These are Susan Blackmore's thoughts on the workshop on cultural evolution convened by Dan Dennett in Santa Fe in May 2014. Dennett's introduction is here.
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There was much agreement at the wonderful working party in Santa Fe. For example, we agreed about the importance of re-production, reconstruction, teaching and demonstration as well as true imitation. I loved DS's T-shirt folding video, but concluded that the variety and complexity of these processes does not detract from the fact that the folded T-shirt and the skill of folding it are memes that are passed on and selfishly compete with other variants.

We all agreed that there is always a leash (if have previously implied that the memes could entirely escape, I would now suggest this is only possible in the digital world of temes). We all agree that, as RB put it 'imitation did not just happen' but arose because of relevant selection pressures.

I'm sure others will describe the many areas of agreement better than I can. I would prefer to note some points of disagreement or openness and the shifts that took place as we discussed the wide range of differing ideas and research methods.

In my introduction I wrote, "The question that drives my interest is whether memetics is fundamentally different from other theories of cultural evolution or not." By the end of the week I am much clearer about the issues involved but concerned that to some extent we need to resolve semantics first. For example, some (e.g. OM) would like the word 'meme' to expand to include all cultural items (which would include some that recur without any kind of replication), while others (NC) would like to stick to memes as replicators. I remain convinced of the power of memetics while others are not. For example, RB and DS argue that it should be seen as a special case of wider cultural processes and PR emphasises the many items that are not at all meme-like or 'memish'. Here are some further thoughts.

Be careful of analogies.

NC and DS claim that for memetics the analogy between genes and memes 'is deep indeed' and assumes direct equivalents, such as a cultural phenotype. I argued that memetics is not based on analogy but on the principle of universal Darwinism: the idea that memes undergo the same evolutionary algorithm as genes. This means some analogies will be close (because of the underlying processes) and others misleading (because genes depend on high fidelity cellular chemistry while memes depend on the complexities and weaknesses of human meme machines). The most troublesome analogies are:

1. Germ-line phenotype distinction. RB suggested that memes live in vehicles or interactors. But for most of memes' relatively brief life there has been no germ-line phenotype distinction and so no meme vehicles or interactors. However, as one might expect, they have recently appeared and are spreading fast. Printing presses, car factories and computer software all copy the instructions for making more books, cars and digital products rather than copying the products directly. Kayaks (an example much used at the meeting) were copied from other kayaks during most of their evolution but when I bought my modern plastic kayak in a shop, I tried out several models before choosing one of many identical ones made on a factory production line.

2. Guided variation or directed change. This disanalogy is often remarked upon, especially in criticisms of memetics. 'Learners are smart shoppers not compulsive imitators' (PR on OM). So it was useful to hear about instances of possible directed change in biological evolution. I was previously under the impression (from many comments in the literature) that guided variation is always destructive but having learned more from our discusssions I now want to think about when

and how it either speeds up the search or leads to traps. I would expect the digital revolution to provide examples of increasingly random variation but I do not know of any non-trivial examples of this.

Are memes attractors?

DS urged me to agree that memes are attractors. I much enjoyed reading the Phil Trans paper, presenting 'Blackmore on Claidière', and using ECMs to think about cultural evolution, but I became increasingly concerned about where innovation comes from. A breakthrough occurred for me when DS explained that the matrix applies to memes that do not yet exist, leading DD to imagine new memes being 'sucked into existence' by hetero-impacts and a discussion of whether this entails cranes or skyhooks, and how shifting the level of abstraction can switch homo- to hetero-impact. In the end I conclude that ECMs describe an abstract space in which memes are drawn into attractors, but memes themselves are not attractors.

Are memes information?

Yes. PGS gave us an excellent primer on information and its bearing on sending, receiving and copying information, and made the interesting point that true imitation requires no co-evolved sender-receiver relationship. After interesting discussions I concluded (for the moment) that, as DD put it, 'all the push and pull happens at the level of tokens' but for explanatory purposes we need to work at the type level (e.g. discussing words as memes). Not everyone agreed about the status of either genes or memes as information but nearly everyone used the word 'information' when discussing memes. I think it's still helpful to stick with Dawkins' original formulation of memes as information copied with variation and selection, even though so much uncertainty surrounds what is meant by 'copied' in this context.

Are memes replicators?

This is really the crux for memetics. I may have been guilty of emphasising too strongly the role of imitation. So now, having been urged to think a lot more about the relevance of reconstruction, re-production, teaching and demonstration, I will be more careful. Yet I agree with OM that in thinking about memetic evolution the psychological complexities can, for some purposes, be abstracted away (or bracketed), and cultural items that are propagated by many different methods can still be classed as replicators. This still leaves the question of how much of culture can be considered meme-like. NC's animal work was useful here, as were the discussions of cultural group selection (RB, PR). On this topic there was a lot of discussion and little agreement – not, I think, because people had differing fixed views but because of the complexity of the issues. I think we made a lot of progress even if we came to no firm conclusions.

Creativity

DD claimed that the termite mound and the cathedral, though looking similar, are created by entirely different processes. I believe they are really the same. The cathedral depends upon meme evolution both between people and within the architects' and builders' heads. So both constructions are designed by Darwinian processes (is there any other kind of design?). This relates to OM saying there is no core; no inner self as designer. Theories of cultural evolution extend the tendency of science to overthrow our self-centred view of the universe.

Where are memes going?

DD claims that culture is getting less Darwinian, whereas I think the opposite. Many (perhaps all) of us found PGS's 3d spaces helpful, and he and DD gave interesting examples of more or less

Darwinian cultural processes. However, I cannot see that, in general, culture is de-Darwinizing. Recent increases in the fidelity, longevity and fecundity of memes suggest the opposite, e.g. with digitisation through language, writing, printing and computers, and the cultural shift from learning by apprenticeship to learning by text. As for the future, I predict further increases and greater autonomy for memes, as well as a shift in power towards a third replicator based on digital information copied, varied and selected by machines. Such temes will surely continue spreading and increase in their ability to restructure the human mind.

I found the whole week absolutely delightful – challenging, interesting, and exciting. I would like to thank everyone who was there, as well as Dan for bringing us all together in such a wonderful place.