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Symposium: Emergence of Mind

Abstract Package

Iain Davidson

Archaeology and Palaeoanthropology

School of Geography, Planning, Archaeology and Palaeoanthropology

University of New England, Armidale, NSW 2351, AUSTRALIA

Recent discussions of the emergence of mind have emphasised the need to consider evidence from all of the disciplines of primatology, psychology, and linguistics as well as physical anthropology and the archaeology of subsistence, stone artefacts, bone tools, ochre, art and the spatial organisation of activities within sites and across landscapes. Views have polarised around two hypotheses: an early emergence to account for the evidence of expansion of brain size, the earliest appearance of regular use of stone tools and changes in subsistence at the time of the emergence of the first fossils that physical anthropologists call *Homo*; a late emergence, probably associated with the use of symbols and dated some time between the appearance of fully modern humans, *Homo sapiens*, in Africa and the colonisation of Australia. In this session, data relevant to both early and late hypotheses are presented in the light of understandings of primatology, psychology and linguistics by specialists in physical anthropology, and the archaeology of subsistence, stone artefacts, bone tools, ochre, and the spatial organisation of activities within sites and across landscapes. In particular there are papers about the latest tantalising evidence from the Middle Stone Age of southern Africa.

CRANIAL CAPACITY AND THE EMERGENCE OF MIND

Iain Davidson
 ARCHAEOLOGY AND PALAEOANTHROPOLOGY
 School of Human and Environmental Studies,
 University of New England,
 Armidale NSW
 AUSTRALIA

Abstract: Between 3 and 2 million years ago the range of cranial capacities of hominids was small and showed little or no change over the period. Between 2 million years ago and 1.5 million years cranial capacity increased both its range of variation and its size when all hominids are considered together. At about 1.5 million years the smaller end of the range of variation disappeared. The new lowest values were about 650 ml. Between 1.5 million years and about 400 thousand years there was very little change in cranial capacity, though both lower and upper limits increased slightly (by about 100 ml). At 400 thousand years, the upper limits of hominid cranial capacity increased, reaching a maximum about 50 thousand years ago with the now extinct Neandertals. About 200 thousand years ago, the smaller end of the range of variation again disappeared

The early change in cranial capacity is closely related to changes in body size. But the second increase in cranial capacity was not accompanied by an increase in body size. This was an unequivocal increase in relative brain size, completed about 250 thousand years ago.

This paper relates these changes to the emergence of language and mind.

The need to communicate precise information about time and place as a selection pressure for the evolution of speech.

Gwen Hewitt
 Department of Life Sciences,
 Roehampton Institute,
 West Hill,
 London SW15 3SN,
 U.K.

e-mail - g.hewitt@roehampton.ac.uk

Evidence from the size of hominid fossil thoracic vertebrae indicates that complex control of speech breathing (necessary though not sufficient for full speech) evolved later rather than earlier, after *Homo ergaster* (or early *Homo erectus*). Evaluation of indirect evidence for the timing of changes in group organisation from archaeological sources (e.g. use of home base sites and controlled use of fire) and from principles of behavioural ecology (e.g. increased size of home range and day journeys, increased predation pressure and energetic constraints) suggests that the fission-fusion patterns of extant human hunter-gatherer groups may also have emerged during the same time period. Human hunter-gatherers forage in widely dispersed smaller units and meet at night in larger groups of relatively consistent

composition, often in different locations, from one night to the next. Other primates that have fission-fusion patterns of organisation do not do this. They either meet in stable groups at the same site each night (e.g. hamadryas baboons and spider monkeys), or sleep in small units wherever they finish foraging (e.g. chimpanzees) or meet in groups of variable composition at variable sites (e.g. guinea baboons). They use loud calls to maintain contact while foraging and to locate other members of their group whereas humans use language in order to plan where and when to meet. This paper evaluates the possibility that this change in pattern of group organisation (rather than any one individual behavioural change) may have been an important selection pressure for the evolution of speech. It is proposed that a major pressure for evolution of speech was to facilitate the planning of group movements and to allow flexible foraging groups to meet consistently at variable communal sleeping sites.

DID HOMO ERECTUS COGNITION INCLUDE A TECHNICAL MODULE?

Thomas Wynn
University of Colorado

Recently Steven Mithen has suggested that *Homo erectus* cognition was characterised by several discrete intelligences or modules, one of which was a technical module devoted to tool manufacture. Two line of evidence support this contention: first, modern technical learning is heavily motor in nature and unlike forms of symbolic learning, and second, the archaeological record presents a picture of monotonous technological conservatism over vast span of time. However, other evidence is difficult to incorporate into this model. Non-human primates, for example, can learn effective tool manufacture and use without any obvious technical module. Also, the imposition of symmetry requires the importing of a concept of symmetry that had probably evolved for non-technical reasons, either navigation or reproductive fitness recognition. It therefore seems unlikely that *Homo erectus* cognition was made up of modules that were entirely discrete and self-contained, and that some kind of general intelligence was in place.

The Behavioral Ecology of Carcass Acquisition and Utilization by Plio-Pleistocene Homo in East Africa

Henry T. Bunn
Dept. of Anthropology
Univ. of Wisconsin
Madison, Wisconsin, USA

Patterns of skeletal element representation and of stone tool-induced butchery marks on mammalian bones from archaeological excavations at Olduvai Gorge, Tanzania, and Koobi Fora, Kenya, indicate that by approximately two million years ago, significant shifts to a diet of increased animal tissue and to a foraging strategy of repeated food transport to so-called home bases, characterized the subsistence adaptations of at least some early members of the genus *Homo*. Because the Plio-Pleistocene was a defining period in the evolution of our genus, with increased meat consumption relative to earlier australopithecine diet plausibly being a significant factor, the reconstruction of the subsistence behavior of early *Homo* has generated stimulating debate for several decades. Although most researchers would probably

now agree that early *Homo* repeatedly transported portions of large mammal carcasses to favored localities on the paleolandscape for further butchery and consumption of meat and fat, there are many unresolved issues concerning carcass acquisition by hunting and/or some form of scavenging, carcass condition and the significance of food transport and amount of animal tissue consumed, and the presence/absence of human-like forms of cooperation and food-sharing behavior. To counterbalance recent studies that emphasize reliance on modern large carnivore behavior in national park ecosystems to model carcass acquisition and use by early *Homo*, this paper presents comparative results from a long-term study of the behavioral ecology of Hadza foragers in Tanzania, to provide relevant insights on the dynamics of carcass acquisition by hunting AND power scavenging, on resulting carcass yields and butchery patterns, and on implications for modeling the foraging behavior of early *Homo*.

CULTURAL MODERNITY IN THE MSA OF SOUTHERN AFRICA: WHAT IS THE EVIDENCE?

Lyn Wadley
Department of Archaeology
University of the Witwatersrand

The issue of whether cultural modernity exists in the MSA of southern Africa is controversial. Cultural modernity has not been clearly defined in the existing southern African literature and it is difficult to "play the game" without having rules. I examine the problems associated with defining cultural modernity in the African context and review the archaeological evidence for modernity.

The results from technological and spatial studies carried out at Rose Cottage Cave, Free State, and Sibudu Cave, KwaZulu Natal, are discussed. On the one hand, at Rose Cottage Cave there is clear evidence of spatial differences between Pleistocene and Holocene camp site arrangements. On the other hand, at Sibudu there is evidence for bone-working in the MSA. In the European Palaeolithic sequence bone-work is considered an attribute of modern human behaviour.

“Archaics”, “moderns”, and the “muddle in the middle”

A.G.M. Sinclair and P.S. Quinney

Recent models of development in hominid behaviour have stressed the difference that exist between so-called ‘modern human behaviour’ as practised by anatomically modern humans, and that of archaic populations. Symbolic behaviour allows modern humans to transcend time and space in managing their social networks and landscape resources. Without symbolic resources pre-modern humans are constrained in the present and by their powers of memory. It is clear, however, from both archaeological and anatomical variation that there is considerable variability in the behaviourable repertoire and capacity of pre-modern humans. Our task is to

characterise and understand this variability. This paper will attempt to do so far four aspects of hominid behaviour (1) planning depth and temporal displacement, (2) the size and complexity of social groups, (3) the control of landscape resources, and (4) the evidence for non-modern symbolic behaviour. The purpose is to specially propose a series of different hypothetical models for Middle and early Upper Pleistocene behaviour which might be examined via the archaeological record. The evidence that we shall use derives from current fieldwork in the Makapansgat region, South Africa, and from the long cultural sequence from the Cave of Hearths in particular.

The Misuse of Stone Tools

JP White
University of Sydney

Some recent analysis of the Upper Palaeolithic phenomenon have argued that finely made and shaped stone tools can be used as a marker of the development of fully human cognitive capacities. This claim is belied by the archaeologies of Papua New Guinea and Australia, where modern human, both agriculturists and hunter-gatherers, rarely made and used more than simple flakes.

Skin-changing ritual performance in the Middle Stone Age

Ian Watts

In southern Africa the use of earth pigments became habitual in the early Upper Pleistocene, sometimes between 120,000 and 100,000 years ago. In procurement and processing there was preferential selection of materials with bright red properties. Utilitarian hypotheses cannot adequately account for the archaeological record of ochre use, I conclude that the predomination mode of use was as body-paint - strongly suggestive of habitual ritual skin-changing performances. This is significant in its own right, but the fuller cognitive significance emerges when contextualised both with the broader archaeology of the early Upper Pleistocene MSA and the interrelated debates on the evolution of symbolic behaviours and the spread of modern humans. The irregular use of red ochre by evolving archaic *H. sapiens* is associated with early evidence for hearths, grindstones, and some kind of 'home-base' arrangement. The regular use of the ochre is associated with the first evidence for a move away from an exclusive use of local•

Seeing yellow: pigment use in the Zambian Middle Stone Age

Barham, L.
Centre for Human Evolutionary Research
Department of Archaeology
University of Bristol, UK

Mineral pigments recovered from the Middle Stone Age levels (130-30 ka) at Mumbwa Caves, Zambia, show a preference for the colours red, purple and yellow.

Raw material sources have been identified as local laterites (hematite and limonite) and distant (22km) outcrops of specular hematite. The use of yellow pigment (limonite and possibly heat treated sandstone) comes as a surprise given the overwhelming predominance of red in the southern African MSA. Limonite has also been found in an early MSA context (200 ka) in Zambia (Twin Rivers). Together, these two sites suggest a central African variant of pigment preference in the MSA, and one which challenges current sex strike models for the evolution of symbolism and ritual.

EXPLORING BEYOND SUBSISTENCE ACTIVITIES AT THE FLORISBAD MIDDLE STONE AGE BUTCHERY SITE?

Zoë Henderson
National Museum
P.O. Box 266, Bloemfontein
9300, South Africa
e-mail: zoelh@nasmus.co.za

This paper evaluates the spatial analysis of a high resolution Middle Stone Age butchery site in central southern Africa, dated to about 121 000 years ago. Patterning in the distribution of lithics and faunal remains in the excavated area indicates certain consistencies in the procurement and processing of carcasses. The suggested dynamics of early modern human hunting and butchering activities are explored in terms of the possibility of extracting more than primarily subsistence focussed information from the excavated material.

The role of enhanced breathing control in the evolution of human language

Ann MacLarnon, School of Life Sciences, Roehampton Institute London, West Hill, London SW15 3SN, UK

The evolution of modern human language from the nonhuman primate condition involved changes in a range of cognitive and physical features. One aspect neglected until recently is the evolution of enhanced breathing control. This is necessary for the production of long phrases punctuated at suitable linguistic breaks, as well as the control of emphasis, pitch and intonation, all of which are essential elements of meaningful human speech. Subtle, complex muscle movements interlinked with cognitive factors are involved, requiring very fine, integrated control of a set of thoracically innervated muscles. Evidence from the thoracic vertebral canal of fossil hominids, the bony encasement of the thoracic spinal cord, indicates that *australopithecines* and *Homo ergaster* (or early *Homo erectus*) did not possess breathing control greater than that of extant modern primates. Neanderthals and early modern humans from Skhul had enhanced breathing control like that of contemporary humans.

It is highly improbable that such a rare feature as increased thoracic innervation for enhanced breathing control evolved more than once in human evolution. Various phylogenetic scenarios have been proposed for the relationship between Neanderthals, modern humans and other

hominids. Increased size of the thoracic vertebral canal is one more feature of potential relevance to this contentious area of the human evolutionary tree. The timing and patterning of the evolution of enhanced breathing control is also an important element of the history of the evolution of human language.