memes. Memes are skills, habits, songs, stories, or any other kind of information that is copied from person to person. The term was coined by Richard Dawkins in his 1976 book *The Selfish Gene*. Memes, like genes, are replicators. That is, they are information that is copied with variation and selection. Because only some of the variants survive, memes (and hence culture) evolve. Memes are copied by imitation and teaching, and they compete for space in our memories and for the chance to be copied again.

On this view our minds and culture are designed by memetic selection, just as organisms are designed by natural selection acting on genes. Many memes succeed because they are useful to us, while others use a variety of tricks to get copied, regardless of their effect on either us or our genes. A central question for memetics is therefore 'why has this meme survived?', remembering that advantage to the human carrier is only one survival strategy a selfish meme might use.

Among the most virus-like of memes are chain letters and e-mail viruses. Their basic structure is a copy-me instruction (pass this message to all your friends) backed up with threats and promises, and they can be highly virulent. Dawkins pointed out that many religions have essentially the same structure and hence called them 'viruses of the mind'. Such religions use threats (hell and damnation), promises (heaven, salvation, and God's love), and instructions to pass them on (teach your children, read the texts, and sing hymns). Some use tricks such as promoting faith over doubt to reduce any sceptical enquiry into dubious claims. This approach makes sense of otherwise puzzling behaviours, such as celibacy. A truly celibate priest cannot pass on his genes, but having no children means he can devote his time and resources to spreading the memes of his religion, including celibacy. So the meme for celibacy succeeds.

Apart from religions, other viral memes include alternative therapies that do not work, new-age fads and cults, and astrology, which is immensely popular even though most of its claims have been shown to be false. Children's games, jokes, and urban legends also spread infectiously, and epidemiological methods can be used to study them.

The vast majority of memes are not viruses but are the very foundations of our lives, including all of the arts and sports, transport and communications systems, political and monetary systems, and science. Note that the memeplexes of science have a different structure from those of religion. Science certainly contains some viral memes, such as false theories and fraudulent claims, but it encourages critical enquiry and experimental testing as criteria for accepting or rejecting its memes. There are several mysteries about human nature that might potentially yield to a memetic explanation. Humans are extraordinarily cooperative and altruistic, often at great cost to themselves or their genes. Indeed, in those cultures with the best communications—and hence the most memes—many altruistic activities thrive, such as pacifism, vegetarianism, recycling, charity work, and the caring professions. People put enormous efforts into helping others who are not their relatives and who are unlikely or unable to reciprocate in the future. In other words these behaviours are hard to explain biologically. The memetic approach explains how these particular memes are able to spread and provides a very different view on the origins of morality.

A process that Susan Blackmore (1999) calls 'memetic drive' may also explain our exceptionally large brains and unique capacity for language. The turning point came when our early ancestors first began to imitate (a skill that is otherwise rare in the animal kingdom). This let loose the new replicator, the memes, which then began to spread. People who could copy the latest memes were at an advantage and so genes for the ability to imitate those memes also spread. As imitation got better and better this meant increasing brain size, and more memes. As the memes evolved in one particular direction, the genes were forced to follow. This explains why we are so good at dancing, music, and religious ritual—abilities that seem hard to explain in biological terms. Finally, since some memes are dangerous or even deadly, the coevolution of genes and memes forced us to copy memes selectively. In other words, unlike other species, we evolved as selective imitators.

This same process might account for the origins of language. On this view competing sounds were copied from person to person, and those of higher fidelity spread more than others. Human brains then evolved to become better and better at copying those winning sounds.

In early human evolution memes spread very slowly, and often vertically from parent to child. Today most memes are spread horizontally, and the machinery for copying them has moved on from human brains to books and newspapers, broadcasting, computers, and the internet. Communication is faster and more extensive all the time, and the internet is a vast playground for memes, supporting the next stage of memetic evolution.

Finally memetics has implications for the mystery of human consciousness. According to Daniel Dennett (1995), humans are a particular sort of ape infested with memes, human consciousness is itself a huge complex of memes, and the self is a 'benign user illusion'. Blackmore suggests that this illusory self is a collection of memes that have come together for their own mutual

protection and propagation, regardless of their effects on the organism that sustains them, and is far from benign. Ordinary human consciousness is distorted by the false idea of a self which has consciousness and free will. Practices like meditation can penetrate the illusion.

Memetics has many critics and is still in its early stages, but it provides testable predictions. Only future research will show whether the meme should be rejected as a useless virus or welcomed as a new idea with real scientific power. SJB

Aunger, R. A. (ed) (2000). *Darwinizing Culture: The Status of Memetics as a Science*.
Blackmore, S. J. (1999). *The Meme Machine*.
Dennett, D. (1995). *Darwin's Dangerous Idea*.