

Between brain and culture

John Morton

Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition. By Merlin Donald. *Harvard University Press: 1991. Pp. 413. \$27.95, £22.25.*

How did the modern human mind evolve from its presymbolic form? Donald proposes that there have been three radical transitions in the evolution of human culture and cognition since the time of our ape-like bipedal ancestors. Two of these transitions are straightforward enough. The first was a change to *Homo erectus* through the emergence of the ability to re-enact events — what Donald calls the “mimetic” skill. The second change, to *Homo sapiens*, is associated with the emergence of speech. It is the final, most recent, nonbiological change that created modern humans.

Like modern apes, our ape-like ancestors were procedurally skilled and had good perceptual and memory abilities. To this was added mimetic skill — the ability to represent knowledge through nonlinguistic voluntary motor acts. These mimetic acts were defined primarily in terms of their representational function and served to create a semantic reference system. The mimetic culture required a degree of social attribution, some teaching skill, and both social coordination and collective knowledge. Many of these skills have in the past been attributed uniquely to language, yet Donald argues not only that the language-less mimetic culture possessed all of them, but that collectively they provided neither a sufficient drive nor a springboard for the invention of language. Language, Donald stresses, “evolved in, and continues to be employed in, a wider cultural context.”

And so to the second important genetically based transition, the development of the human vocal tract, which would not have happened without a radical change in hominid communication; this in turn required the existence of appropriate cognitive skills, driven by the types of mental models that the hominids were creating. The result was a cognitive system that allowed *Homo sapiens* to evolve a complex preliterate culture encompassing causal explanation, prediction and control. Donald calls this the “mythic” culture, a culture which survives in many parts of the world today.

On the other hand, there were three crucial cognitive phenomena that seem to have been underdeveloped in this

oral-mythic culture: graphic invention, external memory and theory construction. These features of modern humans arose through the interaction of cognition with culture. Whereas oral-mythic cultures rely heavily on individual biological memory, modern cultures rely much more on external memory devices, mostly on various symbolic systems ranging from cuneiform and hieroglyphics to alphabetic languages and mathematics. The use of such devices, particularly from a young age, has the effect of reconfiguring the way in which the central nervous system is organized. Thus, for Donald, cognition is the mediator between brain and culture.

Donald argues his case by drawing particularly from evolutionary biology and cultural anthropology but also from cognitive science and neuroscience. His argument accumulates in dribs and drabs rather than growing along foreseen paths. Unusually, he has no axe of his own to grind — this is the only academic book I have read that does not contain any reference to the work of the author. But he does seem to have picked up a few axes belonging to other people on his travels, some of which have become blunt through hard use, and these deviations make some sections of the book unexpectedly hard going. Donald is weak, curiously, on the representation of his theory, having few visual graphics in

the book to represent his mental modelling. And his theory lacks a developmental perspective. Ontogeny must certainly recapitulate phylogeny for Donald's third stage (unless Lamarck is allowed to the party), and there is plenty of relevant work available on cognitive development.

Donald is, of course, the product of his culture as well as his cognition. People are thinking nowadays at several levels about the interaction of genes with environment. There is enormous interest in the role of literacy both in culture and in cognition. And there is work in which the species-typical environment is regarded as being an equal partner to the genotype. So Donald's thesis will undoubtedly find a proper place in the scientific culture. Let me leave you with his final evolutionary challenge — consciousness:

Fear of the homunculus begets irrational behaviour in cognitive scientists. They dread the truth: in a tiny slab of brain there resides a consciousness capable of all we have achieved and experienced; and obviously, on one level, *there is a homunculus*. The homunculus is synonymous with the reflective, conscious mind, and somehow, somewhere in the protean parenchyma of mind, it must reside. □

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WHAT is the truth about the nuclear disaster at Chernobyl in 1986? Vladimir Chernousenko, a senior consultant to the Ukrainian Academy of Sciences Commission that was responsible for rectifying the consequences of the accident, claims in *Chernobyl: Insight from the Inside* that between 5,000 and 7,000 people died as a result of the accident and clean-up operations. The official death-toll is 31. But other scientists remain sceptical of his claims (see *Nature* **351**, 4; 1991). Further, a study coordinated by the International Atomic Energy Agency found that the accident did not result in any measurable radiological health effects (*Nature* **331**, 335; 1991). Nonetheless, many Western scientists share Chernousenko's concerns about the safety of scientists still working at Chernobyl (pictured here is the “rudimentary” protective clothing worn by the so-called ‘liquidators’) and the continuing operation of the RBMK-type reactor used there. Published by Springer, price DM68, £24.50.