

1: Imitation Makes Us Human

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Introduction

To be human is to imitate.

This is a strong claim, and a contentious one. It implies that the turning point in hominid evolution was when our ancestors first began to copy each other's sounds and actions, and that this new ability was responsible for transforming an ordinary ape into one with a big brain, language, a curious penchant for music and art, and complex cumulative culture.

The argument, briefly, is this. All evolutionary processes depend on information being copied with variation and selection. Most living things on earth are the product of evolution based on the copying, varying and selection of genes. However, once humans began to imitate they provided a new kind of copying and so let loose an evolutionary process based on the copying, varying and selection of memes. This new evolutionary system co-evolved with the old to turn us into more than gene machines. We, alone on this planet, are also meme machines. We are selective imitation devices in an evolutionary arms race with a new replicator. This is why we are so different from other creatures; this is why we alone have big brains, language and complex culture.

There are many contentious issues here; the nature and status of memes, the validity of the concept of a replicator, the difference between this and other theories of gene-culture co-evolution, and whether memetics really is necessary, as I believe it is, to explain human nature. I shall outline the basic principles of memetics, show how memes could have driven human evolution, and consider some of these questions along the way.

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The new replicator

Fundamental to all evolutionary processes is that some kind of information is copied with variation and selection (Campbell, 1960). As Darwin (1859) first pointed out, if you have creatures that vary, and if most of them die, and if the survivors pass on to their offspring whatever it was that helped them survive, then those offspring must, on average, be better adapted to the environment in which that selection took place than their parents were. It is the inevitability of this process that makes it such an elegant and beautiful explanation of the origins of biological design.

But it should not be confined to biology. Universal Darwinism (Dawkins, 1976; Plotkin, 1993) is the idea that the same principles apply to any system which has the three requisites – variation, selection and heredity. With these in place you *must* get evolution. Dennett calls this the ‘evolutionary algorithm’, a simple mindless procedure which produces ‘Design out of Chaos without the aid of Mind’ (Dennett, 1995, p. 50). Arguably it is the only process that produces design for function.

Dawkins coined the term ‘replicator’ to refer to the information which is copied with variations or errors, and whose nature influences its own probability of replication (Dawkins, 1976). Our most familiar replicator is the gene; a replicator that builds itself vehicles (Dawkins, 1976) or interactors (Hull, 1988) in the form of bodies that protect the genes and carry them around. Selection may take place at the level of the organism (and possibly at other levels too) but individual bodies die – it is the replicator that is copied reasonably intact through successive replications and is the ultimate beneficiary of the evolutionary process.

This is why replicators are called selfish. Genes are not selfish in the sense that they have human-like desires and intentions (obviously not – they are just information in chemicals). Rather, they are selfish in the sense that they will be copied and proliferate if they can, without concern for the organism that carries them, or indeed for anything else, unless it affects their own likelihood of being copied.

In explaining Universal Darwinism, Dawkins wanted to get people out of the habit of thinking only about genes and so he provided a new example of a replicator. He argued that whenever people copy skills, habits or behaviours from one person to another by imitation, a new replicator is at work.

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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*. ... Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches (Dawkins, 1976, p. 192).

This, then, was the origin of the term ‘meme’. Its literal meaning is ‘that which is imitated’. So other examples include gestures and games, urban myths and financial institutions, scientific theories and complex technologies. Most of these are not simple memes but ‘co-adapted meme-complexes’ or ‘memeplexes’; groups of memes that fare better together than they would individually, so they tend to stick together, and get copied and passed on together, as in the rules, equipment and clothing for a game, or the hardware, software, and knowledge of how to use them for a mobile phone.

It is important to note that not everything you know or think about is a meme. If you are unsure whether something is a meme or not, then ask “was it copied from someone or something else?” If so, it is a meme, otherwise it is not. So the skills you learn by yourself and for yourself are not memes, nor are your memories of places you have seen or people you know, nor are emotions that cannot be accurately conveyed to anyone else. But every word in your vocabulary, every story or song that you know, and every idea you got from someone else is, and when you combine these to make new stories or inventions to pass on then you have created new memes.

Central to the idea of memes is that because they are replicators evolution will happen for the benefit of the memes themselves rather than for their carriers or for anything else. As Dennett (1995) emphasised, the ultimate beneficiary of any evolutionary process is whatever it is that is copied. Everything that happens, and all the adaptations that appear, are ultimately for the sake of the replicators. This idea is what distinguishes memetics from related theories in sociobiology, evolutionary psychology and gene-culture co-evolution theory. In *The Selfish Gene* Dawkins complained of his colleagues that “In the last analysis they wish always to go back to ‘biological advantage.’” (Dawkins, 1976, p. 193). This was certainly true, for example, when Wilson, the founder of sociobiology, famously claimed that “the genes hold culture on a leash” (Lumsden and Wilson, 1981) and took

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inclusive fitness (advantage to genes) as the final arbiter. Perhaps more surprisingly it is still largely true now. Wilson still argues that myths and social contracts evolved because of their benefit to genes rather than to themselves (Wilson, 1998), as does Durham (1991). Even Richerson and Boyd (2005), whose ‘costly information hypothesis’ theory is probably closest to memetics, argue that cultural variants are not replicators and that “Culture is on a leash, all right” even if the dog on the end is big and clever. Deacon’s (1997) theory comes close, especially in likening language to a personal symbiotic organism, but for him the turning point in human evolution was the acquisition of symbolic thought, not imitation. Donald’s (2001) theory of ‘mimesis’ (note the spelling) sounds as though it may be similar to memetics but is not (Blackmore, 2005): in fact Donald rejects meme theory completely.

The bottom line here is that for all these theories culture is an adaptation, created by and for genes. But for memetics culture is not, and never was, an adaptation. Imitation was an adaptation, allowing individuals to learn from each other, but the memes it unintentionally let loose were not. Culture did not arise for our sake, but for its own. It is more like a vast parasite growing and living and feeding on us than a tool of our creation. It is a parasite that we cope with – indeed we and our culture have co-evolved a symbiotic relationship. But it is a parasite nonetheless.

To understand this we have to make the same mental flip that biologists did when they stopped thinking about evolution as being for the sake of the species or the individual and started taking the gene’s eye view. We have to stop thinking of culture as an adaptation and start taking the meme’s eye view.

Taking the meme’s eye view

From the viewpoint of a meme, the important question is “How can I survive and get copied?” and usually this means “How can I get a human to pay attention to me, remember me, and pass me on?” Answers will be very varied but the general principle is that some memes succeed because they are good, useful, true, or beautiful, while others succeed even though they are false, useless or even harmful. From the meme’s point of view their value to us or our genes is irrelevant, while to us it is critical. We try to select true ideas over false ones,

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and good over bad, but we do it imperfectly, and we leave all kinds of opportunities for other memes to get copied – using us as their copying machinery. In other words, there is an evolutionary arms race between us and the memes that we find ourselves copying.

There are many useless, false, or even harmful memes that survive very well. Simple examples are self-replicating viral sentences, chain letters and various kinds of email virus, such as those that make impossible threats and demand that you pass them on to warn your friends. Their basic structure is an instruction to “copy me” backed up by threats and promises; a structure that is seen in other, more serious, memplexes.

Dawkins uses Catholicism as an example of a ‘virus of the mind’ (Dawkins, 1993); a vast memplex that has succeeded for centuries in spite of being based on such falsehoods as miracles, virgin birth, and the Holy Mass, in which the wine is supposed to turn *literally* into the blood of Christ, even though the wine still smells and tastes as it did before and would not show up as Christ’s blood in a DNA test. People infected with such a religion are exhorted to pass on their beliefs by converting others, bringing up lots of believing children, or punishing apostates. Compliance brings eternity in heaven (although of course it’s invisible to us living creatures and so cannot be tested); rejection brings gruesomely described tortures, whether in the hell of *The Bible* or the special fires and torments of *The Qur’an*.

Many religions use the altruism trick (Blackmore, 1999) by which people are made to feel good by believing. This is particularly ironic since religious belief may be bad for societies. Evidence from comparing developed nations suggests that the more religious a country is, the higher are its rates of suicide, murder, teenage pregnancy, and abortion – precisely the things that most religions rail against (Paul, 2005). Believers must also spend much time praying, singing or reading holy works, and must give money not just to the poor but to build more churches, mosques, or synagogues that will inspire further meme hosts. Thus do memes make believers work for their propagation.

Some authors have emphasised viral memes (including cults, fads and alternative therapies that don’t work) to the exclusion of all other memes. This is understandable given the importance of maladaptive cultural traits but it is important to remember that memes range from the completely viral through to the indispensable, and everything in between. In fact viral memes may be in a minority, with most of our

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culture consisting of memes that work at least as much for us as we do for them. These include our languages, the built environment, transport systems, communications technology and scientific theories. Without memes we could not speak, write, enjoy stories and songs, or do most of the things we associate with being human. Memes are the tools with which we think, and our minds and cultures are a mass of memes.

We can now take that big mental flip and see the world in a completely new way. Look out at the streets around you, the building you are in, or the cars passing by and now see them – all of them – as parts of a vast evolutionary system in which they are the winners in the competition to get copied and survive. Why is that house the way it is? Because those windows, that door, that style of roof, and all the many details that make it what it is, have won in the competition to get an architect to draw them, a builder to construct them, or an owner to buy them. Houses that people like fetch higher prices and so more like them get built. And so it goes on.

Step back a bit and think about a whole city. It is a spreading mass of copied memes – housing estates expanding; roads, railways and bus routes growing; the whole thing gobbling up resources, using humans as the willing meme machines that do the work.

Now step back a bit further and look at the whole planet. You might be looking down from an aeroplane at night, seeing those dense patches of lights, with curious streams of moving lights within them, or stretching out to other distant patches. They look like living creatures, and according to memetics that is precisely what they are. They were built on the basis of memes rather than genes, but the same principles apply.

This new view is different indeed from most people's normal way of looking at the world. Its power lies in its ability to unify all creative processes, both biological and cultural, within the same Darwinian framework. Yet after more than thirty years memetics is still not a thriving science.

There are many reasons for this. First, there are legitimate criticisms of memetics and many difficulties to be overcome (Aunger, 2000, Distin, 2005, Jablonka and Lamb, 2005). Second, there are repeated misunderstandings which cause people to abandon memetic explanations, such as thinking that memes must always exist as units, thinking that memetic inheritance is Lamarckian and therefore

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cannot occur, or thinking of memes as some kind of entity that may or may not exist rather than as the actual songs, stories or whatever is copied (Aunger, 2002; Midgley, 2000; Richerson and Boyd, 2005). Finally, some people seem to find memetics deeply unsettling in the way that it undermines free will, and the power of human creativity and consciousness (Midgley, 2000; Donald, 2001). I shall return to this point but for now simply note that fear is not a good reason for rejecting any theory. In my opinion memetics provides the best explanation of what makes us human.

How we got our big brains

One of the mysteries of human evolution is why our brains are so big. These outsize organs are expensive to build, dangerous to give birth to, and use a lot of energy to run, even during sleep. So there needs to be a very good reason.

Nearly all conventional theories start by assuming that the big brain was an adaptation (i.e. an advantage to human genes) but differ in what advantage it provided – for example it might have been implicated in complex social relationships, increased group size, gossip or more practical things like tool making (Deacon, 1997; Dunbar, 1996).

Memetics provides a completely different argument: that the increase in brain size was driven by and for the memes, as they transformed an ordinary brain into a meme machine. I have called this process memetic drive (Blackmore, 1999, 2001) and suggested that it would naturally begin as soon as our hominid ancestors were capable of imitating with sufficiently high fidelity to create the first memes. It does not matter what these were – possibly new ways of hunting, or lighting fires, or wearing clothes – but whatever they were they would change the environment in which human genes were being selected and give an advantage to individuals who could copy them.

Imagine a group in which someone discovered a new trick and some individuals were capable of copying it while others were not. If the trick was useful then the imitators would fare better, not only acquiring more useful survival tricks but higher status as others tried to copy them. They might also attract better mates and pass on (genetically) whatever it was that made them better imitators in the first place. Since imitation is a difficult skill (which is why most animals cannot do it), it is reasonable to assume that it requires a larger brain.

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The result would be that brain size would increase. As imitation ability in the population increased more memes would flourish putting more pressure on individuals to be able to copy them. This process could continue until it became too costly.

Thus far the argument is not very different from many others. It becomes different when we think of memes as a second replicator evolving in its own right. So the presence of memes has another effect. I assumed that the first successful memes were useful ones (that is useful to the people who carried them or to their genes) but once imitation ability improved all sorts of memes would be copied, and people would have to choose what to copy and what not to copy. Seriously dangerous memes, like jumping off cliffs for fun or setting fire to yourself, would kill off their carriers and probably not get passed on (although, like martyrdom, they might), but plenty of neutral or even slightly harmful memes might easily thrive, giving an advantage to people who could select effectively between memes.

This suggests the beginnings of an arms race between the two replicators, with genetic pressure to keep the brain small and best at copying biologically useful memes, and memetic pressure to produce a brain capable of copying as many memes as possible as accurately as possible. It is this competition that makes a memetic explanation for the increasing brain size so different from other explanations. The resulting brain is not just larger but has been turned into a selective imitation device whose properties depend on the results of memetic competition.

The difference becomes even more obvious when we consider not just the size of the brain but the things it is best at copying – such as language.

The origins of language

All other theories of the origins of language – and the question has been hotly debated for centuries – assume that language is an adaptation. For memetics language is not an adaptation but a parasite turned symbiotic partner; an evolving system in its own right that fed off the humans who selected, remembered and copied sounds.

Let us suppose that our hominid ancestors began imitating the sounds each other made, perhaps the sort of sounds that other primates make – food calls, mating calls, danger signals, and so on. Other

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primates cannot imitate well, but these early humans would be able to start copying the nuances of each other's calls, perhaps imitating the more powerful individuals, or starting whole lineages of different copying trends. In a society where imitation was prized, the number of sounds being made would increase and soon people would have to choose which to copy. In other words, looking from the meme's eye view, there would be competition between the sounds. So which would be copied most?

A general principle is that higher fidelity replicators do better. There is nothing magic about this rule. It simply means (in this example) that sounds that are more accurately copied will tend to survive unchanged for longer, and so increase in the meme pool. Once again, individuals capable of high fidelity imitation will gain higher status, attract more desirable mates and so pass on any genes responsible for their superior copying ability. So fidelity of copying will generally increase.

This example shows memetic drive at its clearest, and emphasises the difference between this and other theories. Because the sounds are a replicator in their right, dependent on their living copying machines, they will evolve into a more complex system with higher fidelity sounds as time goes by. But according to the vagaries of circumstance they might evolve in different ways and – here is the critical point – according to which direction memetic evolution took, so genetic evolution would have to follow. If certain sounds became popular then brains would, over time, begin to get better at copying those kinds of sound. In other words the brain would gradually be transformed into one that was designed to copy the very kinds of sounds that had evolved in the meme pool.

In fact the redesign of the human larynx, throat and brain for language was quite dramatic and is one of the features that most distinguishes us from other apes. According to memetics this redesign was driven by pressure from the memes.

Of course language is more than just meaningless sounds; those sounds refer to things and people and actions. This would come about as people copied the sounds that others made while they were looking at a particular object or doing a particular action, or watching someone else perform an action.

If this all seems too speculative or far-fetched it is at least clearly testable. In *The Meme Machine* I argued that if memetic drive really

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were responsible for the evolution of language then the same process should happen with simple robots that can imitate each other's sounds. I called them 'copybots'. In fact very soon after that such robots were built. Steels' (2000) 'talking heads' robots looked at a board covered with simple shapes and colours and imitated the sounds they each made while looking at them. After many iterations of a copying game, not only did the robots begin to agree on certain sounds, but the space of possible vowel sounds became split into sounds they did and did not use, and words that referred to the things they were looking at emerged too. Interestingly no observer could tell just what they were saying, but clearly the beginning of language was evolving from a very simple copying system. There have since been studies of the emergence of grammar and syntax in robots (Steels et al., 2001) and much research on language as an evolutionary system (Christiansen and Kirby, 2003). It appears that the capacity for imitation really is something very special.

Art, music and the lure of religion

Language makes us unique, but there are many other curious aspects of human nature that require explanation. Unlike other animals we seem to love music and singing, dance and theatre, painting and sculpture. Yet none of these provides an obvious survival advantage. As Pinker explains, "As far as biological cause and effect are concerned, music is useless" (Pinker, 1997, p. 528); and Dennett (1999) says we "cannot avoid the obligation to explain how such an expensive, time-consuming activity came to flourish in this cruel world." So why and how did they come about?

Miller (2000) argues that art has been sexually selected: that the songs, paintings, and other artistic creations are the equivalent of a deer's impressive antlers or the famous peacock's tail, whose functions are to attract mates. He cites evidence that men are more artistic, and that women prefer to mate with creative men.

I have suggested that sexual selection plays a part in memetic drive, but the theories are otherwise quite different. According to Miller, artistic creations are aspects of the artist's phenotype and do not necessarily evolve in their own right. By contrast, according to memetics, artistic creations are memes that compete with each other and evolve. Dennett (1999) gives the beginnings of a memetic

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explanation by imagining how music might have begun – a just-so story about the first infectious sounds.

One day one of our distant hominid ancestors sitting on a fallen log happened to start banging on with a stick – *boom boom boom*. For *no good reason at all*. This was just idle diddling ... mere nervous fidgeting, but the repetitive sounds striking his ears just happened to feel to him like a slight improvement on silence ... Now introduce some other ancestors who happen to see and hear this drummer. They might ... again *for no reason*, find their imitator-circuits tickled into action; they might feel an urge to drum along with musical Adam.

Dennett goes on to describe how drumming was copied and some drummings proved more infectious than others. It didn't matter why; the successful ones might have sounded nicer or been easier to copy but, whatever the reason, the drumming virus was born. He goes on to imagine that humming memes spread in the meme pool, the competition heated up, and hummings had to get more catchy, easier to hum, or more likely to gain attention, in order to get copied. By this time everyone lived in a music-filled culture.

The next step, which Dennett does not consider, is memetic drive. If drumming and humming became popular, and people who were good at them acquired status, then the pressures on hominid genes would change. It would then pay to have a brain that was good at copying drumming and humming, when previously it did not. Any genes that contributed to that ability would be favoured and so, gradually, hominid brains would be redesigned. The co-evolutionary process could continue indefinitely.

If this is how music evolved we can easily understand why modern humans have the sort of brains (and ears and hands) that help us enjoy making and listening to music. We are like that, not because music serves any biological function, but because musical memes long ago infected our ancestors and forced their brains to be redesigned. The same argument applies to any kind of art. So, for example, if techniques of cave painting or body decoration or singing evolved in competition with each other, then brains would be driven in the direction of getting better at copying the particular techniques that were successful. In other words, the direction taken by memetic evolution would drive the direction the genes had to take in building our bodies and brains.

Another related mystery is why we are so fond of religion and ritual. The answer could be that religious memes were highly successful

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in the past, putting pressure on people to enjoy religious behaviours and inclining them to believe religious ideas. If this is so it suggests a reason why, in spite of education and rational thought, and in spite of the harm done by religious war and oppression, it seems generally hard for people to live without religion.

This is really a general argument about the design of human nature. Whichever direction memetic evolution happened to take in the past, we humans would become better able to copy the memes that were successful – whether those were words, music, paintings, rituals or anything else. Our modern brains therefore carry the traces of all our past memetic evolution.

Human creativity

Creative design has always seemed to be somehow magical or special. The way it seems is that clever designs need something even cleverer to design them. Dennett (1995) calls this the “trickle down theory of creation”, the idea that it takes a big fancy smart thing to make a lesser thing. As he points out, you never see a horseshoe making a blacksmith or a pot making a potter. So it seems obvious that design requires a designer, and that the designer must be something cleverer than the design.

We now know that there is no need for a designer in biological design: evolution works from the bottom up by the mindless power of natural selection. Yet the intuition remains powerful and drives belief in creationism and the theory of ‘intelligent design’.

Turning to human thought and creativity, these too have been described as evolutionary processes (James, 1890; Popper, 1972), especially in the field of evolutionary epistemology (Campbell, 1960). Yet the intuition remains strong that somewhere inside ourselves there must be a designer, a conscious mind which originates novel ideas and creative output. Could we be wrong about this? I think so. Indeed I think it likely that *all* design works from the bottom up – human creativity included. Memetics shows how.

Let’s take the meme’s eye view again. Think about all the memes that have bombarded you today, from the words on your cereal packet and the news on the breakfast radio, to the ideas you dealt with at work, the e-mails, the phone calls, the letters and faxes, your favourite TV programme or bedtime reading. All day long memes are

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competing to get into your head. Those that succeed have some effect on your memory. They may be stored intact or twisted, but more importantly they get mixed up with all sorts of other memes. A human mind is a veritable factory for new memes. Every word in your vocabulary is a meme and you routinely mix them up to produce unique new sentences, but so are all the more complex ideas you come across. And if you are a creative person your new mixtures will be more interesting than other people's and will set off on their own with a chance of being copied again. This is, indeed, a creative process.

This is all that is happening as I write these words. All my ideas about evolution and memes have come from taking old ones and putting them together in new ways. It is certainly a creative process but not, I think, one that requires a conscious creator inside my head.

Or think of a painter or sculptor or potter who trains for years in techniques developed by others, practices for more years in putting paint to canvas or hands to clay, and then finds novel and exciting products emerging. In this context it is worth reflecting that artists are often surprised by their own creations. They can also be fiercely selective – destroying their own works if they don't like them. Many describe the state of mind in which their best work happens as a kind of 'flow' (Csikszentmihalyi, 1990) in which the self seems put into abeyance and the work creates itself. All this fits with the idea of human creativity as an evolutionary process working through human meme machines. It may seem rather sad to say that we don't really create anything through the power of conscious creativity, but it can be liberating, and I believe it is true.

Self and consciousness

Who then am I? One of the deepest mysteries of human nature is that we seem to be something like an inner conscious self who inhabits a body, rather than *being* the body. This has to be false.

It has to be false because there is no room in the brain for an inner self; there is no central place where the self could sit and receive impressions or from where it could send out the instructions to its arms and legs and mouth. The brain isn't even organised that way; it is a massively parallel system with no central controller and multiple systems all operating at once. Not only is there no place for a self, but there is no need for one. Although most people are dualists of one kind

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or another – believing in a non-material soul, spirit or inner self – philosophers have consistently argued that dualism cannot be made to work, and indeed there are almost no dualist philosophers today (Blackmore, 2003; Dennett, 1991; an exception is Chalmers, 1996).

The interesting question then becomes – if dualism is false why are we so easily deluded? If there is no inner self why does it seem as though there is?

Once again people have attempted biological explanations, for example arguing that it helps our survival to believe in a self who has to be protected. This does not work for the simple reason that the mystery is not why we protect our own bodies – every animal does that with or without belief in a soul – but why we think we are so much more than our physical shell, why it seems as though we are something that controls that body with our own free will, and may even survive after it is dead.

Memetics provides a possible answer by asking whether it would benefit the memes to construct a false idea of self and free will. I think it could. Imagine a child growing up and learning to speak. At first the word ‘I’ refers to this body rather than any other body, but soon the child, immersed in the world of natural language, learns to say lots more things – like ‘I want’, ‘I think’, ‘I believe’, or ‘I know’. Sentences with ‘I’ in them proliferate, and take with them the false idea that there is a single inner self who is the ‘I’ referred to. More and more memes coalesce around this word until it seems just obvious that there must be an inner ‘I’ who has all these desires and wishes, plans and hopes, fears and intentions, when really there is just a meme machine mixing up old memes to make new ones and sending them on their way.

Living life as a meme machine

What makes us human? In the beginning it was imitation and the appearance of memes. Now it is the way we work as meme machines, living in the culture that the memes have used us to build.

Is it depressing to think of ourselves this way – as machines created by the competition between genes and memes, and in turn creating more genes and memes? I don’t think so. We have got used to the idea that we need no God to explain the evolution of life, and that we humans are part of the natural world. Now we have to take a step further in the same direction and change yet again the way we think about

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ourselves, our consciousness and free will (Blackmore, 2006). But this is precisely what makes it so exciting being human – that as meme machines we can, and must, reflect on our own nature.

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