Implications for memetics

By Susan Blackmore

Commentary on Steels, L. and Belpaeme, T. Coordinating perceptually grounded categories through language: A case study for colour.

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ABSTRACT

The implications these models have for memetics are discussed. The results demonstrate the power of memes (in this case colour words) to influence both concept formation, and the creation of innate concepts. They provide further evidence for the memetic drive hypothesis, with implications for the evolution of the human brain and for group differences in categorisation.

MAIN TEXT

Steels and Belpaeme's results are, as they point out, among the first computer simulations to show "how the memetic evolution of language and meaning are possible". They do not explore the further implications of this for memetics, and I propose to do so here.

The basic principle underlying memetics is that memes (including words) are replicators; they can compete with each other and with other replicators in both memetic evolution and meme-gene co-evolution. This contrasts with some other theories of cultural evolution in which, as Wilson puts it, the genes will always keep culture on a leash (Lumsden & Wilson 1981). For memetics there is no obvious leash; either replicator can take on the role of dog or owner under different circumstances. These interactions have previously been modelled (e.g. Bull, Holland & Blackmore 2000, Kendal & Laland 2000) and are modelled in new ways by Steels and Belpaeme.

The critical experiment for meme-gene co-evolution is in section 4.4 where they explore the influence of language on the genetic evolution of colour concepts. In their model, not only do word forms compete to describe the colour space, but agents' concepts evolve "genetically". In this key experiment communicative success of the agents determines fitness, so that agents with the best communicative skills are used to make mutated copies for the next generation.

There are two process here that are highly relevant to memetics. First (section 4.3), when the simulation is run many times the successful memes (colour words) are different each time, which in turn influences the colour concepts the agents adopt (the Sapir-Whorf thesis). This shows the power of memetic evolution to influence concept formation. Second (section 4.4), when communicative success determines fitness, the adopted concepts become genetically assimilated. This is the process that I have previously called memetic drive (Blackmore 1999). It implies that the direction taken by memetic evolution (in this case the winning words) drives the direction taken by genetic evolution (in this case innate colour categorisation). In other words, the vagaries of memetic success end up influencing the genetically encoded colour categories.

Although Steels and Belpaeme do not mention this, it seems likely that as the simulation proceeds, the mutated agents will increasingly start with a fitness advantage over agents like those that started the simulation, because their innate colour concepts map more closely onto the memetically evolved colour words in use in that population. In other words, outsiders would be at a disadvantage in learning the colour words and so (in this model) less likely to become good communicators and survive to the next generation. This would be another reason why, when cultural or memetic factors play a role in

fitness, the divergence between populations becomes more pronounced.

If this process occurs in human evolution, there are two significant implications. First, our brains could have been shaped by the results of memetic evolution. That is, the words that happened to evolve in the past (and they might easily have evolved differently), have influenced the ways in which we innately categorise the world. Second, it implies that differences between populations could be greater, or form more quickly, than is assumed on purely genetic models or on models of cultural evolution that do not treat their cultural units as replicators.

Is this plausible? I think so. There is plenty of evidence that, in human mate selection, being articulate, artistic and creative (Steel's and Belpaeme's "communicative success") is highly prized. Miller (2000) interprets this in terms of runaway sexual selection, but the models used here demonstrate the memetic alternative. Although it is generally assumed that people from any ethnic background are equally capable of learning any human language (Pinker 1994), there may still be differences to be found if we knew what to look for. The methods used here would allow the relevant variables, such as population size and degree of isolation, to be modelled, and specific predictions made.

Steels and Belpaeme have confined their models to colour concepts and words, and to some extent have generalised their findings to all of language. The memetic drive hypothesis can be extended well beyond this to the idea that many aspects of brain design are the way they are because of the history of memetic evolution. For example, the way religious memes evolved in the past (including rituals, or concepts of gods and spirits) could have shaped our peculiarly religious natures (Dawkins 1989, Blackmore 1999) and thus explain the persistence of religious concepts even in highly educated societies. The way that musical memes happened to evolve could have designed our musical abilities (Dennett 1999) thus explaining a skill that Pinker (1997) describes as being biologically "useless".

More controversially, the process of memetic drive might have implications for understanding group differences in cognitive ability. Indeed this troublesome issue might usefully be reframed, building on Steels and Belpaeme's work, in terms of group differences in innate categorisation. Making plausible assumptions about human population sizes, degree of isolation, and timescale, the methods developed here could be used to model human gene-meme co-evolution and find out whether we should expect to see existing human populations that differ in their innate ways of categorising the world because of differences in their past memetic evolution. In these and other ways Steels and Belpaeme's work should prove valuable for testing many memetic hypotheses.

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