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Evolving Thought

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Review Articles

Evolving Thought

Origins of the Modern Mind. Three Stages in the Evolution of Culture and Cognition
by Merlin Donald, 1991,
Cambridge MA & London: Harvard University
Press, 413pp.

Mark Lake

This book is a brave attempt to rectify what the author identifies as a major problem in contemporary cognitive science – the failure to produce broad integrative theories capable of giving direction to the field. Since a lack of bold theorizing also characterizes the archaeology of human origins, Donald's work should be of as much interest to palaeoanthropologists and archaeologists as to cognitive scientists.

Two aspects of Donald's analysis are particularly stimulating. The first is the use of a theoretical framework capable of incorporating biological and technological factors in a single evolutionary continuum. The second is his specific thesis about the evolution of the modern mind which includes a model of the cognitive abilities of *Homo erectus*. Donald is not an archaeologist, and his treatment of the archaeological record is sometimes inadequate. Nevertheless, he has thrown down the gauntlet. In the absence of an alternative model for the origin of the modern mind, disputes over 'fact' will carry little weight, and Donald's will be a hard act to follow.

Donald's aim is to derive a model of higher cognitive structure that is compatible with available neurological evidence and plausible given conventional evolutionary constraints. The author begins by outlining the dichotomous nature of approaches to the problem of mind and the difficulties which they entail. On the one hand there are modular approaches which postulate specific modules for different cognitive abilities. These have tended to be non-evolutionary, and have given rise to structural models which may not be plausible when viewed from an evolutionary perspective. Unitary models, on the other hand, attribute the power of the modern mind to a general learning capacity made possible by encephalization (the expansion of the cerebral cortex),

and thus require a less complex evolutionary scenario; the notion of a general learning capacity, however, is not supported by neuropsychological evidence.

Donald sets out to bridge the divide between these two models by offering a structural proposal with a corresponding evolutionary thesis. He focuses first on cognitive architecture: changes in this may be facilitated by altered neuroanatomy, the functional rearrangement of existing neural resources, or external technological developments. Next he emphasizes the need for an interdisciplinary approach in the spirit of Darwin, stressing that there is no reason to suppose *a priori* that mind lies outside the realm of the natural sciences. He then moves on to address the issue of cognitive stages, arguing here that each major phase in the evolution of the modern mind has involved a new mode of representation, but that at each stage the earlier modes have remained intact.

The second half of the book develops Donald's specific thesis. He argues that there have been three major transitions *en route* to the modern mind. Basic primate cognition is characterized as episodic: our closest living relatives are capable of sophisticated event-perception (particularly in the social sphere) but are incapable of abstraction. Their ability to use but not spontaneously create symbols is the result of a reliance upon situation-dependent 'memory flashbacks'. The first transition, therefore, was from the episodic culture of the apes and australopithecines to the mimetic culture of *Homo erectus*. According to Donald, *Homo erectus* was able to represent any event with the deliberate intent to communicate; an ability founded on a combination of primate event-perception and an extended conscious map of the body. In many respects this is the most exciting part of the book. Donald's method is revealed clearly in his account of a cognitive ability which is no longer the principal level of operation for any extant species.

The second transition coincided with the appearance of *Homo sapiens* and involved the switch from mimetic to mythic culture. The crucial element in mythic culture is the ability to construct conceptual models; this is intricately bound up with language, whose initial function was not communication but a means to facilitate the formalization and unification of thought.

The final – and perhaps unfinished – transition was to a cognitive architecture which involves external symbolic storage. Here material symbols provide an extension to biological memory, one which frequently outlasts the lives of individuals, and which leads the author to argue that the ‘individual mind has long since ceased to be definable in a meaningful way within its confining biological membrane.’

It is Donald’s choice of cognition as the principal level of analysis which facilitates his multidisciplinary approach and which renders his work of considerable interest to archaeologists. He rightly regards cognition as the mediator between biology and culture, and in so doing he assigns Palaeolithic archaeology a crucial role in the wider debate about human origins, since it is only through archaeology that we can examine the cognitive abilities of specific hominids. If cognitive architecture is not determined solely by neural anatomy then major changes in cognition may not be manifest in the fossil record in the form of altered cranial morphology. Similarly, vestiges in the modern mind may provide evidence for past cognitive abilities, but since they contain no intrinsic information about the timing of change they are incapable of supporting an evolutionary thesis. The fact that *Origins of the Modern Mind* makes considerably more use of the evidence available from the study of neural pathologies than that from archaeology may explain why Donald’s evolutionary thesis is weaker than his structural proposal – a problem to which I return below.

If this account places archaeology in its proper place in the study of human evolution it also provides the basis of a framework capable of transcending current divisions within the discipline. There is a growing awareness amongst specialists of later prehistory that material culture does not reflect thought in a passive manner but also plays an active role in structuring it, although attention has been focused on specific meanings rather than on the structure of thought itself. Students of earlier prehistory, by contrast, regard material culture primarily as a means of adaptation; it has a complex feedback with evolutionary processes but is limited in its scope by the cognitive capacities of its creators. Both approaches are partial: the former lacks an evolutionary perspective capable of dealing with long-term change while the latter denies material culture an evolutionary dynamic of its own, regarding it as a ‘tool’ used to solve problems which are independently caused and perceived. By concentrating on cognitive architecture Donald has overcome these limitations: the power and scope of cognition can be

attributed either to biological change or to the possibilities afforded by material culture as an external memory system. Thus material culture is given a creative role within an evolutionary perspective, and the resulting framework is appropriate for all periods from the Lower Palaeolithic to the present day.

Donald’s theoretical framework has much to offer archaeology, but his treatment of archaeological data is less sophisticated than his use of data derived from the cognitive sciences. Given the vital role of archaeology in examining the timing and context of hominid evolution it is no coincidence that his evolutionary thesis is weaker than his structural proposal. In chapter 6, which most clearly demonstrates his method, Donald argues that *Homo erectus* possessed a mimetic culture in which the highest level of processing was the modelling of perceptual events in self-initiated motor acts. His argument has three strands: first, that the evolutionary starting point is the episodic culture of the apes; second, that even without language the modern human mind is superior to that of apes; and third, that the cognition of *Homo erectus* must serve as a basis for the later arrival of language. Having used evidence from clinical psychology to identify a mimetic phase in human cognitive evolution, Donald turns to the archaeological evidence to demonstrate that this phase coincides with *Homo erectus* rather than *Homo habilis* or archaic *Homo sapiens*. If the selective pressures that gave rise to a capacity for mimetic culture are to be identified, it is essential to know something about the anatomy, environment and activities of the hominid which developed that capacity.

Regrettably, Donald’s use of archaeological sources is inadequate. Many of his assertions about the archaeological record are not referenced (unlike his cognitive science) and of the few works cited most are dated and/or simplistic. In outlining the difference between the abilities of the earlier hominids (the australopithecines and *Homo habilis*) and *Homo erectus* Donald makes a number of claims which are problematic: first, that the earlier species remained in an essentially ape environment; second, that their tool-making ability was absent or minimal; and third, that they had a relatively modern social organization which may have involved home-base behaviour. In contrast, *Homo erectus* successfully colonized a range of new habitats, and Acheulean artefacts provide ‘extensive and solid’ evidence for increased tool manufacture. Donald is right that the fossil evidence for early hominids is confined to sub-Saharan Africa, but such a gross level of resolution is inadequate for

discussion of evolutionary processes. Having 'come down from the trees', early hominids occupied a very different microhabitat from that of their closest primate relations. This does not alter the fact that *erectus* inhabited a wider range of environments, but it does indicate the need to be clear about what are the important dimensions of variability. The patchy resource structure of a mosaic savanna environment may have required greater cognitive abilities on the part of the australopithecines and *Homo habilis* than Donald suggests. Similarly his treatment of early hominid tool behaviour is surprisingly simplistic. He argues that Oldowan tools may not have been manufactured, but instead that 'found tools could have been collected, perhaps slightly refined by striking against a harder surface, and left behind in one place after use.' Viewed as imposition of form, Oldowan artefacts are less complex than those of the Acheulean, but it is not at all clear that the context of tool manufacture was significantly different. Spatial aspects of Oldowan tool-use may have been just as developed, involving the transport of raw materials and perhaps the curation of finished tools. Finally, although the social organization of the earliest hominids is an extremely contentious issue, it is probably fair to say that the degree of co-operation postulated by Lovejoy (whom Donald cites) no longer finds widespread support in the literature.

These weaknesses in Donald's use of archaeological data undermine his evolutionary thesis. Episodic culture permits a considerable amount of social interaction, sufficient according to Donald to overcome the increased risk of inhabiting a more open environment without any significant technological advances – hence the minimal tool-making but increased co-operation supposedly evident in the australopithecines and *Homo habilis*. Archaeological evidence, however, suggests that the ability of *habilis* to inhabit a mosaic savanna environment may also have depended on technological advance, not in terms of highly-developed tool forms but rather in the spatial organization of tool manufacture and use. In the realm of technology these early hominids were capable of a degree of anticipation and curation which Donald associates with the mimetic culture of *Homo erectus*. The greater refinement of the tools made by *erectus* does not provide evidence for more advanced instrumental technology; rather it reflects the improvement wrought by mimetic culture in the transmission of skills. In functional terms, Acheulean tools confer relatively little advantage over their Oldowan predecessors, so it is difficult to construct an argument for the selective advantage of 'improved'

tool manufacture. It may be that the increased complexity of Acheulean tools provided an important vehicle for acculturation rather than an improved means of interacting with the physical environment. This might explain the prolonged association of Oldowan tools with *Homo erectus* in the Far East: a wooded environment similar to the ancestral ape environment permitted smaller group-sizes which did not require formal channels for socialization. A social role for the increased sophistication of Acheulean tools would also explain why they show practically no variability across widely differing environments. Thus mimetic culture does not exhibit the one-to-one mapping with *Homo erectus* that Donald suggests. Some of the more general integrative skills may already have been present in certain of the earlier hominids (Donald's conflation of *Australopithecus africanus*, *Australopithecus robustus* and *Australopithecus boisei* is potentially dangerous in this respect), while the more localized 'support modules' appear to have come into their own with *Homo erectus*.

It would be foolish to suggest that the above in any sense refutes Donald's thesis. It does indicate, however, that his model remains vague in establishing the selective pressures which gave rise to mimetic culture. A more detailed treatment of the archaeological record would make his argument more convincing.

Similar criticisms could be applied to Donald's use of archaeology in documenting the transitions from mimetic to mythic culture and from mythic culture to external symbolic storage, but here again *Origins of the Modern Mind* contains tantalizing glimpses of the way forward. He discusses the work of Plotkin and colleagues, who propose that the process of evolution occurs at different levels each sensitive to events of different frequency. Donald then makes the highly significant observation that over the course of hominid evolution there has been a decrease in the breadth of adaptive radiation, i.e. there have been fewer and fewer competing hominid subspecies. Finally, he argues that mythic culture facilitates the piecing together of a large number of episodes so as to give a place and meaning to smaller-scale events. These three ideas point to the significance of perception: as the modern mind evolved, it was able to perceive events occurring over increasing (and decreasing) temporal and spatial scales. The number of coexisting subspecies may have decreased because the capacity for event perception at new scales effectively broadened the hominid niche. Since event-perception is a function of cognitive architecture, the challenge facing archaeologists aiming to document

cognitive evolution is to determine the scale of perception operative at different points in hominid evolution. The evidence available includes the spatial organization of stone tool technology, rates of change of tool morphology (which will reflect the degree and type of social interaction), and the scheduling of resource exploitation.

Origins of the Modern Mind should prove inspirational, both for those specifically interested in hominid evolution and for those who want to understand the role played by material culture in the human career. Donald has developed a model of hominid cognition which is bolder and more inclusive than anything yet attempted by archaeologists. His treatment of aspects of the archaeological record may lack sophistication, but its broad scope largely outweighs the individual failings. He has challenged archaeologists to put their work in its proper context and make a contribution to the wider debate about what it is to be human – and how we came to be that way.

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