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The Law of the Jungle: Moral Alternatives and Principles of Evolution

J. L. MACKIE

When people speak of 'the law of the jungle', they usually mean unrestrained and ruthless competition, with everyone out solely for his own advantage. But the phrase was coined by Rudyard Kipling, in *The Second Jungle Book*, and he meant something very different. His law of the jungle is a law that wolves in a pack are supposed to obey. His poem says that 'the strength of the Pack is the Wolf, and the strength of the Wolf is the Pack', and it states the basic principles of social co-operation. Its provisions are a judicious mixture of individualism and collectivism, prescribing graduated and qualified rights for fathers of families, mothers with cubs, and young wolves, which constitute an elementary system of welfare services. Of course, Kipling meant his poem to give moral instruction to human children, but he probably thought it was at least roughly correct as a description of the social behaviour of wolves and other wild animals. Was he right, or is the natural world the scene of unrestrained competition, of an individualistic struggle for existence?

Views not unlike those of Kipling have been presented by some recent writers on ethology, notably Robert Ardrey and Konrad Lorenz. These writers connect their accounts with a view about the process of evolution that has brought this behaviour, as well as the animals themselves, into existence. They hold that the important thing in evolution is the good of the species, or the group, rather than the good of the individual. Natural selection favours those groups and species whose members tend, no doubt through some instinctive programming, to co-operate for a common good; this would, of course, explain why wolves, for example, behave co-operatively and generously towards members of their own pack, if indeed they do.

However, this recently popular view has been keenly attacked by Richard Dawkins in his admirable and fascinating book, *The Selfish Gene*.¹ He defends an up-to-date version of the orthodox Darwinian theory of evolution, with special reference to 'the biology of selfishness and altruism'. One of his main theses is that there is no such thing as group selection, and that Lorenz and others who have used this as an explanation are simply

¹ R. Dawkins, *The Selfish Gene* (Oxford, 1976).

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wrong. This is a question of some interest to moral philosophers, particularly those who have been inclined to see human morality itself as the product of some kind of natural evolution.²

It is well, however, to be clear about the issue. It is not whether animals ever behave for the good of the group in the sense that this is their conscious subjective goal, that they *aim* at the well-being or survival of the whole tribe or pack: the question of motives in this conscious sense does not arise. Nor is the issue whether animals ever behave in ways which do in fact promote the well-being of the group to which they belong, or which help the species of which they are members to survive: of course they do. The controversial issue is different from both of these: it is whether the good of the group or the species would ever figure in a correct evolutionary account. That is, would any correct evolutionary account take either of the following forms?

(i) The members of this species tend to do these things which assist the survival of this species because their ancestors were members of a sub-species whose members had an inheritable tendency to do these things, and as a result that sub-species survived, whereas other sub-species of the ancestral species at that time had members who tended not to do these things and as a result their sub-species did not survive.

(ii) The members of this species tend to do these things which help the group of which they are members to flourish because some ancestral groups happened to have members who tended to do these things and these groups, as a result, survived better than related groups of the ancestral species whose members tended not to do these things.

In other words, the issue is this: is there natural selection by and for group survival or species survival as opposed to selection by and for individual survival (or, as we shall see, gene survival)? Is behaviour that helps the group or the species, rather than the individual animal, rewarded by the natural selection which determines the course of evolution?

However, when Dawkins denies that there is selection by and for group or species survival, it is not selection by and for individual survival that he puts in its place. Rather it is selection by and for the survival of each single gene—the genes being the unit factors of inheritance, the portions of chromosomes which replicate themselves, copy themselves as cells divide and multiply. Genes, he argues, came into existence right back at the beginning of life on earth, and all more complex organisms are to be seen as their products. We are, as he picturesquely puts it, gene-machines: our biological function is just to protect our genes, carry them around, and enable them to reproduce themselves. Hence the title of his book, *The Selfish Gene*. Of course what survives is not a token gene: each of these

² I am among these: see p. 113 of my *Ethics: Inventing Right and Wrong* (Penguin, Harmondsworth, 1977).

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perishes with the cell of which it is a part. What survives is a gene-type, or rather what we might call a gene-clone, the members of a family of token genes related to one another by simple direct descent, by replication. The popularity of the notions of species selection and group selection may be due partly to confusion on this point. Since clearly it is only types united by descent, not individual organisms, that survive long enough to be of biological interest, it is easy to think that selection must be by and for species survival. But this is a mistake: genes, not species, are the types which primarily replicate themselves and are selected. Since Dawkins roughly defines the gene as 'a genetic unit which is small enough to last for a number of generations and to be distributed around in the form of many copies', it is (as he admits) practically a tautology that the gene is the basic unit of natural selection and therefore, as he puts it, 'the fundamental unit of self-interest', or, as we might put it less picturesquely, the primary beneficiary of natural selection. But behind this near-tautology is a synthetic truth, that this basic unit, this primary beneficiary, is a small bit of a chromosome. The reason why this is so, why what is differentially effective and therefore subject to selection is a small bit of a chromosome, lies in the mechanism of sexual reproduction by way of meiosis, with crossing over between chromosomes. When male and female cells each divide before uniting at fertilization, it is not chromosomes as a whole that are randomly distributed between the parts, but sections of chromosomes. So sections of chromosomes can be separately inherited, and therefore can be differentially selected by natural selection.

The issue between gene selection, individual selection, group selection, and species selection might seem to raise some stock questions in the philosophy of science. Many thinkers have favoured reductionism of several sorts, including methodological individualism. Wholes are made up of parts, and therefore in principle whatever happens in any larger thing depends upon and is explainable in terms of what happens in and between its smaller components. But though this metaphysical individualism is correct, methodological individualism does not follow from it. It does not follow that we must always conduct our investigations and construct our explanations in terms of component parts, such as the individual members of a group or society. Scientific accounts need not be indefinitely reductive. Some wholes are obviously more accessible to us than their components. We can understand what a human being does without analysing this in terms of how each single cell in his body or his brain behaves. Equally we can often understand what a human society does without analysing this in terms of the behaviour of each of its individual members. And the same holds quite generally: we can often understand complex wholes as units, without analysing them into their parts. So if, in the account of evolution, Dawkins's concentration upon genes were just a piece of methodological individualism or reductionism, it would be inadequately motivated. But it

is not: there is a special reason for it. Dawkins's key argument is that species, populations, and groups, and individual organisms too, are as genetic units too temporary to qualify for natural selection. 'They are not stable through evolutionary time. Populations are constantly blending with other populations and so losing their identity', and, what is vitally important, 'are also subject to evolutionary change from within' (p. 36).

This abstract general proposition may seem obscure. But it is illustrated by a simple example which Dawkins gives (pp. 197–201).

A species of birds is parasitized by dangerous ticks. A bird can remove the ticks from most parts of its own body, but, having only a beak and no hands, it cannot get them out of the top of its own head. But one bird can remove ticks from another bird's head: there can be mutual grooming. Clearly if there were an inherited tendency for each bird to take the ticks out of any other bird's head, this would help the survival of any group in which that tendency happened to arise—for the ticks are dangerous: they can cause death. Someone who believed in group selection would, therefore, expect this tendency to be favoured and to evolve and spread for this reason. But Dawkins shows that it would not. He gives appropriate names to the different 'strategies', that is, the different inheritable behavioural tendencies. The strategy of grooming anyone who needs it he labels 'Sucker'. The strategy of accepting grooming from anyone, but never grooming anyone else, even someone who has previously groomed you, is called 'Cheater'. Now if in some population both these tendencies or strategies, and only these two, happen to arise, it is easy to see that the cheaters will always do better than the suckers. They will be groomed when they need it, and since they will not waste their time pecking out other birds' ticks, they will have more time and energy to spare for finding food, attracting mates, building nests, and so on. Consequently the gene for the Sucker strategy will gradually die out. So the population will come to consist wholly of cheaters, despite the fact that this is likely to lead to the population itself becoming extinct, if the parasites are common enough and dangerous enough, whereas a population consisting wholly of suckers would have survived. The fact that the group is open to evolutionary change from within, because of the way the internal competition between Cheater and Sucker genes works out, prevents the group from developing or even retaining a feature which would have helped the group as a whole.

This is just one illustration among many, and Dawkins's arguments on this point seem pretty conclusive. We need, as he shows, the concept of an *evolutionarily stable strategy* or ESS (p. 74 *et passim*). A strategy is evolutionarily stable, in relation to some alternative strategy or strategies, if it will survive indefinitely in a group in competition with those alternatives. We have just seen that where Cheater and Sucker alone are in competition, Cheater is an ESS but Sucker is not. We have also seen, from this example, that an ESS may not help a group, or the whole species, to survive and

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multiply. Of course we must not leap to the conclusion that an ESS never helps a group or a species: if that were so we could not explain much of the behaviour that actually occurs. Parents sacrifice themselves for their children, occasionally siblings for their siblings, and with the social insects, bees and ants and termites, their whole life is a system of communal service. But the point is that these results are not to be explained in terms of group selection. They can and must be explained as consequences of the selfishness of genes, that is, of the fact that gene-clones are selected for whatever helps each gene-clone itself to survive and multiply.

But now we come to another remarkable fact. Although the gene is the hero of Dawkins's book, it is not unique either in principle or in fact. It is not the only possible subject of evolutionary natural selection, nor is it the only actual one. What is important about the gene is just that it has a certain combination of logical features. It is a replicator: in the right environment it is capable of producing multiple copies of itself; but in this process of copying some mistakes occur; and these mistaken copies—mutations—will also produce copies of themselves; and, finally, the copies produced may either survive or fail to survive. Anything that has these formal, logical, features is a possible subject of evolution by natural selection. As we have seen, individual organisms, groups, and species do not have the required formal features, though many thinkers have supposed that they do. They cannot reproduce themselves with sufficient constancy of characteristics. But Dawkins, in his last chapter, introduces another sort of replicators. These are what are often called cultural items or traits; Dawkins christens them *memes*—to make a term a bit like 'genes'—because they replicate by memory and imitation (*mimesis*). Memes include tunes, ideas, fashions, and techniques. They require, as the environment in which they can replicate, a collection of minds, that is, brains that have the powers of imitation and memory. These brains (particularly though not exclusively human ones) are themselves the products of evolution by gene selection. But once the brains are there gene selection has done its work: given that environment, memes can themselves evolve and multiply in much the same way as genes do, in accordance with logically similar laws. But they can do so more quickly. Cultural evolution may be much faster than biological evolution. But the basic laws are the same. Memes are selfish in the same sense as genes. The explanation of the widespread flourishing of a certain meme, such as the idea of a god or the belief in hell fire, may be simply that it is an efficiently selfish meme. Something about it makes it well able to infect human minds, to take root and spread in and among them, in the same way that something about the smallpox virus makes it well able to take root and spread in human bodies. There is no need to explain the success of a meme in terms of any benefit it confers on individuals or groups; it is a replicator in its own right. Contrary to the optimistic view often taken of cultural evolution, this analogy shows that a cultural

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trait can evolve, not because it is advantageous to society, but simply because it is advantageous to itself. It is ironical that Kipling's phrase 'the law of the jungle' has proved itself a more efficient meme than the doctrine he tried to use it to propagate.

So far I have been merely summarizing Dawkins's argument. We can now use it to answer the question from which I started. Who is right about the law of the jungle? Kipling, or those who have twisted his phrase to mean almost the opposite of what he intended? The answer is that neither party is right. The law by which nature works is not unrestrained and ruthless competition between individual organisms. But neither does it turn upon the advantages to a group, and its members, of group solidarity, mutual care and respect, and co-operation. It turns upon the self-preservation of gene-clones. This has a strong tendency to express itself in individually selfish behaviour, simply because each agent's genes are more certainly located in him than in anyone else. But it can and does express itself also in certain forms of what Broad called self-referential altruism, including special care for one's own children and perhaps one's siblings, and, as we shall see, reciprocal altruism, helping those (and only those) who help you.

But now I come to what seems to be an exception to Dawkins's main thesis, though it is generated by his own argument and illustrated by one of his own examples. We saw how, in the example of mutual grooming, if there are only suckers and cheats around, the strategy Cheat is evolutionarily stable, while the strategy Sucker is not. But Dawkins introduces a third strategy, Grudger. A grudger is rather like you and me. A grudger grooms anyone who has previously groomed him, and any stranger, but he remembers and bears a grudge against anyone who cheats him—who refuses to groom him in return for having been groomed—and the grudger refuses to groom the cheat ever again. Now when all three strategies are in play, both Cheat and Grudger are evolutionarily stable. In a population consisting largely of cheats, the cheats will do better than the others, and both suckers and grudgers will die out. But in a population that starts off with more than a certain critical proportion of grudgers, the cheats will first wipe out the suckers, but will then themselves become rare and eventually extinct: cheats can flourish only while they have suckers to take advantage of, and yet by doing so they tend to eliminate those suckers.

It is obvious, by the way, that a population containing only suckers and grudgers, in any proportions, but no cheats, would simply continue as it was. Suckers and grudgers behave exactly like one another as long as there are no cheats around, so there would be no tendency for either the Sucker or the Grudger gene to do better than the other. But if there is any risk of an invasion of Cheat genes, either through mutation or through immigration, such a pattern is not evolutionarily stable, and the higher the proportion of suckers, the more rapidly the cheats would multiply.

So we have two ESSs, Cheat and Grudger. But there is a difference between these two stable strategies. If the parasites are common enough and dangerous enough, the population of cheats will itself die out, having no defence against ticks in their heads, whereas a separate population of grudgers will flourish indefinitely. Dawkins says, 'If a population arrives at an ESS which drives it extinct, then it goes extinct, and that is just too bad' (p. 200). True: *but is this not group selection after all?* Of course, this will operate only if the populations are somehow isolated. But if the birds in question were distributed in geographically isolated regions, and Sucker, Cheat and Grudger tendencies appeared (after the parasites became plentiful) in randomly different proportions in these different regions, then some populations would become pure grudger populations, and others would become pure cheat populations, but then the pure cheat populations would die out, so that eventually all surviving birds would be grudgers. And they would be able to re-colonize the areas where cheat populations had perished.

Another name for grudgers is 'reciprocal altruists'. They act as if on the maxim 'Be done by as you did'. One implication of this story is that this strategy is not only evolutionarily stable within a population, it is also viable for a population as a whole. The explanation of the final situation, where all birds of this species are grudgers, lies partly in the non-viability of a population of pure cheats. So this is, as I said, a bit of group selection after all.

It is worth noting how and why this case escapes Dawkins's key argument that a population is 'not a discrete enough entity to be a unit of natural selection, not stable and unitary enough to be "selected" in preference to another population' (p. 36). Populations can be made discrete by geographical (or other) isolation, and can be made stable and unitary precisely by the emergence of an ESS in each, but perhaps different ESSs in the different regional populations of the same species. This case of group selection is necessarily a second order phenomenon: it arises where gene selection has produced the ESSs which are then persisting selectable features of groups. In other words, an ESS may be a third variety of replicator, along with genes and memes; it is a self-reproducing feature *of groups*.

Someone might reply that this is not really group selection because it all rests ultimately on gene selection, and a full explanation can be given in terms of the long-run self-extinction of the Cheat gene, despite the fact that within a population it is evolutionarily stable in competition with the two rival genes. But this would be a weak reply. The monopoly of cheating *over a population* is an essential part of the causal story that explains the extinction. Also, an account at the group level, though admittedly incomplete, is here correct as far as it goes. The reason why all ultimately surviving birds of this species are grudgers is partly that *populations* of

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grudgers can survive whereas *populations* of cheats cannot, though it is also partly that although a population of suckers could survive—it would be favoured by group selection, if this possibility arose, just as much as a population of grudgers—internal changes due to gene selection after an invasion of Cheat genes would prevent there being a population of suckers. In special circumstances group selection (or population selection) can occur and could be observed and explained as such, without going down to the gene selection level. It would be unwarranted methodological individualism or reductionism to insist that we not merely can but must go down to the gene selection level here. We must not fall back on this weak general argument when Dawkins's key argument against group selection fails.

I conclude, then, that there can be genuine cases of group selection. But I admit that they are exceptional. They require rather special conditions, in particular geographical isolation, or some other kind of isolation, to keep the populations that are being differentially selected apart. For if genes from one could infiltrate another, the selection of populations might be interfered with. (Though in fact in our example *complete* isolation is not required: since what matters is whether there is more or less than a certain critical proportion of grudgers, small-scale infiltrations would only delay, not prevent, the establishing of pure populations.) And since special conditions are required, there is no valid general principle that features which would enable a group to flourish will be selected. And even these exceptional cases conform thoroughly to the general logic of Dawkins's doctrine. Sometimes, but only sometimes, group characteristics have the formal features of replicators that are open to natural selection.

Commenting on an earlier version of this paper, Dawkins agreed that there could be group selection in the sort of case I suggested, but stressed the importance of the condition of geographical (or other) isolation. He also mentioned a possible example, that the prevalence of sexual reproduction itself may be a result of group selection. For if there were a mutation by which asexual females, producing offspring by parthenogenesis, occurred in a species, this clone of asexual females would be at once genetically isolated from the rest of the species, though still geographically mixed with them. Also, in most species males contribute little to the nourishment or care of their offspring; so from a genetic point of view males are wasters: resources would be more economically used if devoted only to females. So the genetically isolated population of asexual females would out-compete the normal sexually reproducing population with roughly equal numbers of males and females. So the species would in time consist only of asexual females. But then, precisely because all its members were genetically identical, it would not have the capacity for rapid adaptation by selection to changing conditions that an ordinary sexual population has. So when conditions changed, it would be unable to adapt, and would die out. Thus there would in time be species selection against any species that

produced an asexual female mutation. Which would explain why nearly all existing species go in for what, in the short run, is the economically wasteful business of sexual reproduction.³

What implications for human morality have such biological facts about selfishness and altruism? One is that the possibility that morality is itself a product of natural selection is not ruled out, but care would be needed in formulating a plausible speculative account of how it might have been favoured. Another is that the notion of an ESS may be a useful one for discussing questions of practical morality. Moral philosophers have already found illumination in such simple items of game theory as the Prisoners' Dilemma; perhaps these rather more complicated evolutionary 'games' will prove equally instructive. Of course there is no simple transition from 'is' to 'ought', no direct argument from what goes on in the natural world and among non-human animals to what human beings ought to do. Dawkins himself explicitly warns against any simple transfer of conclusions. At the very end of the book he suggests that conscious foresight may enable us to develop radically new kinds of behaviour. 'We are built as gene machines and cultured as meme machines, but we have the power to turn against our creators. We, alone on earth, can rebel against the tyranny of the selfish replicators' (p. 215). This optimistic suggestion needs fuller investigation. It must be remembered that the human race as a whole cannot act as a unit with conscious foresight. Arrow's Theorem shows that even quite small groups of rational individuals may be unable to form coherently rational preferences, let alone to act rationally. Internal competition, which in general prevents a group from being a possible subject of natural selection, is even more of an obstacle to its being a rational agent. And while we can turn against some memes, it will be only with the help and under the guidance of other memes.

This is an enormous problematic area. For the moment I turn to a smaller point. In the mutual grooming model, we saw that the Grudger strategy was, of the three strategies considered, the only one that was healthy in the long run. Now something closely resembling this strategy, reciprocal altruism, is a well known and long established tendency in human life. It is expressed in such formulae as that justice consists in giving everyone his due, interpreted, as Polemarchus interprets it in the first book of Plato's *Republic*, as doing good to one's friends and harm to one's enemies, or repaying good with good and evil with evil. Morality itself has been seen, for example by Edward Westermarck, as an outgrowth from the retributive emotions. But some moralists, including Socrates and Jesus,

³ This suggestion is made in a section entitled 'The paradox of sex and the cost of paternal neglect' of the following article: R. Dawkins, 'The value judgments of evolution', in M. A. H. Dempster and D. J. McFarland (eds) *Animal Economics* (Academic Press, London and New York, forthcoming).

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have recommended something very different from this, turning the other cheek and repaying evil with good. They have tried to substitute 'Do as you would be done by' for 'Be done by as you did'. Now this, which in human life we characterize as a Christian spirit or perhaps as saintliness, is roughly equivalent to the strategy Dawkins has unkindly labelled 'Sucker'. Suckers are saints, just as grudgers are reciprocal altruists, while cheats are a hundred per cent selfish. And as Dawkins points out, the presence of suckers endangers the healthy Grudger strategy. It allows cheats to prosper, and could make them multiply to the point where they would wipe out the grudgers, and ultimately bring about the extinction of the whole population. This seems to provide fresh support for Nietzsche's view of the deplorable influence of moralities of the Christian type. But in practice there may be little danger. After two thousand years of contrary moral teaching, reciprocal altruism is still dominant in all human societies; thoroughgoing cheats and thoroughgoing saints (or suckers) are distinctly rare. The sucker slogan is an efficient meme, but the sucker behaviour pattern far less so. Saintliness is an attractive topic for preaching, but with little practical persuasive force. Whether in the long run this is to be deplored or welcomed, and whether it is alterable or not, is a larger question. To answer it we should have carefully to examine our specifically human capacities and the structure of human societies, and also many further alternative strategies. We cannot simply apply to the human situation conclusions drawn from biological models. Nevertheless they are significant and challenging as models; it will need to be shown how and where human life diverges from them.

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