

THE FREEDOM OF THE GENE

HOW GENETICS CHALLENGES SOCIALIZATION THEORY

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Modern social science has tended to portray biology as deterministic, and itself as committed to freedom. This is paradoxical, because sociology has emphasized social conditioning in much the same way that academic psychology used to believe in behaviourist conditioning. Just as Pavlov's dogs were individually conditioned to salivate at the sound of a bell, so sociologists have tended to teach that human beings are socially conditioned. One of the founders of modern sociology, Émile Durkheim (1857-1917), claimed that all 'social facts' had social causes irreducible to other factors. He even believed that suicide was a social fact and that social causes had a coercive effect on individual behaviour. Like the behaviourist psychologist who regarded the organism as a clean slate on which anything could be written by the appropriate conditioning, Durkheim saw the individual mind as an empty field until filled and given form by a 'collective consciousness'. This came about through a process that today would be called *socialization* — the moulding of the individual by Society. The most extreme expression of this was 'altruistic' suicide, where individuals counted their own lives as nothing compared to that of the group on whose behalf they sacrificed themselves.

But altruism — even altruistic suicide — is not limited to human behaviour. The current revolution sweeping through behavioural science and associated with the rediscovery of authentic Darwinism began with research into this very issue.

THE FALLACY OF GROUP SELECTION

In evolutionary biology discussions of altruism can be put on a firm scientific basis by defining it as a technical term, rather in the same way that terms like 'mass' and 'force' are given precise, technical definitions in physics. For these purposes 'altruism' is defined as *any act by one individual that promotes the reproductive success of another at a cost to the altruist's reproductive success*. The problem is that if altruism is defined in such objective terms it seemingly cannot evolve because, by the definition, it promotes the

reproductive success of the recipient at a cost to the reproductive success of the altruist.

Suppose that we had a population of selfish organisms among whom an altruist as defined above appeared by mutation. By definition, that altruistic mutant would have to promote the reproductive success of the other, selfish members of the population at a cost to its own reproductive success. Since natural selection ultimately selects for reproductive success, it must select against such altruists to the point that they soon become extinct. Altruism, it seems, cannot evolve by natural selection if we conceive of that process in terms of individual organisms' reproductive success and if we define altruism in terms of sacrifices to individuals' reproductive success. The logic seems inescapable.

Nevertheless, altruism as we have just defined it is surprisingly common in the natural world. Social insects such as bees, wasps and ants, for example, show it to an extreme extent. The vast majority of individuals in such societies have no reproductive success at all, but rather labour altruistically for the queens and drones, who are the only ones who do have offspring. If natural selection is ultimately a question of individual reproductive success as we now know it to be, how could it have produced entire castes of insect workers, soldiers and nurses who have absolutely no personal reproductive success whatsoever?

After some reflection, we might consider a slightly different situation that at first sight appears to get round the problem. Suppose that there is a population of altruists among whom no selfish organism exists. By definition, all will benefit each other, and altruism, once established by the group, will continue to flourish. From this we might conclude that altruism can indeed evolve by natural selection, *but only if it acts, not on individuals as such, but on an entire group* — in other words, by 'group-selection'.

Anyone familiar with evolutionary writing a generation or two ago would have noticed that, far from being just a thought-experiment, group-selection was in fact the most common solution to the problem of altruism. Up to the 1960s it was widely believed that even if selection might act on individuals it could also act on entire groups by way of benefitting all who made sacrifices for the good of all. It seemed obvious that the only way to explain the selfless sacrifice of insect workers was to conclude that natural selection regarded bee hives or ant colonies as 'super-organisms', to quote Herbert Spencer's term, and acted on them just as it appeared to do on individual organisms. After all, the individual organisms on which natural selection evidently did act could themselves be seen as vast societies of individual cells, most of whom did not reproduce themselves (in the sense of giving rise to other organisms) any more than insect soldiers or workers did. Like sterile castes of social insects, most cells in a sexually-reproducing, multi-cellular organism fail to reproduce the organism itself and instead leave it to the sex cells to do so, just as female workers in insect societies let drones and queens reproduce the colony. Entire societies, it



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seemed, could be the object of natural selection, and selection at that level would inevitably select for the self-sacrifice that made such 'super-organisms' possible.

But let's now imagine that a selfish individual appears by mutation in our group-selected super-organism. By definition, the altruistic majority must favour the reproductive success of the selfish mutant. This is because we agreed to define altruism as a contribution to the reproductive success of another at a cost to the altruist, and this must hold good even if the beneficiary is totally selfish. The similarly selfish offspring of the original selfish mutant will also be favoured by the altruists around them. The inevitable outcome will be that in each generation there will be more selfish individuals, until finally the altruists are driven to extinction. Once again, we seem to be able to conclude with total certainty that altruism as we have defined it cannot evolve by natural selection because, by definition, *the altruists will always promote the reproductive success of selfish organisms to the point of the altruists' total extinction.*

In other words, the group-selectionist solution to the problem of altruism is perennially vulnerable to what has become known as the 'free-rider' problem. This is the realization that if individuals pay a price in terms of their reproductive success to benefit the group or species, such a benefit will, by definition, reward others' reproductive success. Yet individuals who attempt to get the benefit without paying the cost will always be selected because their reproductive success will be favoured by the altruists defined as those who do pay. Gradually, natural selection would eliminate the paying population because of the cost to their own reproductive success and the benefit to that of the non-paying, free-riders.

This is an important principle, and one that is often overlooked, even by social scientists. An incident that illustrates the point took place a few years ago. An academic department decided to entertain a retiring professor at a restaurant. The head of the department insisted on having one bill, with everyone paying equal shares. But in the event he found that, after seemingly having collected everyone's contribution, he was one short. Yet everyone claimed to have paid. Having unwisely taken cash, there was no way that the individual contributions could be checked, and so someone had a free lunch — ultimately at everyone else's expense. This incident illustrates what we all know from common experience of life: that in reality individuals often put the cost to themselves before the benefit to others even when, as in this case, the others were colleagues in a profession largely defined by its belief in Durkheimian holism.

THE ALTRUISM OF THE SELFISH GENE

Nevertheless, in the early 1960s W. D. Hamilton showed that exquisite altruism could be explained by selection at the level of the individual gene (Hamilton 1964). Hamilton had been a graduate student in the sociology department at LSE for a while, and although he is often thought to have made the discovery by studying social insects, in fact it was puzzlement about human altruism that first led him to the topic. (Perhaps he too attended departmental dinners!) To see how Hamilton did it, consider the following example:

Suppose that I have a gene — or many genes, it doesn't matter — that encourages me to sacrifice my life to save the lives of at least three of my children (a gene for altruistic suicide, in other words). To understand how such suicidal altruism can evolve in human beings we need first to take account of a genetic factor. This is that everyone has two complete sets of genes in the cells of their bodies. However, we only pass on one set in our sex cells, sperm or eggs. A fertilized egg has a double set of genes restored — one from each parent (see figure 1, top). Now comes the interesting bit where altruism is concerned. If I do indeed have genes that encourage me to sacrifice my life for three of my children's lives, we can see that one hundred per cent of such genes is destroyed in my act of altruism. However — and this is the surprise — one hundred and fifty per cent of the genes for such a sacrifice is preserved. This is because each of my children receives half my genes. So the chances are that each carries fifty per cent of my gene or genes for self-sacrifice. Three times fifty per cent is one hundred and fifty per cent, which means that such genes enjoy greater reproductive success because of my self-sacrifice than they would enjoy had I not performed my act of suicidal altruism (see figure 1, bottom). Exactly the same is true if it is siblings I save because they too share half my genes. Furthermore, since all my other genes are in the same situation as my genes for altruism, they too benefit in exactly the same way: their reproductive success is enhanced by my sacrifice, provided I save enough copies of them. What Durkheim would have interpreted as altruistic suicide brought about by social causes could be explained by natural selection at the level of the individual gene!

Indeed, this principle also applies to multi-cellular organisms, like individual human beings. Our various cells cooperate with one another in the larger body because they are all identically related and genes favouring cooperation in one cell benefit identical copies of them in others. In short, Hamilton's discovery that altruism could evolve at the level of the individual gene was an absolutely fundamental one, applicable not merely to closely related communities of individual organisms, but to multi-cellular organisms in general. Essentially his insight was that altruism rigorously defined could and would evolve by natural selection on the basis BrC (where B is the benefit to the reproductive success of the gene in the recipient of the altruistic act, C is the cost to the reproductive success of the gene for altruism in the altruist and r is the coefficient of genetic relatedness). What had appeared to be a 'super-organism' or Society now was seen as a set of individuals serving the interests of shared genes for cooperation.

But the most surprising thing of all to emerge from this is the finding that, to understand social cooperation of the most elaborate kind, we need to see selection acting at the most basic level — that of the single gene. The so-called 'selfish gene' view of natural selection acting solely on individual genes was the inevitable outcome of Hamilton's discovery of the way in which genetics could favour the evolution of altruism. The consequence is that the most natural way of understanding altruism is from the point of view of single genes, and to see the gene sacrificing the organism to the benefit of the reproductive success of identical copies of itself in near relatives (figure 1). Looked at from this point of view, altruism is no more of a paradox than is the death of a living organism. Organisms may die, but reproduction ensures that genes are potentially immortal.

This leads to a view of organisms as little more than the biodegradable packaging or vehicles of their genes, at least as far as natural selection is concerned. From this, ultimate point of view,

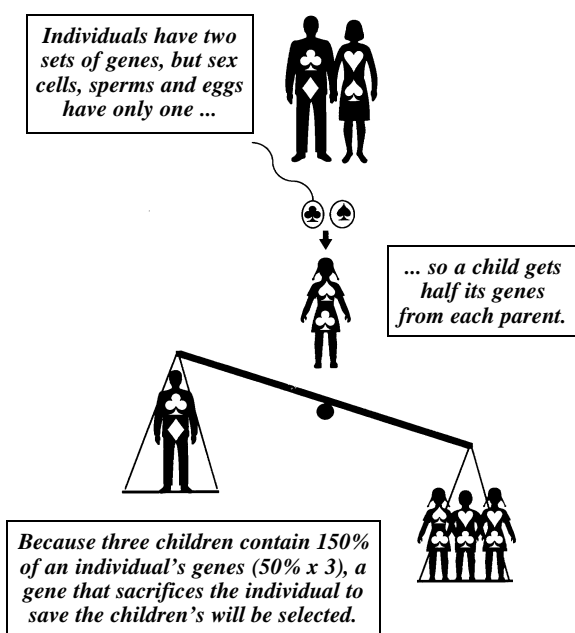


Figure 1: How genetics favours altruism.

sacrifice of individuals for the benefit of their genes is not so much a problem for evolutionary explanation as an insight into its most fundamental mechanism: natural selection at the level of the gene (Dawkins 1976).

INTENSE AND FUNDAMENTAL CONFLICTS

In retrospect, group-selection in evolutionary biology can now be seen as an ideology that justified and excused the self-interest of certain individual agents at the expense of others. 'Our destruction of group-selection thinking,' observed Robert Trivers, 'has removed the chief prop from the comfortable belief that the dominant interests naturally rule in everybody's self-interest. And we uncovered a series of submerged actors in the social world, for example, females and offspring, whose separate self-interest ... we emphasize.' Studies of infanticide in langur monkeys, for example, showed that explanations in terms of its benefit to group or species in preventing 'overpopulation' were hardly credible, but that it could easily be shown to benefit the reproductive success of the dominant males who carried it out. As Trivers points out, 'in group- or species-advantage thinking, one individual's self-interest is typically elevated to that of the entire group. In this example, the adult male's self-interest has been elevated to that of the species. It is even given a new name; what he is concerned with is population regulation, something that is beneficial to all. The individual with the power to get away with murder becomes the benefactor, a patron of the weak and foolish. Elevating the self-interest of the powerful to that of the species tends to make the behaviour of the powerful appear justified. This must be one of the reasons for the popularity of species-advantage reasoning.' (Trivers 1981: 39, 6-7)

A striking example of the conflicts that emerge once you are prepared to take costs and benefits of social behaviour to all individuals irrespective of their status is the human fetus. Far from constituting a harmonious unit with its mother merely because it is physically inside her body and dependent on her for its own existence, we now know that fundamental conflicts occur between mother and offspring over the question of blood-supply. Cells from the fetus have recently been discovered to invade the mother's arteries close to the placenta, but not the veins. There they break down the arterial walls so that the blood vessels widen, allowing more blood to enter the placenta to the benefit of the fetus, which also releases toxins into the maternal blood supply to increase blood pressure, also to the fetus's, rather than the mother's benefit. The mother for her part fights back by similar biochemical means that aim to reduce the effects of such fetal intrusions, explaining why if either side fails serious illness usually results, either for fetus or mother or both.

If the mother-fetus unit is now seen as a site of intense parent-offspring conflict over resources with differential value to both parties, the sociological unit of the family is hardly likely to be different. In both sociology and pseudo-Freudian psychotherapy the family is seen as a unity, with family members ideally 'adapted' to it and to one another (I say 'pseudo-Freudian here because this was not Freud's own view). For example, oral behaviour (sucking independent of hunger) has been understood in terms of 'attachment'.

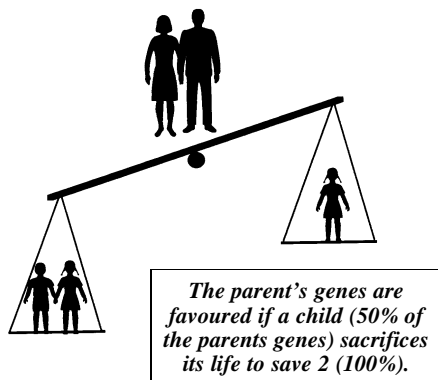


Figure 2: How parents see self-sacrifice by siblings.

However, persistent stimulation of the mother's nipples by the baby inhibits her sexual cycles. Nevertheless, a nursing mother's sensitivity to nipple-stimulation begins to decline after approximately two years. Given that it may take a few months for her sexual cycles to become re-established and for her to conceive, succeeded by nine month's pregnancy, it follows that the contraceptive effect of oral behaviour on women will tend to result in births being spaced approximately four years apart — a prediction confirmed by studies of birth-spacing among the !Kung hunter-gatherers, for example.

Recent research has shown that in primal hunter-gatherer or Third World conditions the birth of child within the first four to five years of the life of an existing child is the greatest single threat to the older child's life. Indeed, in West Africa a term has been coined to describe 'the disease of the displaced one' — gross protein deficiency in a child peremptorily weaned because of the birth of a sibling (Thapa, Short et al. 1988). The basic parameters of human behaviour can be taken to have been set during the 1-2 million years that our genus spent as primal hunter-gatherers. Given that the birth of a sibling within the first four years of an existing child's life is such a critical factor for the existing child's survival in primal conditions, we can see that oral behaviour makes a great deal of sense when seen against this background. A gene whose effect was to make a baby suck for the sake of it for at least two to three years after birth could certainly pay for itself in the only currency that evolution accepts — reproductive success. Far from being concerned with harmonious 'attachment' to the mother, oral behaviour now begins to look like a paradigmatic case of evolved parent-offspring conflict over the mother's fertility (Badcock 1990).

In this example the child, and not just the mother, is an active protagonist, just as the fetus was in the previous example. Much of the force of the idea of social causes relies on the doctrine of socialization understood as the moulding of the child by the social environment. In the view of socialization theories, the child is seen as the largely passive victim of others, such as the family, class, or Society as a whole. But as we can now see this is not the way the child — or even the fetus — is seen by modern evolutionary biology. On the contrary, Robert Trivers pointed out that parent-offspring conflict is inevitable at the level of the most basic agency of all — the gene.

EVOLUTIONARY BIOLOGY DISCREDITS ALL PRIVILEGED FRAMES OF REFERENCE

To understand how this comes about, consider a simple, illustrative case: Let's suppose that parents have a number of offspring. Suppose that we look at the same situation we considered before with regard to the evolution of suicidal self-sacrifice in the offspring from the parents' point of view. Since the parents each have half their genes invested in all their offspring, they would favour the sacrifice of any one as long as it saved at least two others. This is because, although half of each parent's genes might be lost in the self-sacrificing saviour, two sets of half of each parent's genes would be saved in the two siblings. Overall this is a net gain compared to losing the two and saving the one (see figure 2).

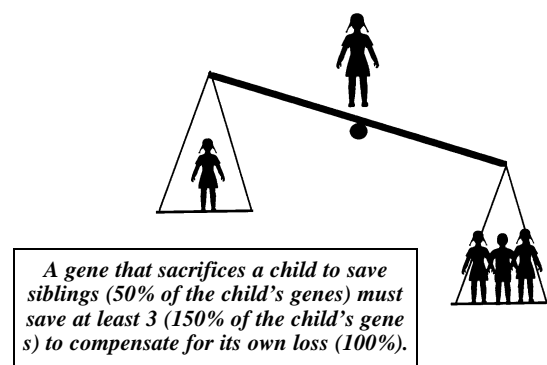


Figure 3: How a child sees self-sacrifice to save siblings.

However, any offspring takes a different view. For it, the situation is the same as it would be if each parent were rating the value of their own survival against that of their offspring. Since a sibling shares only half its genes with any other full sibling, such a child will only be selected to sacrifice its life if it can save at least three siblings. This is because one hundred percent of the gene or genes for altruism are sacrificed in it, but one hundred and fifty percent are saved in the siblings, making a net gain in reproductive success for the gene or genes for altruism overall (see figure 3).

In general, parents will favour self-sacrifice of any kind by their offspring wherever the net benefit exceeds the cost, ($B > C$), but offspring will only favour self-sacrifice where benefit is more than twice the cost ($B > 2C$). In other words, parents will be selected to want at least twice as much altruism (or half as much selfishness, which comes to the same thing) as offspring themselves will be selected to want. Conflict between parents and their offspring is fundamental, unavoidable and rooted in evolution.

If we now stand back from the detail of the theory of parent-offspring conflict and look at the general effect, we immediately notice that this is something familiar. As human beings, we are habituated to finding that parents demand better behaviour — or less bad behaviour, which comes to the same thing — from their offspring than their offspring often wish. We take it as an obvious fact of life that parents will need to discipline and socialize children and that children will not always be as cooperative about this as they might be. What is surprising about this is that such a conclusion should have been reached purely by means of our basic, biological argument about altruism.

This has some very important consequences, because it suggests that we may have been mistaken when in the past we followed authorities like Durkheim and assumed that parent-offspring conflict in the human case was purely a question of a conflict between the biological self-interest of the child on the one hand, and the cultural responsibilities of the parent on the other. On the contrary, we now realize that such conflicts can be seen arising from the biological self-interest of both parties and that, to quote Robert Trivers, 'one is not permitted to assume that parents who attempt to impart such virtues as responsibility, decency, honesty, trustworthiness, generosity, and self-denial are merely providing the offspring with useful information on the appropriate behavior in the local culture; for all such virtues are likely to affect the amount of altruistic and egoistic behavior impinging on the parent's kin, and the parent and offspring are expected to view such behavior differently.' (Trivers 1981: 32)

What might have seemed an epitome of nature/nurture conflict now turns out to be a nature/nature one, at least if the basic theorems of parent-offspring conflict at the level of the gene are taken seriously. The classic case of traditional nature/nurture controversy — socialization — now begins to look distinctly like a half truth, with a more profound insight being that there are natural factors on both sides and that neither parent nor offspring can claim to be privileged, at least in representing nature. And as far as nurture is concerned, the parent's use of it in attempting to mould the child is much more likely to serve the parent's self-interest than it is the child's. Indeed, socialization theories which endorse and emphasize the role of the parent or other socializing agent are bound to appeal to adults who play such roles. The fact that most social scientists are probably parents themselves, are certainly of parental age, and are often employed as teachers and professors may well explain much of the popularity of socialization ideology with them. For professional educators, it literally pays to believe it, for how else could they justify their claims to influence the young!

In general, the methodological conclusion to be drawn from our new understanding of the evolution of altruism at the level of the gene is to relativize all agents in evolutionary biology, discrediting privileged frames of reference in terms of what is 'good for Society, the group or species' and substituting one that sees all behaviour in terms of its contribution to the reproductive success of the individual genes coding for it. Neither parents nor offspring, males nor females, group-members nor free-riders, have a privileged frame of reference as far as social analysis is concerned. No holis-

tic entities such as 'family', 'kin group', or 'Society' itself can be invoked as if they were unitary agencies, uncompromised by internal conflict or clashes of self-interest between their component parts. To quote Robert Trivers again, the use of such agencies in explaining behaviour now appears more likely to 'distract attention from the self-interest of the subordinate actors. No one analyzes how selection acts on them. Thus counter-strategies are overlooked, and resistance tends to be minimized. Conflict is overlooked or explained away as serving some larger function. Those who took up the cry against sociobiology because it appeared to slight the interests of the oppressed failed to appreciate that the foundations of sociobiology have precisely the opposite effect: they call attention to the self-interest of the subordinate actors.' (Trivers 1981: 7)

IT IS SOCIALIZATION THEORY THAT ENSLAVES

In my experience, social scientists often show an almost phobic attitude to any mention of evolution or genes. Many of them seem to regard evolution in general and the gene in particular as something that turns people into robots controlled by rigid programs of biological determinism that leave no room for freedom as such. In this paper I have not been able to discuss the issue of how individual genes can influence human behaviour. What I have tried to do is to show that, contrary to received wisdom among sociologists, appeal to the gene rather than to groups or Society does not have the effect of robbing individuals of their freedom.

On the contrary, my quotation above from Robert Trivers shows that if anything it has been sociologists with their holistic agencies that tend to enslave individuals, making them into puppets whose strings are pulled by Society. It is socialization theory that has tended to dehumanize children, reducing them to the status of passive victims of social circumstances, without freedom, dignity or identity independent of Society. It is belief in social conditioning over-riding individual freedom and self-interest that allows some sociologists to disenfranchise entire classes of voters by claiming that they suffer from false 'class-consciousness' and so vote for the wrong party. And it sometimes seems as if excessive emphasis on the social background of some offenders implies that certain sociologists are even ready to shift the moral responsibility for crime from the individual who commits it to Society as a whole. But who would seriously argue that those whose crime was to aid or shelter Jews in Nazi Germany were simply victims of society, without freedom or responsibility for their often heroic actions?

Like group-selection in evolution, sociological collectivism has had the effect of robbing individuals of the freedom to act and to choose which is rightly theirs. In the study of animal behaviour, the so-called 'selfish gene' model discredited the belief that groups had collective interests coincident with those of some of their members but not with those of others. Gene-selection also relativized frames of reference and restored to every individual the freedom, dignity and responsibility for their own actions. It is to be hoped that the revolution in part begun by W. D. Hamilton will eventually spread to the social sciences and restore to individual human beings the freedom to act, choose and take responsibility for themselves that other organisms now enjoy in modern Darwinism.

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