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# The Selfish Gene

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I am an enthusiastic Darwinian, but I think Darwinism is too big a theory to be confined to the narrow context of the gene. The gene will enter my thesis as an analogy, nothing more.

What, after all, is so special about genes? The answer is that they are replicators. The laws of physics are supposed to be true all over the accessible universe. Are there any principles of biology that are likely to have similar universal validity? When astronauts voyage to distant planets and look for life, they can expect to find creatures too strange and unearthly for us to imagine. But is there anything that must be true of all life, wherever it is found, and whatever the basis of its chemistry? If forms of life exist whose chemistry is based on silicon rather than carbon, or ammonia rather than water, if creatures are discovered that boil to death at  $-100$  degrees centigrade, if a form of life is found that is not based on chemistry at all but on electronic reverberating circuits, will there still be any general principle that is true of all life? Obviously I do not know but, if I had to bet, I would put my money on one fundamental principle. This is

the law that all life evolves by the differential survival of replicating entities.\* The gene, the DNA molecule, happens to be the replicating entity that prevails on our own planet. There may be others. If there are, provided certain other conditions are met, they will almost inevitably tend to become the basis for an evolutionary process.

But do we have to go to distant worlds to find other kinds of replicator and other, consequent, kinds of evolution? I think that a new kind of replicator has recently emerged on this very planet. It is staring us in the face. It is still in its infancy, still drifting clumsily about in its primeval soup, but already it is achieving evolutionary change at a rate that leaves the old gene panting far behind.

The new soup is the soup of human culture. We need a name for the new replicator, a noun that conveys the idea of a unit of cultural transmission, or a unit of *imitation*. 'Mimeme' comes from a suitable Greek root, but I want a monosyllable that sounds a bit like 'gene'. I hope my classicist friends will forgive me if I abbreviate mimeme to *meme*.\* If it is any consolation, it could alternatively be thought of as being related to 'memory', or to the French word *même*. It should be pronounced to rhyme with 'cream'.

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. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain. As my colleague N. K. Humphrey neatly summed up an earlier draft of this chapter: '... memes should be regarded as living structures, not just metaphorically but technically.\* When you plant a fertile meme in my mind you literally parasitize my brain, turning it into a vehicle for the meme's propagation in just the way that a virus may parasitize the genetic mechanism of a host cell. And this isn't just a way of talking—the meme for, say, "belief in life after death" is actually realized physically, millions of times over, as a structure in the nervous systems of individual men the world over.'

Consider the idea of God. We do not know how it arose in the meme pool. Probably it originated many times by independent 'mutation'. In any case, it is very old indeed. How does it replicate

itself? By the spoken and written word, aided by great music and great art. Why does it have such high survival value? Remember that 'survival value' here does not mean value for a gene in a gene pool, but value for a meme in a meme pool. The question really means: What is it about the idea of a god that gives it its stability and penetrance in the cultural environment? The survival value of the god meme in the meme pool results from its great psychological appeal. It provides a superficially plausible answer to deep and troubling questions about existence. It suggests that injustices in this world may be rectified in the next. The 'everlasting arms' hold out a cushion against our own inadequacies which, like a doctor's placebo, is none the less effective for being imaginary. These are some of the reasons why the idea of God is copied so readily by successive generations of individual brains. God exists, if only in the form of a meme with high survival value, or infective power, in the environment provided by human culture.

Some of my colleagues have suggested to me that this account of the survival value of the god meme begs the question. In the last analysis they wish always to go back to 'biological advantage'. To them it is not good enough to say that the idea of a god has 'great psychological appeal'. They want to know *why* it has great psychological appeal. Psychological appeal means appeal to brains, and brains are shaped by natural selection of genes in gene-pools. They want to find some way in which having a brain like that improves gene survival.

I have a lot of sympathy with this attitude, and I do not doubt that there are genetic advantages in our having brains of the kind that we have. But nevertheless I think that these colleagues, if they look carefully at the fundamentals of their own assumptions, will find that they are begging just as many questions as I am. Fundamentally, the reason why it is good policy for us to try to explain biological phenomena in terms of gene advantage is that genes are replicators. As soon as the primeval soup provided conditions in which molecules could make copies of themselves, the replicators themselves took over. For more than three thousand million years, DNA has been the only replicator worth talking about in the world. But it does not necessarily hold these monopoly rights for all time. Whenever conditions arise in which a new kind of replicator *can* make copies of itself, the new replicators *will* tend to take over, and start a new kind of evolution of their own. Once this new evolution begins, it will in no

necessary sense be subservient to the old. The old gene-selected evolution, by making brains, provided the 'soup' in which the first memes arose. Once self-copying memes had arisen, their own, much faster, kind of evolution took off. We biologists have assimilated the idea of genetic evolution so deeply that we tend to forget that it is only one of many possible kinds of evolution.

Imitation, in the broad sense, is how memes *can* replicate. But just as not all genes that can replicate do so successfully, so some memes are more successful in the meme-pool than others. This is the analogue of natural selection. I have mentioned particular examples of qualities that make for high survival value among memes. But in general they must be the same as those discussed for the replicators of Chapter 2: longevity, fecundity, and copying-fidelity. The longevity of any one copy of a meme is probably relatively unimportant, as it is for any one copy of a gene. The copy of the tune 'Auld Lang Syne' that exists in my brain will last only for the rest of my life.\* The copy of the same tune that is printed in my volume of *The Scottish Student's Song Book* is unlikely to last much longer. But I expect there will be copies of the same tune on paper and in peoples' brains for centuries to come. As in the case of genes, fecundity is much more important than longevity of particular copies. If the meme is a scientific idea, its spread will depend on how acceptable it is to the population of individual scientists; a rough measure of its survival value could be obtained by counting the number of times it is referred to in successive years in scientific journals.\* If it is a popular tune, its spread through the meme pool may be gauged by the number of people heard whistling it in the streets. If it is a style of women's shoe, the population memeticist may use sales statistics from shoe shops. Some memes, like some genes, achieve brilliant short-term success in spreading rapidly, but do not last long in the meme pool. Popular songs and stiletto heels are examples. Others, such as the Jewish religious laws, may continue to propagate themselves for thousands of years, usually because of the great potential permanence of written records.

This brings me to the third general quality of successful replicators: copying-fidelity. Here I must admit that I am on shaky ground. At first sight it looks as if memes are not high-fidelity replicators at all. Every time a scientist hears an idea and passes it on to somebody else, he is likely to change it somewhat. I have made no secret of my debt in this book to the ideas of R. L. Trivers. Yet I have

not repeated them in his own words. I have twisted them round for my own purposes, changing the emphasis, blending them with ideas of my own and of other people. The memes are being passed on to you in altered form. This looks quite unlike the particulate, all-or-none quality of gene transmission. It looks as though meme transmission is subject to continuous mutation, and also to blending.

It is possible that this appearance of non-particulate nature is illusory, and that the analogy with genes does not break down. After all, if we look at the inheritance of many genetic characters such as human height or skin-colouring, it does not look like the work of indivisible and unblendable genes. If a black and a white person mate, their children do not come out either black or white: they are intermediate. This does not mean the genes concerned are not particulate. It is just that there are so many of them concerned with skin colour, each one having such a small effect, that they *seem* to blend. So far I have talked of memes as though it was obvious what a single unit-meme consisted of. But of course it is far from obvious. I have said a tune is one meme, but what about a symphony: how many memes is that? Is each movement one meme, each recognizable phrase of melody, each bar, each chord, or what?

I appeal to the same verbal trick as I used in Chapter 3. There I divided the 'gene complex' into large and small genetic units, and units within units. The 'gene' was defined, not in a rigid all-or-none way, but as a unit of convenience, a length of chromosome with just sufficient copying-fidelity to serve as a viable unit of natural selection. If a single phrase of Beethoven's ninth symphony is sufficiently distinctive and memorable to be abstracted from the context of the whole symphony, and used as the call-sign of a maddeningly intrusive European broadcasting station, then to that extent it deserves to be called one meme. It has, incidentally, materially diminished my capacity to enjoy the original symphony.

I have been a bit negative about memes, but they have their cheerful side as well. When we die there are two things we can leave behind us: genes and memes. We were built as gene machines, created to pass on our genes. But that aspect of us will be forgotten in three generations. Your child, even your grandchild, may bear a resemblance to you, perhaps in facial features, in a talent for music, in the colour of her hair. But as each generation passes, the contribution of your genes is halved. It does not take long to reach negligible proportions. Our genes may be immortal but the *collection* of genes that is any one of us is bound to crumble away. Elizabeth II is a direct descendant of William the Conqueror. Yet it is quite probable that she bears not a single one of the old king's genes. We should not seek immortality in reproduction.

But if you contribute to the world's culture, if you have a good idea, compose a tune, invent a sparking plug, write a poem, it may live on, intact, long after your genes have dissolved in the common pool. Socrates may or may not have a gene or two alive in the world today, as G. C. Williams has remarked, but who cares? The meme-complexes of Socrates, Leonardo, Copernicus and Marconi are still going strong.