativity, and lay outside the ordinary technology of their society.

In the case of gunpowder, for example, the crucial ingredient, saltpetre, was not included in the various ingredients that military engineers in the ancient world used as incendiary mixtures in warfare. Gunpowder originated in China because there the Taoist alchemists were interested in finding how to convert metals into the chemical form that would allow them to be drunk as elixirs, believed to confer immortality. Saltpetre, potassium nitrate, has the property that, when combined with many metals, it converts them into salts that are soluble in water. The alchemists tested salts to see which of them was really saltpetre by heating them with charcoal, because saltpetre burns with a distinctive purple flame. The alchemists were always heating different mixtures, and they discovered that a mixture of saltpetre, charcoal, and sulphur was highly inflammable. They had links with the military engineers, who found that when this mixture had a high proportion of saltpetre and was closely confined in a tube, it would actually explode, but they would not have discovered the properties of saltpetre for themselves, within the limits of their own technology.

Secondly, as the case of saltpetre illustrates, things have multiple properties, and some of these will often be more obvious or attractive than others, and so will provide a relatively easy way for people to get to know more about a particular thing. But once it is in their cultural repertoire, these other properties can also become available over time in the right circumstances. Fire, for example, presumably attracted early man as a means of keeping warm at night and of cooking food, but it has far more evolutionary potential than that. It converts clay into pottery; it allows metals to be softened for working, ores to be smelted and alloys to be produced, and the making and blowing of glass; it is the basis of a vast range of chemical processes and reactions including distillation and gunpowder, and it causes water to expand to about two thousand times its volume as steam, and so is the means of converting heat into mechanical work.

So the Darwinian emphasis on adaptation as the product of selection is often profoundly misleading when applied to human social evolution, because explanations based on the idea of *construction* are far more fruitful:

> Darwinism thinks of the environment as weeding out failure, and selecting the fittest, but I think of the environment in a quite different way: as a set of constraints and opportunities for active individuals that make some changes easier than others, in a process of *construction*. Just because some social institution, or invention, or idea has ceased to exist, it does not therefore mean that it was a failure in the struggle for survival, because we must also look at what it made possible while it was around. Instead of wasting time trying to find adaptive explanations for particular customs and beliefs, we need to ask about their origins, about what conditions made it easy for people to do or to think X, and then, what X can lead to, either by itself, or combined with other cultural traits – in other words, what is X's evolutionary potential. (Hallpike 2008:16-17)

For example, the discovery of fire for cooking not only had immediate consequences for diet and social organization, but also laid the foundations for agriculture, because the plants that were most suitable for cultivation by the first farmers – cereals, tubers, and pulses such as peas and beans – were also those that were also essentially inedible unless they were first cooked. In its turn, the adoption of agriculture also made possible the discovery of metals, because this required the prior conditions of fixed settlements, and the sophisticated mastery of fire for baking bread and firing pottery, that went well beyond its uses in simple cooking.

There is, then, simply no need for adaptive explanations in the social sciences. When some institution or piece of technology has been designed for a purpose, its adaptive value or lack of it will be self-evident, and needs no appeal to Darwinian theory. When, on the other hand, we are considering the unintended consequences of our decisions that turn out to be beneficial in some ways, there is no reason to think that the concept of adaptation will tell us why this should have been so. The only way to understand why such benefits occur is to examine their causes, the combination of social, cultural, environmental and other factors responsible. While everything we do must necessarily conform to the laws of nature, we must avoid the trap of thinking of human relations with the environment as merely a passive set of *responses*, rather than an active, creative, and constructive use of nature's opportunities.

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