At the end of Charles Darwin's famous book, *The Origin of Species*, there is a beautiful paragraph in which he contemplates "an entangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth." Which of us has not, at some point, sat with Darwin on his "entangled bank" - or taken some other mental snapshot of the natural world - and marvelled, as he did, at how "from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved"? Which of us has not contemplated nature in all its diverse complexity on the one hand, and evolutionary theory in all its essential simplicity on the other, and been struck, as Darwin was, by "the grandeur in this view of life"?

I want to invite you to do the same, today, with human culture: to take a mental snapshot of all that humans pass on to each other socially, rather than genetically, and ask yourself how what we learn from each other has become so much more complex and diverse than what members of any other species learn from each other.

My snapshot will be different from yours, and different again from Justin's, who was born in Hong Kong but is now being educated in England. Ask Justin to talk about home, and his mind leaps straight to Sunday meals with his extended family: all of them gathered around a big circular table, using chopsticks to eat rice dishes cooked on the stove top with delicious sauces; talking mostly to the other children and feeling rather shy with the adults. He talks of his apartment home in a fast-paced, densely populated city; of the domestic helper who used to look after him during the week while his parents were at work on the mainland; of the specially designed furniture that creates space for her to sleep in the apartment's kitchen; of the vast gatherings of helpers on Sundays in the public squares; of long hours spent in tutorial classes after school each day. And what of England? Too many potatoes and not enough rice, says Justin! Not enough sauce, either, and why do things always dry out when they're cooked in the oven? He likes the space and the clean air in the countryside around his boarding school, though, and muses thoughtfully on the amount of contact that English children have with their parents, and how their upbringing seems to him much less strict than his own.[1]

Housing and furniture; cooking techniques and intergenerational relationships; immigration laws and employment patterns; schooling and parenting habits … how has what we humans learn from each other become so very complex and diverse? This book's thesis is that what we need, to account for

[1] My thanks to the boys of School House, Warwick School, for this snapshot of life in Hong Kong.

human culture, is a new kind of evolutionary theory: one in which the same general laws to which Charles Darwin pointed in nature are also at work, but in a different jurisdiction. Evolution is a gradual, inter-generational process of change in a population's characteristics, and cannot happen unless variations in that population's characteristics are inherited across many generations. In nature, the unit of selection is the gene. In culture, Richard Dawkins has suggested, we might talk of the *meme*: "A unit of cultural inheritance, hypothesized as analogous to the particulate gene, and as naturally selected in virtue of its 'phenotypic' consequences on its own survival and replication in the cultural environment." (Dawkins 1982:290)

The evolution of an idea

My version of Dawkins's hypothesis has, itself, evolved over time. The ideas in this book were first nurtured by an eclectic mix of authors whose writings I discovered as a schoolgirl (Charles Darwin and Richard Dawkins, of course, but also Aristotle and Lucretius, John Steinbeck and Arthur Koestler, among others). They began to germinate in 1990, when I wrote an undergraduate dissertation on the relationship between mind and brain, which the following year resulted in my being awarded the Jacob Bronowski prize for History and Philosophy of Science by the University of Cambridge. And they first came to fruition in the summer of 1993, as I was coming to the end of a Master's degree in Philosophy at the University of Sheffield. To complete the course, I needed to write a 12,000 word dissertation, but with less than four weeks to go before the deadline for submission I had yet to decide on the topic. I was still intrigued by the nature of mind, and for reasons that I cannot now recall my thoughts turned back to Dawkins's meme hypothesis, which I had first encountered several years before. Was there something in it that could help me to make sense of the emergence of mind from matter? As well as Dawkins, I was still reading Koestler, and by now I had also encountered more of the writings of Gilbert Ryle and Karl Popper. Over the next four weeks, I began to pick out the common threads in the work of these four thinkers.

Richard Dawkins had opened up the exciting possibility that a form of Darwinism might be able to account for the emergence of human mind and culture: a form of evolution in which the unit of selection is not the gene but the meme. But what *are* memes, if they exist? We know that genes have their basis in DNA, but it is harder to see what might form the basis of a unit of cultural selection. Karl Popper (1972) had written about the evolution of scientific knowledge, and about how, when we think, the world of our subjective conscious interacts with the world of objective knowledge. The content of

our thoughts, said Popper, exists independently of us - and this led me to explore the idea that memes might be units of representational content: cultural information preserved in a representational form that has a potential effect on or through those who acquire it.

Gilbert Ryle's (1979) comparison of thinking with teaching provided some early clues to the ways in which these units of information might be replicated - the ways in which the content of my mind might be transmitted to yours - and this was further illuminated by an insight that is found in both Richard Dawkins's (1976) and Arthur Koestler's (1979) writings: the fact that complex replication will always be more successful if that complexity is hierarchically organised.

Finally, if cultural information is to evolve, then it must not only be preserved and replicated, but also vary from time to time. Arthur Koestler's (1964) exploration of the nature of innovation was the catalyst for my thoughts about recombination and mutation in culture. I concluded that it was possible to defend Dawkins's meme theory, and spent the next two years exploring how that might be done. The result was the doctoral thesis that formed the basis for this book. It was completed over the summer of 1995, lay dormant until I had chance to return to it, and was then expanded and re-shaped to become *The Selfish Meme*, published in 2005 by the Cambridge University Press.

Memes: representations in languages

The Selfish Meme explores in more detail those early ideas about the nature of memes and how the essential elements of evolutionary theory might work in culture. Ideas and customs develop at a pace that is far too great to be picked up at the level of biological evolution, and Richard Dawkins had suggested that we should look instead to evolution within culture itself. Evolution, as we have seen, cannot happen unless variations in a population's characteristics are inherited across many generations - but in fact, variations in a population's characteristics are not directly inherited: they are instead the expression of variations in inherited *information*. Genes are units of biological information, replicated via cellular inheritance mechanisms, with particular properties that are due to their basis in DNA. In *The Selfish Meme* I argue that the culture we see all around us is the artefactual and behavioural expression of variations in cultural information, and that memes, the units of cultural information, have particular properties because they consist in representational content. Members of many other species are of course capable of forming representations of the world around them, but memes are representations of a particular kind: they are those bits of our mental 'furniture' that control our behaviour in response to the information that they carry, which we can link in our own minds to

other such representations, and which preserve their content in a way that can be transmitted to other people.

Individual representations gain meaning from their context within a representational system. Different representational systems have evolved to fit different areas of culture, and so we can find content represented in natural languages but also in what, in a later book (Distin 2011), I call 'artefactual languages': systems of representation such as the written word, musical notation or the conventions of architectural drawings, which are realized in objects made or fashioned by humans. Once we begin to consider these artefactual languages, it becomes apparent that there are many novel concepts that we simply cannot grasp until the relevant representational system has been developed. The way in which we represent information shapes the way in which we are able to think about it.

Some memetic controversies

The Selfish Meme was published almost three decades after the book that launched memetics (Dawkins 1976). During that time, Dawkins himself had written little more about memes, but others had begun to contribute their ideas, and inevitably controversies had emerged about some aspects of Dawkins's hypothesis. One key question was where memes are to be found. Writers like Daniel Dennett (1991) had claimed that memes exist primarily in external artefacts like tools, buildings and wagons, which carry the idea of those artefacts from mind to mind, and that human consciousness is a complex of the effects that these memes have on human brains. But we have seen that evolution is the product of variations in inherited *information*: what we observe in culture, as in nature, is the *expression* of variations in that information. Since memes are the units of cultural selection, this means that they must be units of cultural information - and cultural information is not represented in artefacts like tools, buildings or wagons. It is represented in natural and artefactual languages, and is expressed in these external artefacts, as well as in culturally learned behaviours. What this means is that memes can be found both inside human minds and in the cultural media that carry representations of the content of human minds - books, speech, maps, memory sticks - but *not* in anything (like a wagon) that does not have representational content.

Another question that had been asked in the memetics literature was whether cultural information is ever truly replicated. Dan Sperber (1996) had said that cultural information is not replicated but transformed and reconstructed in the process of cultural transmission. Robert Aunger (2002) had denied that the same information can be replicated in more than one medium. Susan Blackmore

(1999), on the other hand, had claimed that memes are truly replicated and that imitation forms the basis for all memetic replication. Who was right? In *The Selfish Meme* I argue that some forms of information transmission are so much more complex than what we normally mean by 'imitation' that it is unhelpful of Blackmore to want to restrict cultural replication methods in that way. But I disagree with Sperber's claim that the complexity of the processes of cultural transmission undermine the possibility of true cultural replication: the (admittedly complex) processes of inference and decoding that are involved in cultural transmission are the *mechanisms* of cultural replication, not an alternative to it. Finally, I agree with Aunger that the representational system and medium in which information is represented will have a significant impact on evolutionary dynamics, but disagree that this means that information cannot truly be replicated across media.

As I had discovered in my early dissertation, the replication of complexity will always be a more stable process if that complexity is hierarchical, and cultural complexity is no exception. This means that cultural information, like biological information, must be represented in particulate units, which can be assembled into stable hierarchies rather than being blended and diluted in the process of being transmitted to the next generation. Critics of memetics, such as Maurice Bloch (2000), had denied that culture can be divided into discrete elements, but in *The Selfish Meme* I argue that we can find the same evidence for the particulateness of memes as Mendel once presented for his gene theory: the clear presence or absence of the replicators' effects on the world. And here it is important to remember that in memetics, just as in genetics, replicators exist independently of their effects. Even when their effects appear to blend (in the skin colour of a person of mixed race, for example), the replicators themselves are still a particulate representation of the information about those effects.

A virus of the mind?

The recombination and mutation of existing memetic information produces the variation that, over time, gives rise to cultural evolution. The direction of variation will be unpredictable in culture, as it is in nature, and random with respect to fitness. Information will gain and retain human attention if it is more fit to its environment than the available alternatives. There is no guarantee that what emerges will be the best in absolute terms, because fitness is always a relative concept: the successful memes will simply be those that are more fit for the current memetic, genetic and environmental context than the alternatives.

Richard Dawkins (1993) has famously claimed, however, that some cultural information succeeds not because it is actually fitter than the alternatives, but because it is in effect a virus of the mind. Whereas 'good memes', like evidence-based scientific theories or great music, succeed because people evaluate them and see their (relative) worth, these mental viruses succeed because they hijack and exploit the normal processes of cultural replication, rather as a physical virus hijacks and exploits the replicative machinery of an organism's cells. In particular, Dawkins is well-known for his view that a belief in God (or indeed gods, the Tao or any other spiritual aspects of reality) is a virus of the mind, the success of which can only be explained by the fact that children catch it at a vulnerable age and later ensure that their own children catch it too.

Dawkins is right, of course, that harmful errors are replicated and preserved via the same cultural mechanisms as useful truths, but this does not tell us whether the belief in God is a harmful error or a useful truth, any more than it tells us whether memetics or any other hypothesis is true or false. In *The Selfish Meme* I argue that Dawkins has based this part of his hypothesis on a false analogy between nature and culture. In nature, the genes in an organism produce the cellular machinery for their own replication: they build an organism, and their success depends on their producing beneficial effects on its chances of survival and reproduction. The genes in a virus, on the other hand, simply hijack the replicative machinery that the genes in an organism have built, and their success depends merely on their ensuring that they are copied. But in culture, there are no memes that build the machinery for their own replication: cultural information is replicated by human minds, which certainly cannot develop their full potential without the stimulus of culture, but which are not *built* by memes in anything like the way that human bodies are built by genes - and therefore there is nothing analogous to an organism for mental viruses to hijack.

Human minds are, rather, the product of a unique interaction between two separate evolutionary processes. Biological evolution has produced human bodies and brains whose potential depends on their ongoing interaction with human artefacts and behaviours. Cultural evolution has produced human artefacts and behaviours whose potential depends on their ongoing interaction with human bodies and brains. At one level, we can give a complete description of human nature and human culture in terms of mindless evolutionary algorithms. At another, equally accurate level, we can describe them in terms of choices and emotions, consciousness and intelligence. The world can be seen through a variety of theoretical lenses - physical, chemical, biological, cultural or psychological -

and the mindlessness of the cultural evolutionary algorithm need no more undermine our identity as conscious selves, than does the mindlessness of physical or chemical descriptions of our interactions.

The explanatory value of memetics

If it is true that we can add a memetic level of description to our understanding of human behaviour, then what does this level of description give us? Gene theory has unified and increased our understanding of nature in countless ways. What advantages does meme theory bring to our understanding of culture?

Some would argue that memetics has no real explanatory value. It is a theory that does still provoke a measure of hostility in some circles. Part of the problem is that memetics has not always been explored with proper intellectual rigour, and some academics have therefore come to see it as less well-established and more speculative than it really is. Part of the problem is that different evolutionary biologists will inevitably take different approaches to their subject, and people who disagree with Richard Dawkins's particular approach to biology are unwilling to take on board his theory of culture. And part of the problem is that memeticists need to be very careful in our handling of the gene-meme analogy, because when we aren't, the credibility of memetics suffers. *The Selfish Meme* discusses, for example, how the handy distinction between information and its "vehicles" has misled some authors to regard anything as a meme vehicle so long as it travels between humans, and to talk about memes as though they could "leap" from brain to brain, forgetting to ask important questions about *how* memes might be able to achieve this.

Doubtless the reason for this confusion is that, as this book shows, language shapes thought. If we are not careful, therefore, then using the term "vehicle" will nudge our thoughts in a particular direction. (It is perhaps no coincidence that Daniel Dennett's favourite example of a meme vehicle is a wagon with spoked wheels, which is of course literally a vehicle.) Nevertheless, there is a very positive aspect to the way in which language shapes thought, which is that the development of specialist representational systems enables us to grasp concepts that we would not otherwise be able to access. For me, the use of memetic language has certainly been key in the development of my ideas about cultural evolution, enabling me to grasp and work with ideas that I could not otherwise have accessed so easily. It was with regret that I put down this handy conceptual tool before writing my next book on this subject (Distin 2011), in order to avoid distracting readers who are used to

dismissing memes out of hand. In truth, I believe that our understanding of human culture is not only unified but also enriched by a memetic theory of cultural evolution.

Indeed, this has been amply demonstrated by the ways in which memetics has been used to inform research and practice in a wide variety of cultural areas. For instance, a research team at the BBC World Service Trust drew heavily on the ideas in this book to inform the creation of their media outputs for a malaria communication campaign in Cambodia (Khosla 2008). This approach helped the team to prioritise and focus their messages, against the background of a complex and contradictory set of malaria beliefs and practices in their Cambodian audiences. The international collaborative project, *Visual Exploration of Cultural Design in Style*, which investigates the design style features of South Korean and Spanish cultural artefacts, has productively related this book's concept of cultural DNA to its methodology (Ji-Hyun Lee, personal communication). In addition, I am aware of research projects that have been completed in recent years, which apply this book's ideas to cultural areas as diverse as the professional conservatism of teachers in India; aspects of the UK's National Health Service; the impact of workspaces on organisational culture; sex ratio dynamics in China; font design and typography. Meme theory's explanatory power is already being demonstrated in a way that crosses international and cultural borders.

My own research currently focuses on how we can look with intellectual integrity for the answers to life's big questions. There are myriad different worldviews, and the differences between many of them are significant (compare, for example, Atheism with Christianity or Taoism). Memetics is a theory about the development of ideas and information: it cannot tell us whether those ideas are true or false, beneficial or harmful. But this does not mean that there is no truth to be found, and no value in the search for it. Meme theory can help us to understand the complex interplay between human nature, culture and environment, to chart the factors that influence our beliefs and attitudes, and to see how false or pernicious ideas can succeed despite the weight of rational evidence against them. Against this background, we can perhaps begin to discern more easily the paths that might lead us towards the truth.

It is my great privilege to write a Foreword to the Chinese translation of *The Selfish Meme*. My ideas in this field have continued and no doubt will continue to evolve, but the core of the theory is still to be found in this book.

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