

Gene-juggling

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Genes cannot be selfish or unselfish, any more than atoms can be jealous, elephants abstract or biscuits teleological. This should not need mentioning, but Richard Dawkins's book *The Selfish Gene* has succeeded in confusing a number of people about it, including Mr J. L. Mackie.¹ What Mackie welcomes in Dawkins is a new, biological-looking kind of support for philosophic egoism. If this support came from Dawkins's producing important new facts, or good new interpretations of old facts, about animal life, this could be very interesting. Dawkins, however, simply has a weakness for the old game of Brocken-spectre moralizing—the one where the player strikes attitudes on a peak at sunrise, gazes awe-struck at his gigantic shadow on the clouds, and reports his observations as cosmic truths. He is an uncritical philosophic egoist in the first place, and merely feeds the egoist assumption into his *a priori* biological speculations, only rarely glancing at the relevant facts of animal behaviour and genetics, and ignoring their failure to support him. There is nothing empirical about Dawkins. Critics have repeatedly pointed out that his notions of genetics are unworkable.² I shall come to this point later, but I shall not begin with it, because, damning though it is, it may seem to some people irrelevant to his main contention. It is natural for a reader to suppose that his over-simplified drama about genes is just a convenient stylistic device, because it seems obvious that the personification of them must be just a metaphor. Indeed he himself sometimes says that it is so. But in fact this personification, in its literal sense, is essential for his whole contention; without it he is bankrupt. His central point is that the emotional nature of man is exclusively self-interested, and he argues this by claiming that all emotional nature is so. Since the emotional nature of animals clearly is not exclusively self-interested, nor based on any long-term calculation at all, he resorts to arguing from speculations about the emotional nature of genes, which he

¹ J. L. Mackie, 'The Law of the Jungle', *Philosophy* 53 (October 1978).

² The attempt which he has eventually made to answer some of these criticisms may be read in *Zeitschrift für Tierpsychologie* 47 (1978), 61–76. Apart from some minor disputes, it simply intensifies the conceptual blunders which I discuss here. Dawkins always answers opponents who point out that 'genes' as scientists normally conceive them cannot possibly play the role which he assigns to them by retreating still further from the facts to a more general metaphysical position where 'genes' are classed as 'replicators'. Unless he either learns to do metaphysics or retreats out of sight entirely, this is not going to do him any good.

treats as the source and archetype of all emotional nature. This strange convoluted drama must be untwisted before the full force of the objections from genetics can be understood.

Dawkins does toy with egoistic explanations at the more ordinary level as well as with metaphysical 'gene' selfishness, although it is not clear why he thinks he needs to. When animals act, as they quite often do, for each other's advantage, Dawkins explains this, where possible, as 'reciprocal altruism', that is, not altruism at all but a bargain. It is only when this becomes too obviously unconvincing that he shifts his ground, becoming equally ready to say *either* that the individual is aiming to 'increase his own genetic fitness'—i.e. to prosper by having a lot of descendants and relatives—*or* that the real agent is not the individual at all but the personified Gene. This is a mysterious entity riding in the individual and apparently composed of the numerous genes in his cells, which chooses to sacrifice him—and in some sense itself—for the sake of its representatives, with which it somehow identifies, in the descendants who outlive him. I shall discuss the two last alternatives, which are extremely bizarre, later. The first and slightly more respectable idea is the one which seems chiefly to attract Mr Mackie, because it fits in with traditional egoism. Mackie approvingly cites Dawkins's exposition of it in terms of three imaginary genetic strains in a supposed bird population. They are: Suckers, who help everybody indiscriminately, Cheats, who accept help from everybody and never return it, and Grudgers, who refuse help only to those who have previously refused it to them. These 'strategies' are supposed each to be controlled by a single gene, and the help in question is assumed to be essential for survival. In this absurdly abstract and genetically quite impossible situation, Dawkins concludes that Cheats and Grudgers would exterminate Suckers, and Grudgers might well do best of all. Mackie comments with satisfaction that 'a grudger is rather like you and me' (p. 410), and reproves Socrates and Christ for supporting Suckers in telling us to return good for evil. 'As Dawkins points out', he goes on, 'the presence of Suckers endangers the healthy Grudger strategy . . . This seems to provide fresh support for Nietzsche's view of the deplorable influence of moralities of the Christian type' (p. 464), though he more cheerfully concludes that such moralities are mere words and will have no influence anyway.

Now even if Dawkins's calculations made genetic sense, the only way in which they could provide support for Nietzsche or any other philosophic egoist would be by showing that 'reciprocal altruism' or Hobbesian prudential bargaining was the *only* source, or at least far the most persistent and central source, of all animal altruism—in which case we should indeed have good reason to suspect that it was more important than appeared in the human case as well. But the facts of animal life contradict this suggestion entirely. The main source and focus of altruistic behaviour in animals is the care of the young, which in most species will certainly never be repaid.

Where the young leave home at maturity, parents are lamentably bad Hobbists if they take any notice of their children at all, apart from eating them. Moreover, advanced social species show a great deal of casual and uncalculating friendliness in their lives, and this often proceeds from old to young, from the strong to the weak, even where there is no blood relationship. Calculation about the future is an extreme late-comer in evolution; what forges society is the emotions. Animals are never guided in their lives by any such rigid, simple, games-theory criterion as ‘did he do it to me last time?’ still less ‘will he be able to do it back?’ They can certainly be angry, and to some extent bear grudges. But these events form only one strand among others in the very complex web of social relations which unites them. Within their friendships, mutual help will indeed take place. But the reason will not be the recognition of an insurance premium falling due. It will be liking and affection.

All this is to explain what I mean by calling Dawkins’s case absurdly abstract. (It is significant that he could not find a real one.) Dawkins supposes the help given to consist in grooming. But then—at least in birds and mammals—the behaviour of ‘sucker’ is impossible. Grooming occurs only in social creatures, and occurs there as part of their social bonds. They groom their friends and relations; nobody grooms all comers indiscriminately. This is not a fiddling point. The advantage of being social does not spring from a chance collection of isolated behaviour-atoms like hygienic grooming. It is only possible as part of a whole complex way of life in which the outgoing emotions—which egoism denies—constantly work for harmony. (Insects may need to be understood differently, but then neither Mackie nor Dawkins supposes that we are insects.) This disregard of the essential emotional context reappears in Mackie’s idea that the indiscriminating ‘sucker’ behaviour is one recommended by Socrates and Christ. Neither sage is recorded to have said ‘be ye equally helpful to everybody’. Both, in the passages he means, were talking about behaviour to one narrow class of people, with whom we are already linked, namely our enemies, and were talking about it because it really does present appalling problems. The option of jumping on one’s enemies’ faces whenever possible has always been popular. In spite of its attractions, and in spite of Nietzsche’s romantic power-worship, it has proved to have grave drawbacks. Of course charity and forgiveness have their drawbacks too, especially if they are unintelligently practised. As Mackie rightly says, there are problems about reconciling them with justice, and justice too has its roots in our emotional nature. There are real conflicts here as both Socrates and Christ realized. But since they are real they cannot be much helped by a dashing gesture towards Nietzsche.

In dealing with these problems Dawkins’s grossly simplified and distorted scheme is no use at all. Suckers do not exist. A blank, automatic, indiscriminating disposition to help everyone in sight would be pathological

in any animal. In a human being, it would certainly not pass as charity or forgiveness but simply as loopiness. No doubt this, along with the equal dottiness of 'cheat', is what gives Mackie the impression that, by comparison 'a Grudger is rather like you and me'. Being a shade less simple he certainly is *more* so, but the difference is trifling. We find him slightly less hard to believe in because he seems to show signs of being able to distinguish between friends, enemies and strangers. And we, like any other social animal regard this as a paramount condition of normal life. But the signs are deceptive because the Grudger is supposed to view as enemies all those who have ever failed to return his help in the past, and as friends all those who have returned it. This principle, on which a man's employer would usually be his best friend and his children always his enemies, is unknown in the animal world. Altruism is transitive long before it is reciprocal. No one who has heard of evolution has any business to suppose, as Hobbes excusably did, that calculating prudence is the root of all social behaviour. Now that we know how complex the social life of other species can become when their intelligence does not make calculation possible, we know that there is no such single root. Ethological comparison strongly confirms, what an unprejudiced view of the human scene has always suggested, that motivation is complex. There is no short cut to understanding it. In each case we have to look at the detailed evidence.

The particular case which Mackie raises of the way in which the injured treat their injurers is a good instance of the surprising complexity which we find when we do this. In the species most like our own, lasting resentment after injuries is by no means a prominent or important motive. In some cases, of course, immediate fighting is possible, but prolonged grudge-bearing is rare and trivial. Jane Goodall notes with interest how in her chimps the usual effect of an injury is something very different—a distressed approach to the aggressor with a demand for reconciliation. What seems to be most noticed is not the injury itself, but the failure of the social bond:

A chimpanzee, after being threatened or attacked by a superior, may follow the aggressor, screaming and crouching to the ground or holding out his hand. He is, in fact, begging a reassuring touch from the other. Sometimes he will not relax until he has been touched or patted, kissed or embraced (*In the Shadow of Man*, p. 221).

While a male chimpanzee is quick to threaten or attack a subordinate, he is usually equally quick to calm his victim with a touch, a pat on the back, an embrace of reassurance. And Flo, after Mike's vicious attack, and even while her hand dripped blood where she had scraped it against a rock, had hurried after Mike, screaming in her hoarse voice, until he turned. Then as she approached him, crouched low in apprehension, he

had patted her again and again on her head, and as she quietened, had given her a final reassurance by leaning forward to press his lips on her brow (p. 114).

As she points out, this reaction makes it possible to resume the relationship as though the injury had never taken place. (A community of retentive 'grudgers' would by contrast be a terribly insecure one; no lapses would be tolerated.) She rightly remarks, too, that small human children do the same thing. It is only for adult human beings, with their much stronger powers of memory, imagination and foresight, that this simple reaction becomes impossible. The whole problem then takes on another dimension of complexity.

Altogether, I know of no evidence from the behaviour of other species to suggest that prolonged grudge-bearing is anywhere a powerful motive. It can hardly, then, be an important root of justice. By contrast, readiness to fight back *immediately* in case of injury certainly is such a root. Actual animal-watching shows that this tendency is nothing like as strong or as common as has often been imagined. Still, there are plenty of situations where it does occur, usually either between individuals of roughly equal status, or between strangers, or on occasions of exceptional outrage. But to grow into the emotional raw material of justice, this capacity for instant retribution needs another element. It has to become vicarious; that is, altruistic. And it does so. Dominant animals often do attack middle-ranking ones who are bullying their inferiors, and may take the inferiors under their permanent protection. But this too is an outgrowth of parental protectiveness; again it presents the problem of altruism. In fact, the account that Mill gave of the matter is a fair one, provided that it is understood, not as an analysis of the notion of justice, but as an account of its psychological origins:

The sentiment of justice appears to me to be, the animal desire to repel or retaliate a hurt or damage to oneself, or to those with whom one sympathizes, widened so as to include all persons, by the human capacity of enlarged sympathy, and the human conception of intelligent self-interest (*Utilitarianism*, Ch. 5).

But the fact that there are 'those with whom one sympathizes' at all is ruinous to simple-minded egoism. 'The human capacity of enlarged sympathy' certainly makes the point still more pressing, but the simplest case of parental care in animals already presents it in a damning form.

This persistent difficulty in reducing parents to the egoist pattern is just the kind of thing which makes Dawkins's typical readers—people with vaguely egoist leanings about individual human psychology—willing to follow him in losing touch with the observed facts of motivation altogether

and taking off for the empyrean with the Gene. Dawkins, however, does not even start from those facts. He draws all his material from 'sociobiological' evolutionists such as W. D. Hamilton, Edward O. Wilson, and John Maynard Smith who are not directly interested in individual psychology at all. (Incidentally, his pages are virgin of originality except for a single suggestion which I shall discuss in my last section.) These evolutionists' main business has been to show how conduct which does not benefit the agent can survive in evolution by benefiting his kin; they have worked out the arithmetic of 'kin-selection'. This way of thinking actually makes any dependence on individual selfishness as a motive unnecessary, and the term 'selfish' should not appear in their writings. For some reason, however, they are still devoted to it. Even the least romantic of them, W. D. Hamilton, has a paper called 'Geometry for the Selfish Herd', and Wilson takes enormous pains to show that a great range of obviously uncalculated altruistic human behaviour, such as impulsive rescuing, is *really* bargaining, and therefore concealed selfishness.³ They show a strong and unexamined tendency to assume both that individual motivation must actually, despite appearances, be selfish, and that it makes sense to talk of entities other than individuals as being selfish. R. S. Trivers, closely followed by Dawkins, has inflated this bad habit into a mythology. Before examining it, however, it is worth while asking why dogmatic egoism exerts this powerful pull. At the quite unthinking level, of course, it has two great attractions, both of which it shares with Hedonism—its great apparent simplifying power, and its swashbuckling style. But anyone who is so far intrigued by these as to begin applying it in detail quickly finds that the facts are too complicated for it. The first advantage is illusory. The second, though very influential in accounting for Dawkins's success, cannot be the only factor determining his mentors; two other more serious reasons come in.

The first is an error that has always dogged this controversy, namely, an unrealistic notion of altruism. People define altruistic behaviour negatively, as activity which while helping others does nothing for the agent, which he himself does not at all want, or which is necessarily to his disadvantage. This negative conception seems to destroy the possibility of motivation towards it. The word however means something positive. The act is done *for* the benefit of another. Helping him is the *aim*, one's own feelings are

³ See *Sociobiology* (Harvard University Press, 1975), 120. He adds, however, 'Human behaviour abounds with reciprocal altruism consistent with genetic theory, *but animal behaviour seems to be almost devoid of it*'. He accounts for this (as I do) by the lack of calculation in animals, but seems not to see that, since these 'animals' are the subjects we are dealing with for almost the whole of evolution, any 'genetic theory' inconsistent with their capacities will have to be revised. Dawkins, in his 'Grudger' story, ignores Wilson's reasoning here, as he does most other things that do not suit him.

the inducement; one's own disadvantage forms no part of the idea. It is mere confusion to suppose that satisfaction taken in it, or its happening to turn out useful to one, make it a selfish act. Bishop Butler long ago nailed this error:

If, because every particular affection is a man's own, and the pleasure arising from its gratification his own pleasure, such particular affection must be called self-love, according to this way of speaking, no creature whatever can possibly act but merely from self-love. But then, this is not the language of mankind; or if it were, we should want words to express the difference between the principles of an action, proceeding from cool consideration that it will be to my advantage; and an action, suppose of revenge, or of friendship, by which a man runs upon certain ruin, to do evil or good to another (Sermon XI, Sec. 7).

Altruism, in fact, is not a fantastic concept, but a descriptive one with a use to distinguish some existing motives from others. Besides this familiar difficulty, however, the evolutionary context adds another, newer and more confusing factor. In natural selection, many are born but few survive for long. We call this 'competition', and the metaphor at once suggests the specific *motive* of contentiousness. As we begin to grasp the scale of the phenomenon, the strength of the motive involved seems to grow. Before Darwin drew attention to it, nobody, probably, realized how many must die early as the necessary condition of the life and development of a few. My present business is not with the problems of theology but with the confused way in which people have persistently attributed to individual creatures the motives which seem needed in an imaginary being who might actually understand, and will, this whole process in which he is involved. Darwin, just because he was an exceptionally humane man, was shaken by what he found, and often used terms like 'war' and 'remorseless struggle'. Being a realistic naturalist, however, he would never have made the mistake of supposing that mice and mushrooms, pigs and pampas-grass were actually busy on unscrupulous plots to destroy each other, still less that minute scraps of their cell-tissues were so occupied. Only quite advanced creatures are sufficiently conscious of each other's existence to 'compete' in the full sense of the word—to know what they are about and have the appropriate motives. (Even human beings do not usually do so.) Predators, as their expressive movements show, do not regard their prey with anger or cruelty or as a fellow-creature at all, but just as meat. Remorse could not enter into the matter, so 'remorselessness' in the true sense of determined callousness cannot either. For the same reason, the milder notion of 'selfishness' is equally out of place. Among social birds and mammals we might use it, though hesitantly, to describe an individual who constantly grabbed more than his share. But for non-social creatures we could not use it so, since no question of shares arises among them. Similarly, a robin

driving intruders off his territory cannot be supposed to weigh up their claims, predict their subsequent starvation, and decide in his own favour. He is not selfish; he just wants the place clear. One cannot speak even of 'unthinking selfishness' in beings incapable of the thought in question. Most selective competition does not require competitive motives, nor any sort of motive involving calculation of consequences, and much of it requires altruistic ones. Absolutely none of it below the human level can proceed from dynastic ambition. Moreover, dynastic ambition is not selfishness, but a particular complex human motive which may well conflict with self-interest. The further down the scale of creatures we go, the more obvious all this becomes. Nobody attributes selfish planning to a paramecium. What, then, can Dawkins mean by attributing it to a gene?

Doing his best for Dawkins, Mackie ignores this point, but it cannot be ignored; as its title implies, the book depends on it. Dawkins brings in gene motivation because his account of individual motivation is a total failure; in fact, he switches from one to the other with bewildering speed every time he gets into a difficulty. About individual motivation he would like to be an egoist, but the facts of ethology prevent it. He wants to relate the workings of natural selection in a simple and satisfying way to those of motivation by finding a single universal motive, and there is no such motive. Having picked on selfishness for this role, he personifies genes in order to find an owner for it. It may indeed seem that he must just be speaking metaphorically, as he sometimes claims. But the trouble about these admissions is that Dawkins seems to have studied under B. F. Skinner the useful art of open, manly self-contradiction, of freely admitting a point that destroys one's whole position and then going on exactly as before. When ruin stares him in the face, he withdraws into talk of metaphors, but he goes on afterwards as if the literal interpretation still stood. For instance, on p. 95 of *The Selfish Gene*:

If we allow ourselves the license of talking about genes as if they had conscious aims, always reassuring ourselves that we could translate our sloppy language back into respectable terms if we wanted to, we can ask the question, what is a single selfish gene trying to do? . . . 'It' is a distributed agency . . . A gene might be able to assist *replicas* of itself which are sitting in other bodies . . .

In short, because a gene cannot perpetuate *itself* but only likenesses of itself, the language of selfishness is so crashingly wrong that even Dawkins sees he will have to hide it under the table for a bit, even from people who were willing to make a pet of his bogus entity. But this by no means makes him go back and alter the flat, unfigurative assertions which are everywhere essential to the book's argument or modify its opening manifesto:

[This book] is not science fiction; it is science. Cliché or not, 'stranger than fiction' expresses exactly how I feel about the truth. We are survival machines—robot vehicles blindly programmed to preserve the selfish molecules known as genes. This is a truth which still fills me with astonishment (p. x).

Not a word of caution about metaphors follows. On p. 210, Dawkins has the gall to write, 'Throughout this book, I have emphasized that we must not think of genes as conscious, purposeful agents'. These disavowals do occur now and then, but, like the paternosters of Mafia agents, they have no force against his practice of habitually relying on the literal sense. On p. 48, too, he takes a very different line. Resisting people who might say that he has 'an excessively gene-centred view of evolution', he makes the quite proper and moderate reply that study of genetic causes is useful. Then, evidently concluding that genes have been shown to be the only reality, he suddenly adds:

At times, gene language gets a bit tedious, and for brevity and vividness we shall lapse into metaphor. But we shall always keep a sceptical eye on our metaphors, to make sure they can be translated back into gene language if necessary.

This seems to mean that not only the talk of conscious motives, but also all talk of whole organisms and their behaviour, is only a metaphorical way of describing the behaviour of genes. Anyone who can talk like this has a deeply confused view of metaphor, and a few words on this topic seem called for.

To understand how metaphors can properly be used in scientific writing, we must get straight a fundamental point about the relation between metaphors and models. Every metaphor suggests a model; indeed, a model is itself a metaphor, *but one which has been carefully pruned*. Certain branches of it are safe; others are not, and it is the first business of somebody who proposes a new model to make this distinction clear. Once this is done, the unusable parts of the original metaphor must be sharply avoided; it is no longer legitimate to use them simply as stylistic devices. For instance, the familiar model of *mechanisms* in biology has long ago been pruned of its original implication that a mechanism needs an inventor or maker. Anyone writing about a 'biological mechanism' knows that he must keep such inventors out of his explanation. He must somehow manage to use the language of purpose and adaptation without this reference; figurative speculations about the inventor's character and history will damage and confuse his reasoning. He may want to do theology, but if so, he must do it explicitly, not by loosely extending the language of 'mechanisms'.

Mary Midgley

Just so Dawkins, in officially discussing the merely physical action of genes, constantly uses the language of conscious motive and depends entirely on it to create the impression that he is in a position to say anything about human psychology. Calling genes selfish is indeed a metaphor. Whatever may be deemed to be the usable part of this metaphor, which might fit it to become a model, everyone will agree that the attribution of conscious motive belongs to the unusable part. Yet that attribution is the only thing which makes it possible for him to move from saying 'genes are selfish' to saying 'people are selfish'.

If anyone has any doubt about this, it may be best dealt with by moving on to examine the supposedly safer branches, to ask 'what then, ignoring the figurative flourishes, is the literal sense which the metaphor is there to convey?' Shorn of its beams, it turns out to be a point about the ultimate 'unit of selection':

The fundamental unit of selection, and therefore of self-interest, is not the species, nor the group, nor even, strictly, the individual. It is the gene, the unit of heredity (p. 12, cf. p. 42).

Genetically speaking, individuals and groups are like clouds in the sky or dust-storms in the desert. They are temporary aggregations or federations. They are not stable through evolutionary time [whereas the gene] does not grow senile . . . It leaps from body to body in its own way and for its own ends . . . The genes are the immortals (p. 36).

The suggestion seems to be that, in order to understand the behaviour of larger units or 'temporary aggregations', all that we need is to understand the behaviour of genes. This looks like a simple recommendation to go and do some genetics. Dawkins, however, is no geneticist, and when we ask for further information on how genes do behave, he invariably returns to what was supposed to be merely a metaphor:

Can we think of any *universal* qualities which we would expect to find in all good (i.e. long-lived) genes? . . . There might be several such universal properties, but there is one which is particularly relevant to this book; at the gene level, altruism must be bad and selfishness good . . . Genes are competing directly with their alleles for survival . . . The gene is the basic unit of selfishness (p. 38–39).

The reason why he cannot get off this subject is not that he knows no genetics, but that all the genetics which he or anyone else knows is solidly opposed to his notion of genes as independent units, only contingently connected, and locked in constant internecine competition, a war of all against all. (In spite of some words in the last quotation, he cannot really mean that it is just war between each gene and its own alleles; this would

allow co-operation over the rest of the field and destroy his case entirely.) What he needs is a 'prisoners' dilemma' situation, in which each unit operates alone, and does it in the same way whatever the others may do. What he has got is a situation of the utmost causal complexity, in which genes probably always vary their workings according to context, always depend on each other, and in many cases may produce a totally different effect when different 'modifier' genes accompany them.

It is time to turn to the genetic realities. As I have suggested, Dawkins's crude, cheap, blurred genetics is not just an expository device. It is the kingpin of his crude, cheap, blurred psychology. For selection to work as he suggests by direct competition between individual genes, the whole of behaviour would have to be divisible into units of action inherited separately and each governed by a single gene. Something like his simple sucker/cheat model would have to be adequate right across the board. One gene must govern each 'strategy' if their 'interests' are supposed to be always in competition. To convince us that this is so, Dawkins brings up once more the case of Rothenbuhler's Hygienic Bees, creatures which have been appearing in suspicious isolation as a stage army in all such arguments for some time, and, as if it were both well proven and typical, he airily adds, 'If I speak, for example, of a hypothetical gene "for saving companions from drowning" and you find such a concept incredible, remember the story of the hygienic bees' (p. 66). Actually, not only does the bees' case stand alone, but it is certainly not proven. To show that even the simple behaviour it involves is really governed by only two genes would take something like seventy generations of outbreeding experiments to ensure that the effects described are not due to the close linkage of genes at a whole series of adjacent loci, and even this would not show that these genes affected nothing else.⁴ (By Dawkins's account, Rothenbuhler has studied two generations.) Those are the standards to which geneticists work. Genetics is that complicated. It is so because—as is well known—genes are essentially co-operative; they are linked together in the most complex and hierarchical ways and affect each other's working to an incalculable extent. The idea of a one-one correlation is not genetics at all. As Dobzhansky put it, tracing the history of his subject in 1962:

The original conception of simple unit-characters had to be given up when it was discovered that the visible traits of organisms are mostly conditioned by the interaction of many genes and most genes have pleiotropic, or manifold, effects on many traits . . . Although geneticists no longer speak of unit-characters, others continue to do so . . . The academic

⁴ For an example of such work fully carried through, see Kyriakou, Burnet and Connolly on heterozygote advantage in the mating behaviour of *Drosophila* ('The behavioural basis of over-dominance in competitive mating success at the *ebony* locus in *Drosophila melanogaster*'). *Animal Behaviour* 27 (1979) (in press).

lag goes far to explain why so many social scientists are repelled by the idea that intelligence, abilities or aptitudes may be conditioned by heredity (*Mankind Evolving*, p. 33).

This refers to work done before 1920. Since that time, the emphasis on interdependence among genes has steadily grown. In his offhand way, Dawkins acknowledges some of this in Chapters 3 and 4. But this in no way embarrasses him when he writes of ‘the grudger gene’ (p. 199) nor when he repeatedly assumes in those same chapters that each gene is a quite independent force wielding enormous individual influence. Thus, in considering how sexual reproduction arose, he writes that this would indeed be hard to understand in terms of advantage to the individual or even the increase of his posterity:

But the paradox seems less paradoxical if we follow the argument of this book, and treat the individual as a survival machine built by a short-lived confederation of long-lived genes. ‘Efficiency’ from the whole individual’s point of view is then seen to be irrelevant. *Sexuality versus non-sexuality will be regarded as an attribute under single-gene control, just like blue eyes versus brown eyes.* A gene ‘for’ sexuality manipulates all the other genes for its own selfish ends (p. 47, my italics).⁵

Occurring in a student’s genetics essay, the italicized sentence would just be a bad mistake. It cannot be turned into something else here by the metaphorical context, because this point is not part of the metaphor; it is what the metaphor is meant to convey as literal fact. The context does, of course, make a difference, because what in a student would be simple ignorance is here being used to bail out an unworkable thesis. The same open disregard for consistency surrounds the questions of the gene’s credentials as a unit. Its unity and permanence are, as the quotations just made show, supposed to be its great merits. Dawkins however cheerfully acknowledges what is well known; that the word ‘gene’ is used in various senses by geneticists for varying sections along the DNA, and that none of them is immortal. In fact the word may be used to indicate different lengths of DNA within the chromosome depending whether a unit of mutation, function or recombination is being referred to. These are so far different that Dawkins’s clanger is like that of someone analysing language,

⁵ Contrast with this confident and startling pronouncement a typical passage from the Preface to John Maynard Smith’s thoughtful book *The Evolution of Sex* (Cambridge University Press, 1976): ‘I am under no illusion that I have solved all the problems that I raise. Indeed, on the most fundamental questions—the nature of the forces responsible for the maintenance of sexual reproduction and genetic recombination—my mind is not made up. On sex, the relative importance of group and individual selection is not easy to decide . . . It has struck me while writing that the crucial evidence is often missing, simply because the theoretical issues have not been clearly stated.’

who insists that we must find its fundamental elements, but talks as if it did not matter whether we take those elements to be letters, words or sentences. Aware of trouble here, he hastily adopts a general definition for 'gene' which he attributes (rather surprisingly and without reference) to George Williams. A gene is now defined as 'any portion of chromosomal material which potentially lasts for enough generations to serve as a unit of natural selection' (p. 30). This, he claims with relief, is the end of his search for 'the fundamental unit of natural selection, and therefore the fundamental unit of self-interest. What I have now done is to *define* the gene in such a way that I cannot help being right.' That is: in physical terms, what he says is tautological and meaningless; he might be talking about any section of the DNA, though obscurely. In psychological terms, it is both meaningless and absurd, since he has linked the notion of self-interest quite gratuitously to a kind of subject for which it can make no sense at all. The only possible unit of self-interest is a self, and there are no selves in the DNA.

When the mountains of metaphor are removed, in fact, what we find is not so much a mouse as a mare's nest, namely the project of finding a unit which will serve for every kind of calculation involved in understanding evolution; a 'fundamental unit' at a deep level which will displace, and not just supplement, all serious reference to individuals, groups, kin and species, and which (for some unexplained reason) will also be the unit of selfishness or self-interest. Dawkins is not the only person to be impressed by the idea of a universal unit, but it is vacuous. To see how vacuous, we might ask the parallel question, 'what is the fundamental unit of economics?' A coin? If so how large and of what country? A single worker? A factory? A complete market exchange? A minimal investor? For various purposes and from different angles, we might need to count any of these things. The decision which to count, and how finely to divide them, would depend entirely on the particular problem which we wanted to solve, and for most purposes we would refer to all of them, and would rightly not expect to have to reduce one to another. The reason which Dawkins gives for electing genes to this strange position in evolution is that they are less changeable than the entities of which they form part. But as far as this goes, physical particles are in a stronger position still. Dawkins sometimes does toy with this thought, calling them too 'selfish replicators'; why stop at genes? The reason can only be that our understanding of genes does a special job in explaining evolution. This is true, but, since genes are not on view, it is a limited job, entirely dependent on a direct understanding of the more obvious entities in their own terms. Moreover, physical particles can exist without organisms; genes cannot. They survive only if their owner belongs to a species, and one which has not fallen below the critical frequency for further breeding. Members of a population within a species probably have as many as 70–80 per cent of their genes in common (ignoring 'neutral

alleles' whose results (allozymes) make no difference and are therefore 'invisible' to selection).⁶ And these genes are hierarchically linked in such a way that any serious disturbance of the group will not give rise to a viable organism at all. (This is why hybrids are usually sterile.) Genes are units indeed for some purposes of calculation, but they are not independent, privateering units. If a gene *were* a conscious planner, it would have to reckon its interests as including those of a mass of other genes on which it is dependent, as well as all such genes in all possible mates for its owner's descendants, and all necessary ancestors for those mates—in short, everything needed for the gene pool—in short, since any gene pool can fall into trouble, everything needed for the whole species, and indeed for the eco-system. No biological unit can be both 'fundamental' in the sense of lasting, and also independent. But this is no tragedy, since there is no sort of need for such a unit. Physics itself no longer looks, as it used to, for 'atoms' in the strict sense of unsplitable units, permanent and unchangeable billiard-balls, at the end of its analysis. There is no point at all in other sciences dressing up in its old clothes and inventing such units.

There is however a perfectly good controversy carried on among evolutionists about the 'unit of selection', one dealing with a real but much more limited issue. We ask: *what* is it that natural selection selects? Now there is an obvious and perhaps conclusive sense in which we must answer 'individuals'. Organisms are born and die as wholes; each does not directly involve another, but it does involve all its parts. The notion of 'group selection', however, was invented to account for the fact that some ways of behaving seem adapted rather to preserve the group than the individual. (This thought arose not so much about altruistic behaviour as about population mechanisms which look like devices to stabilize the size of a group.) But the phrase 'group-selection' is confused, because what is selected ought to be items out of a set. And it does not normally happen that many distinct groups compete without mixing. Instead there is usually gene-flow between them, and group-stabilizing characters spread throughout the species. 'Group-selection' is a bad term if it is taken to mean something parallel and *alternative* to individual selection. All the same, the point raised is a real one, and draws attention to a confusion in the notion of 'selection' itself. Organisms are selected *as* individuals, but what are they selected *for*? The term 'select' leads people to hope for a simple, positive answer to this question, a single, isolable purpose. We would like to say, 'just as an employer choosing workers selects simply the ones who will maximize profits, so evolutionary pressures select simply those who will maximize something specific like their own life-span'. But neither employers nor

⁶ See R. S. Singh, R. C. Lewontin, and A. A. Felton on 'Genetic Heterogeneity within Electrophoretic "Alleles" of Xanthine Dehydrogenase in *Drosophila pseudoobscura*', *Genetics* 84 (1976), 609–629.

pressures can really act so simple-mindedly. The idea of an ‘economic man’ whose *sole* aim is to maximize profits cannot be made coherent. This is not only because, if he is a man as well as being economic, he will be moved by non-economic considerations like not wanting to go to jail or work himself to death. It is because we do not know, and economics cannot tell us, *at what time* the profits are to be counted. Security for next year, or for some such slice of the future, normally counts as a condition to be satisfied before profits start to be reckoned; indeed, the notion of ‘profits’ is normally understood against a background of this condition and many others, such as not murdering all possible rivals. But in principle one could decide to aim at absolute maximization in six months followed by suicide, or alternatively, as misers do, to live in penury with a view to maximizing at the end of the longest possible life-span. Quite different policies would follow these decisions. Puzzles remarkably like this infest the attempt to find a single aim for natural selection. Sociobiological thinkers are inclined to hope they can solve them by substituting ‘maximum genetic fitness’ for ‘maximum life-span’ as the aim of selection. But this is mere word-spinning. ‘Maximum genetic fitness’ means having as many surviving relatives as possible, and this simply *is* ‘being selected’—it is not the aim or condition of it. Just as with economics, the degree of ‘success’ achieved will seem to vary with the time when one decides to do the audit. Changes long after an individual’s death can bring his hitherto unwelcome genes into sudden demand; webbed feet or a silent habit become necessary in new circumstances. But they might not have done, and it is idle to say ‘then he was fitter than we supposed’; after all, we might have to reverse the judgment again later on.

It is probably necessary, for evolution as for economics, to think not of one single aim, but of a number which converge, and particularly to notice a number of negative conditions which must be met. No sensible economist supposes that his subject lays bare the ultimate structure of human life and reveals its deep determining purpose. Evolution, however, is a much larger and more complex thing than human life, less likely still to yield to formulation in such simple terms. Even if we confine ourselves to asking what is needed for an individual to be ‘selected’—to survive and leave descendants—we shall not find one goal which he has to reach, but rather a great many disasters which he has to avoid. His own qualities can only account for some of them. Some are outside anyone’s control, some—a great many in social species—lie in the control of con-specifics. Mutual aid and protection can be quite essential to him, and they are more often transitive than reciprocal. Because they largely occur among kin, this point has been expressed by talking of ‘kin-selection’, which means the development of kin-profiting behaviour by the selective advantage which it gives to those kin-groups which practise it. This is a reasonable idea, though again it is not actually an *alternative* to individual selection. As with larger

groups, the picture is not one of isolated kin-groups competing, but of protective behaviour spreading through the advantage it confers. Since kin-groups are normally not exclusive, this spread will eventually go beyond them. 'Kin' in fact is not the name of a super-entity which *replaces* individuals in the selection process, but a pointer to the necessarily social character of some behaviour. This social character can have various ranges. Parental care helps chiefly one's kin. The mobbing of predators helps chiefly one's group. Migration and colonization may help chiefly one's species. In all these kinds of case, the reason why the behaviour can develop is that it helps to build up the supportive background needed by all individuals rather than directly helping the agent.

Thus the notions of kin- and group-selection each have a point, but it is one which can be expressed compatibly with the obvious truth expressed by the notion of individual selection. Real empirical issues remain, about just how the mechanisms involved work, both socially and physiologically, but a blank clash of polarized views is unnecessary. Gene-selection, however, which Dawkins puts forward as winning candidate for this somewhat unreal race, is a much more obscure idea. Because of the genetic complications I have mentioned, it is hard to give it any meaning at all. As Stephen Jay Gould sensibly puts it:

No matter how much power Dawkins wishes to assign to genes, there is one thing that he cannot give them—direct visibility to natural selection. Selection simply cannot see genes and pick among them directly. It must use bodies as an intermediary. . . . Bodies cannot be atomized into parts, each constructed by a single gene. . . . Parts are not translated genes, and selection doesn't even work directly on parts. It accepts or rejects entire organisms . . . The image of individual genes, plotting the course of their own survival, bears little relation to developmental genetics as we understand it 'Caring Groups and Selfish Genes', *Natural History*, Vol. 86, Dec. 1977).

Why, finally, does all this matter? There are many aspects of it which I cannot go into now, and I concentrate on the moral consequences which Dawkins and Mackie draw. Egoism, when it is not just vacuous, is a moral doctrine. It has, as Mackie sees, always a practical point to urge. Aristotle used it to tell us to attend to our own personal and intellectual development. Hobbes used it to urge citizens to treat their government as accountable to them generally, and particularly to make them resist religious wars. Nietzsche, non-political and often surprisingly close to Aristotle, did on his egoist days preach self-sufficiency and self-fulfilment as a counterblast to the self-forgetful and self-despising elements in Christianity. But he is only a part-time egoist. Any attempts to use him as a signpost here would, as usual, be frustrated by his equal readiness to denounce bourgeois caution and exalt suicidal courage, or 'love of the remotest'. He hated

prudent bargaining. His egoism is confused, too, by contributions from his personal terror of love and human contact. Still, against the wilder excesses of Christianity he certainly had a point, and he was able to make it without any reference to genes. Is there any way in which reference to genes could become relevant to disputes about it? Dawkins makes the connection as follows:

The argument of this book is that we, and all other animals, are machines created by our genes. Like successful Chicago gangsters, our genes have survived, in some cases for millions of years, in a highly competitive world. This entitles us to expect certain qualities in our genes. I shall argue that a predominant quality to be expected in our genes is ruthless selfishness . . . Let us try to teach generosity and altruism, because *we are born selfish* (pp. 2–3, my italics).

He contends, that is, that the appearance of ‘a limited form of altruism at the level of individual animals’ including ourselves, is only a deceptive phantom. The underlying reality, as he often says, is not any other individual motivation either, but the selfishness of the genes. Yet he just as often talks as if this established that the individual motivation *were* different from what it appears to be—as here, ‘*we are born selfish*’. His thought seems to be that individual motivation is only an expression of some profounder, metaphysical motivation, which he attributes to genes, and is bound therefore to represent it. And he has arrived at his notion of gene-motivation by dramatizing the notion of competition. Even as drama, this fancy is gratuitous. All that can be known about our genes from the fact that they have survived is that they are strong. If people insist on personification, the right parallel would no doubt be with a situation in which a number of travellers had, independently, crossed a terrible desert. It might happen that in doing so they had unknowingly often removed resources which would have saved the lives of others—but this could tell us nothing about their characters unless they had known that they were doing so, and scraps of nuclear tissue are incapable of knowledge. We could be sure only that such travellers were strong, and to make a parallel here we must examine the concept of gene ‘strength’. This strength is not an abstract quality, but is relative to the strains imposed at the time. The fact that people have survived so far shows only that they have had the genetic equipment to meet the challenges they have so far encountered. Human pugnacity had its place in this equipment. But since people are now moving into a phase of existence when that pugnacity itself becomes one of the main dangers to be faced, new selective pressures are beginning to operate. In this situation telling people that they are *essentially* Chicago gangsters is not just false and confused, but monstrously irresponsible. It can only mean that their feeble efforts to behave more decently are futile, that their conduct will amount to the same whatever they do, that their own and

other people's apparently more decent feelings are false and hypocritical. On the other hand, to tell them (what is quite different) that they have actually no motives at all and no control over their actions, that they live in a permanent state of post-hypnotic suggestion, helpless pawns in the hands of powers over whom they have no influence, is melodramatic and incoherent fatalism. The unlucky thing is that people enjoy fatalism, partly because it promotes bad faith and excuse-making, partly because the melodrama has a sado-masochistic appeal—an appeal which gets stronger the nastier the powers in question are supposed to be.

Dawkins, however, claims innocence of all this. He says he is merely issuing a warning that we had better *resist* our genes and 'upset their designs':

Be warned that if you wish, as I do, to build a society in which individuals co-operate generously and unselfishly towards a common good, you can expect little help from biological nature . . . Let us understand what our own selfish genes are up to, because we may then at least have the chance to upset their designs . . . (p. 3).

He does not explain who the 'we' are that have somehow so far escaped being pre-formed by these all-powerful forces as to be able to turn against them. He does not even raise the question how we are supposed to conceive the idea of 'building a society in which individuals co-operate generously and unselfishly towards a common good', if there were no kindly and generous feelings in our emotional make-up. He does however see some difficulty in accounting for the diversities of human conduct. This so far disturbs him that he produces for once an idea of his own, not derived from Trivers, Hamilton, Wilson or anybody else—the idea that cultural evolution is a process on its own, taking place in units called *memes* (short for mimemes):

Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperms or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation (p. 206).

These memes, equally with genes, are selfish and ruthless:

When we look at the evolution of cultural traits, and at their survival value, we must be clear whose survival we are talking about . . . A cultural trait may have evolved in the way that it has, simply because it is *advantageous to itself* . . . Once the genes have provided their survival machines with brains that are capable of rapid imitation, the memes will automatically take over. We do not even have to posit a genetic advantage in imitation (pp. 214–215).

So, apparently, if we want to study (say) dances, we should stop asking what dances do for people and should ask only what they do for themselves. We shall no longer ask to what particular human tastes and needs they appeal, how people use them, how they are related to the other satisfactions of life, what feelings they express or what needs cause people to change them. Instead, presumably, we shall ask why dances, if they wanted a host, decided to parasitize people rather than elephants or octopuses. This is not an easy question to handle for dances, but it will be still harder for scientific theories. Dawkins explicitly includes them as memes, so that the proper way to enquire about them seems to be, not to investigate their truth or any other advantage which they might have for the people using them, but to study the use they make of people. Here, to be frank, Dawkins blathers, and no wonder. The idea of memes is meant to save human uniqueness, to avoid producing the sense of insult which readers often feel on being told that their traits are inherited, and which they have a right to feel ten times more strongly after the account which Dawkins has given of inherited traits. But it is still an explanation of the only kind which (apparently) Dawkins can conceive, namely a metaphysical one in terms of autonomous, parasitical, non-human entities. Again it is unrelated to the facts, and on top of that this time it fails still more obviously and resoundingly in the job of providing 'units'. A meme is meant to be 'a unit of cultural transmission, or a unit of imitation'. In the case of genes, Dawkins has insisted very firmly on the permanence, distinctness and separability needed for such units, and because the general public does not realize that genes do not have it, he has more or less got by. In the case of 'memes' the simplest observer can see that no such standards can be met. Consequently, even if—absurdly—imitation were the essence of culture, it could not have units and the whole conception falls to the ground. Besides this, of course, the theory not only fails to give a proper, workable account of human freedom but sets up another, apparently impenetrable, barrier in the way of supposing that we are free at all. No wonder, then, that Dawkins hurries past his half-finished meme-construction to advise us, in peroration, to save ourselves from 'the worst excesses of the blind replicators' including memes. We are to do this partly by improved calculations of self-interest, but also, he says, partly by 'deliberately cultivating and nurturing pure, disinterested altruism—something that has no place in nature, something that has never existed before in the whole history of the world. We are built as gene machines and cultured as meme machines, but we have the power to turn against our creators.' Why it should be imagined that Dawkins and his disciples, beginning this enterprise now, could succeed when everyone else in recorded and unrecorded history who has tried it has managed only to become infested by memes (including scientific theories), does not emerge. Nor is it clear whether Mr Mackie is going to welcome this new enterprise.

Mary Midgley

Over memes there is, of course, a nightmare possibility of developing Dawkins's case. In a sufficiently depressed mood, a psychologist might really feel moved to describe the history of human thought in terms of its progressive infestation by conscious, self-interested, parasitical *bad ideas*. For the time, that might seem to him the only way of explaining the confusion he sees, the chronic waste of human speculative intelligence, the contentiousness, the showing-off, the neglect of obvious facts. In this project, he might well find his most convincing examples in theories of motivation, and specially in those (like Dawkins's) which simplify it by reduction and trade on fatalism. This topic is, of all important human enquiries, perhaps the hardest to approach impartially, the most prone to distortion both by oversimplification and bad faith. Modern specialization, too, has made it even more vulnerable to bad theories by dividing the critics who should provide immunity against them. There is now no safer occupation than talking bad science to philosophers, except talking bad philosophy to scientists. Should we then (he might wonder) resign ourselves to enduring all such manifestations, including *The Selfish Gene*, as impregnable alien life-forms, a kind of mental bacillus against which no antigen can ever be developed? Emerging finally from his bad mood, however, he would find strength to resist this idea. Entities (he would remind himself) ought after all not to be multiplied beyond necessity. Spooks should not be encouraged; less superstitious explanations are not hard to find. Slapdash egoism is not really a very puzzling phenomenon. It is a natural expression of people's lazy-minded vanity, an armchair game of cops-and-robbers which saves them the trouble of real enquiry and flatters their self-esteem. No non-human intervention is needed to account for it; it is a commonplace, understandable disorder of human development, like obesity or fallen arches. It is no subject for science fiction; ordinary care and attention are enough to remedy it.⁷

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⁷ For a fuller discussion of sociobiological ideas in their more modest, Wilsonian form, see my book *Beast and Man* (Cornell University Press, 1978; Harvester Press, 1979), Chapters 4–8. Up till now, I have not attended to Dawkins, thinking it unnecessary to break a butterfly upon a wheel. But Mr Mackie's article is not the only indication I have lately met of serious attention paid to his fantasies. What this shows is that, in the absence of a serious and realistic psychology of motive, people will clutch at straws. Moral philosophers, in particular, have so thoroughly and deliberately starved themselves of the natural facts needed to deal with their problems that many of them are reduced to a weak state in which they lack resistance to even the most obvious absurdities. Anti-naturalist diets must be altogether given up if this sort of thing is to be avoided.

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