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NOTICES

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, do please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, do let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

SCIENCE NEWS – New Zealand birds show humanlike ability to make predictions

Whether it’s calculating your risk of catching the new coronavirus or gauging the chance of rain on your upcoming beach vacation, you use a mix of statistical, physical, and social information to make a decision. So do New Zealand parrots known as keas, scientists report today. It’s the first time this cognitive ability has been demonstrated outside of apes, and it may have implications for understanding how intelligence evolved.

https://www.sciencemag.org/news/2020/03/new-zealand-birds-show-humanlike-ability-make-predictions?utm_campaign=news_daily_2020-03-03&et rid=17774313&et cid=3229793

SOCIETY FOR SCIENCE – New fossils and artifacts show Homo erectus crafted a diverse toolkit

Ancient hominid made stone tools demanding a range of skills and planning, a study finds.

<http://click.societyforscience-email.com/?qs=1cb27ce12a362e6e3cd569e1fcb7c3e44b7c9ea8c83a83a85a0102aad5c9d3b106cb4266d35d22136c89c9004f2fa0debafca36c4553f4f5>

SOCIETY FOR SCIENCE – The ancient hominid species of 'Nutcracker Man' may have made tools

Newly described hand, arm and shoulder fossils suggest that Paranthropus boisei had powerful arms with hands capable of making simple tools.

<http://click.societyforscience-email.com/?qs=1cb27ce12a362e6ebdea5295fde8cf39e2e0dde2e4d1be762901a1607781fc2ab30226e9fc56bfacca705326395d4ab7276c2603eb5b1687>

BREAKING SCIENCE – New Study Reveals Link between Bee and Human Brains

A team of researchers from New Zealand and Germany has demonstrated that the honeybee brain generates oscillations which share characteristics of ‘alpha’ oscillations in the human brain. In 1929, German psychiatrist Professor Hans Berger discovered the alpha oscillations: prominent, ongoing oscillations around 10 Hz in the electroencephalogram of the human brain.

http://feedproxy.google.com/~r/BreakingScienceNews/~3/vNp-HrpP26M/bee-alpha-waves-08179.html?utm_source=feedburner&utm_medium=email

BREAKING SCIENCE – Not a 'math person'? You may be better at learning to code than you think

New research finds that a natural aptitude for learning languages is a stronger predictor of learning to program than basic math knowledge.

<https://www.sciencedaily.com/releases/2020/03/200302103735.htm>

SCIENCE DAILY – Bees recognize that six is more than four

A new study at the University of Cologne proves that insects can perform basic numerical cognition tasks. Their neuronal network can also be used to perform successful machine learning.

<https://www.sciencedaily.com/releases/2020/03/200302103745.htm>

SCIENCE DAILY – Apes' inner ears could hide clues to evolutionary history of hominoids

Studying the inner ear of apes and humans could uncover new information on our species' evolutionary relationships, suggests a new study.

<https://www.sciencedaily.com/releases/2020/03/200303113352.htm>

SCIENCE DAILY – Siberian Neanderthals originated from various European populations

At least two different groups of Neanderthals lived in Southern Siberia researchers have now shown that one of these groups migrated from Eastern Europe.

<https://www.sciencedaily.com/releases/2020/03/200304141523.htm>

SCIENCE DAILY – Honeybee dance dialects

Honeybees use their waggle dance to tell their conspecifics where to find food. Depending on the honeybee species, there are different dance dialects.

<https://www.sciencedaily.com/releases/2020/03/200304141520.htm>

SCIENCE DAILY – As farming developed, so did cooperation -- and violence

The growth of agriculture led to unprecedented cooperation in human societies, a team of researchers, has found, but it also led to a spike in violence, an insight that offers lessons for the present.

<https://www.sciencedaily.com/releases/2020/03/200304141459.htm>

ACADEMIA.EDU – Why We Need an Alternative Approach to Modern Human Behaviour

Canadian Journal of Archaeology/Journal Canadien d'Archéologie 37:21–47 (2013)

CHRISTOPHER J. H. AMES, JULIEN RIEL-SALVATORE & BENJAMIN R. COLLINS – Why We Need an Alternative Approach to the Study of Modern Human Behaviour

In this paper we review recent developments in the debate over the emergence of modern human behaviour (MHB) to show that despite considerable diversity among competing models, the identification of given material traits still underpins almost all current perspectives. This approach, however, allows assumptions over the biological relationship between archaic and modern humans to permeate the definitions of MHB and, as a result, has effectively stultified archaeology's potential contribution to the issue. We suggest that the concept of MHB as currently defined is flawed. It must either be redefined in strictly behavioural terms before reincorporation into the debate over modern human origins or, more productively, discarded all together to avoid the harsh and unrealistic dichotomy it creates between a modern and non-modern archaeological record.

https://www.academia.edu/4342376/Why_We_Need_an_Alternative_Approach_to_the_Study_of_Modern_Human_Behaviour?email_work_card=view-paper

SAPIENS – Neanderthals Traversed Vast Distances

Stone tools reveal the expansive regions connecting Europe to Asia covered by our explorer cousins.

<https://sapiens.us11.list-manage.com/track/click?u=80f6cf678900daf984bf763b7&id=18793ee055&e=dc0eff6180>

THE CONVERSATION – Evolution: that famous 'march of progress' image is just wrong

New research shows animal evolution often involves losing genes and becoming less complex.

<https://theconversationuk.cmail19.com/t/r-l-jhiylkxk-khhllilahlh-k/>

PUBLICATIONS

Evolutionary Anthropology

PAPERS

MICHELLE C. LANGLEY, ANTONIO BENÍTEZ-BURRACO & VERA KEMPE – Playing with language, creating complexity: Has play contributed to the evolution of complex language?

We argue that enhanced play may have contributed to the emergence of complex language systems in modern humans (*Homo sapiens*). To support this idea, we first discuss evidence for an expansion of playing behavior connected to the extended childhood of modern human children, and the potential of this period for the transmission of complex cultural traits, including language. We then link two of the most important functions of play—exploration and innovation—to the potential for cumulative cultural evolution in general and for the emergence of complex language in particular. If correct, the shorter childhood of Neanderthals—involving restrictions on time to experiment and innovate—may have restricted their language (and other symbolic) system/s. Consequently, fully investigating the role that play may have had in the transmission of language and the development of symbolic cultures in both modern humans and Neanderthals provides a new avenue of research for Paleolithic archaeology and related disciplines.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.21810?campaign=woletoc>

BRIANA L. POBINER – The zooarchaeology and paleoecology of early hominin scavenging

Questions about the timing, frequency, resource yield, and behavioral and biological implications of large animal carcass acquisition by early hominins have been a part of the “hunting-scavenging debate” for decades. This article presents a brief outline of this debate, reviews the zooarchaeological and modern ecological evidence for a possible scavenging niche among the earliest animal tissue-consuming hominins (pre-2.0 Ma), revisits some of the questions that this debate has generated, and outlines some ways to explore answers to those questions with evidence from the archaeological record.

<https://onlinelibrary.wiley.com/doi/abs/10.1002/evan.21824?campaign=wolearlyview>

Evolutionary Human Sciences

PAPERS

DANIEL SMITH – Cultural group selection and human cooperation: a conceptual and empirical review

Cultural group selection has been proposed as an explanation for humans’ highly cooperative nature. This theory argues that social learning mechanisms, combined with rewards and punishment, can stabilise any group behaviour, cooperative or not. Equilibrium selection can then operate, resulting in cooperative groups outcompeting less-cooperative groups. This process may explain the widespread cooperation between non-kin observed in humans, which is sometimes claimed to be altruistic. This review explores the assumptions of cultural group selection to assess whether it provides a convincing explanation for human cooperation. Although competition between cultural groups certainly occurs, it is unclear whether this process depends on specific social learning mechanisms (e.g. conformism) or a norm psychology (to indiscriminately punish norm-violators) to stabilise groups at different equilibria as proposed by existing cultural group selection models. Rather than unquestioningly adopt group norms and institutions, individuals and groups appear to evaluate, design and shape them for self-interested reasons (where possible). As individual fitness is frequently tied to group fitness, this often coincides with constructing group-beneficial norms and institutions, especially when groups are in conflict. While culture is a vital component underlying our species’ success, the extent to which current conceptions of cultural group selection reflect human cooperative evolution remains unclear.

<https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/cultural-group-selection-and-human-cooperation-a-conceptual-and-empirical-review/3BEEC0756C9D4DFA7D97A320D9D54AB3>

ALBERTO J. C. MICHELETTI, GRAEME D. RUXTON & ANDY GARDNER – The demography of human warfare can drive sex differences in altruism

Recent years have seen great interest in the suggestion that between-group aggression and within-group altruism have coevolved. However, these efforts have neglected the possibility that warfare – via its impact on demography – might influence human social behaviours more widely, not just those directly connected to success in war. Moreover, the potential for sex differences in the demography of warfare to translate into sex differences in social behaviour more generally has remained unexplored. Here, we develop a kin-selection model of altruism performed by men and women for the benefit of their groupmates in a population experiencing intergroup conflict. We find that warfare can promote altruistic, helping behaviours as the additional reproductive opportunities winners obtain in defeated groups decrease harmful competition between kin. Furthermore, we find that sex can be a crucial modulator of altruism, with there being a tendency for the sex that competes more intensely with relatives to behave more altruistically and for the sex that competes more intensely with non-relatives in defeated groups to receive more altruism. In addition, there is also a tendency for the less-dispersing sex to both give and receive more altruism. We discuss implications for our understanding of observed sex differences in cooperation in human societies.

<https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/demography-of-human-warfare-can-drive-sex-differences-in-altruism/4E775E752897C3C655C96825AE2088EB>

Frontiers for Young Minds

PAPERS

MAANSI DESAI et al – Brain Stimulation Can Help Us Understand Music and Language

Language and music are important ways that we communicate with each other. Talking out loud and playing a guitar may seem pretty different, but did you know that they use many of the same brain areas? Did you know that researchers have been able to study the language and music functions of the brain during brain surgery? In this article, you will learn about a procedure called electrocortical stimulation mapping (ESM), which is a procedure used during brain surgery to figure out which parts of the brain are important for speaking and playing an instrument.

<https://kids.frontiersin.org/article/10.3389/frym.2020.00016>

Frontiers in Psychology

PAPERS

ROBERTA BETTONI et al – Infants' Learning of Rule-Based Visual Sequences Predicts Language Outcome at 2 Years

The ability to learn and generalize abstract rules from sensory input – i.e., Rule Learning (RL) – is seen as pivotal to language development, and specifically to the acquisition of the grammatical structure of language. Although many studies have shown that RL in infancy is operating across different perceptual domains, including vision, no studies have directly investigated the link between infants' visual RL and later language acquisition. Here, we conducted a longitudinal study to investigate whether 7-month-olds' ability to detect visual structural regularities predicts linguistic outcome at 2 years of age. At 7 months, infants were tested for their ability to extract and generalize ABB and ABA structures from sequences of visual shapes, and at 24 months their lexical and grammatical skills were assessed using the MacArthur-Bates CDI. Regression analyses showed that infants' visual RL abilities selectively predicted early grammatical abilities, but not lexical abilities. These results may provide the first evidence that RL mechanisms are involved in language acquisition, and suggest that RL abilities may act as an early neurocognitive marker for language impairments.

https://www.frontiersin.org/articles/10.3389/fpsyg.2020.00281/full?utm_source=F-AAE&utm_medium=EMLF&utm_campaign=MRK_1262035_69_Psycho_20200305_arts_A

Language and Cognition

PAPERS

NIKLAS JOHANSSON, ANDREY ANIKIN & NIKOLAY ASEYEV – Color sound symbolism in natural languages

This paper investigates the underlying cognitive processes of sound–color associations by connecting perceptual evidence from research on cross-modal correspondences to sound symbolic patterns in the words for colors in natural languages. Building upon earlier perceptual experiments, we hypothesized that sonorous and bright phonemes would be over-represented in the words for bright and saturated colors. This hypothesis was tested on eleven color words and related concepts (red–green, yellow–blue, black–white, gray, night–day, dark–light) from 245 language families. Textual data was transcribed into the International Phonetic Alphabet (IPA), and each phoneme was described acoustically using high-quality IPA recordings. These acoustic measurements were then correlated with the luminance and saturation of each color obtained from cross-linguistic color-naming data in the World Color Survey. As expected, vowels with high brightness and sonority ratings were over-represented in the words for colors with high luminance, while sonorous consonants were more common in the words for saturated colors. We discuss these results in relation to lexicalization patterns and the links between iconicity and perceptual cross-modal associations.

<https://www.cambridge.org/core/journals/language-and-cognition/article/color-sound-symbolism-in-natural-languages/537E325E594CFC227056D4FEA6BCD8E3>

Nature

ARTICLES

GLEN A. LICHTWARK & LUKE A. KELLY – Ahead of the curve in the evolution of human feet

The longitudinal arch has long been considered a crucial structure that provides stiffness to the human foot. Now the transverse arch is stepping into the spotlight, with a proposed central role in the evolution of human foot stiffness.

<https://www.nature.com/articles/d41586-020-00472-z>

PAPERS

MADHUSUDHAN VENKADESAN et al – Stiffness of the human foot and evolution of the transverse arch

The stiff human foot enables an efficient push-off when walking or running, and was critical for the evolution of bipedalism. The uniquely arched morphology of the human midfoot is thought to stiffen it, whereas other primates have flat feet that bend severely in the midfoot. However, the relationship between midfoot geometry and stiffness remains debated in foot biomechanics, podiatry and palaeontology. These debates centre on the medial longitudinal arch and have not considered whether stiffness is affected by the second, transverse tarsal arch of the human foot. Here we show that the transverse tarsal arch, acting through the inter-metatarsal tissues, is responsible for more than 40% of the longitudinal stiffness of the foot. The underlying principle resembles a floppy currency note that stiffens considerably when it curls transversally. We derive a

dimensionless curvature parameter that governs the stiffness contribution of the transverse tarsal arch, demonstrate its predictive power using mechanical models of the foot and find its skeletal correlate in hominin feet. In the foot, the material properties of the inter-metatarsal tissues and the mobility of the metatarsals may additionally influence the longitudinal stiffness of the foot and thus the curvature–stiffness relationship of the transverse tarsal arch. By analysing fossils, we track the evolution of the curvature parameter among extinct hominins and show that a human-like transverse arch was a key step in the evolution of human bipedalism that predates the genus *Homo* by at least 1.5 million years. This renewed understanding of the foot may improve the clinical treatment of flatfoot disorders, the design of robotic feet and the study of foot function in locomotion.

<https://www.nature.com/articles/s41586-020-2053-y>

Nature Communications

PAPERS

DAVID GOKHMAN et al with DAVID REICH – Differential DNA methylation of vocal and facial anatomy genes in modern humans

Changes in potential regulatory elements are thought to be key drivers of phenotypic divergence. However, identifying changes to regulatory elements that underlie human-specific traits has proven very challenging. Here, we use 63 reconstructed and experimentally measured DNA methylation maps of ancient and present-day humans, as well as of six chimpanzees, to detect differentially methylated regions that likely emerged in modern humans after the split from Neanderthals and Denisovans. We show that genes associated with face and vocal tract anatomy went through particularly extensive methylation changes. Specifically, we identify widespread hypermethylation in a network of face- and voice-associated genes (*SOX9*, *ACAN*, *COL2A1*, *NFIX* and *XYLT1*). We propose that these repression patterns appeared after the split from Neanderthals and Denisovans, and that they might have played a key role in shaping the modern human face and vocal tract.

<https://www.nature.com/articles/s41467-020-15020-6>

AMALIA P. M. BASTOS & ALEX H. TAYLOR – Kea show three signatures of domain-general statistical inference

One key aspect of domain-general thought is the ability to integrate information across different cognitive domains. Here, we tested whether kea (*Nestor notabilis*) can use relative quantities when predicting sampling outcomes, and then integrate both physical information about the presence of a barrier, and social information about the biased sampling of an experimenter, into their predictions. Our results show that kea exhibit three signatures of statistical inference, and therefore can integrate knowledge across different cognitive domains to flexibly adjust their predictions of sampling events. This result provides evidence that true statistical inference is found outside of the great apes, and that aspects of domain-general thinking can convergently evolve in brains with a highly different structure from primates. This has important implications not only for our understanding of how intelligence evolves, but also for research focused on how to create artificial domain-general thought processes.

<https://www.nature.com/articles/s41467-020-14695-1>

Nature Ecology & Evolution

PAPERS

PHILIP A. DOWNING, ASHLEIGH S. GRIFFIN & CHARLIE K. CORNWALLIS – Group formation and the evolutionary pathway to complex sociality in birds

Group-living species show a diversity of social organization, from simple mated pairs to complex communities of interdependent individuals performing specialized tasks. The advantages of living in cooperative groups are well understood, but why some species breed in small aggregations while others evolve large, complex groups with clearly divided roles is unclear. We address this problem by reconstructing the evolutionary pathways to cooperative breeding across 4,730 bird species. We show that differences in the way groups form at the origin of cooperative breeding predicts the level of group complexity that emerges. Groups that originate through the retention of offspring have a clear reproductive divide with distinct breeder and helper roles. This is associated with reproductive specialization, where breeders invest more in fecundity and less in care. In contrast, groups formed through the aggregation of unrelated adults are smaller and lack specialization. These results help explain why some species have not transitioned beyond simple groups while others have taken the pathway to increased group complexity.

<https://www.nature.com/articles/s41559-020-1113-x>

Nature Scientific Reports

PAPERS

MARIA GENDRON et al – Emotion Perception in Hadza Hunter-Gatherers

It has long been claimed that certain configurations of facial movements are universally recognized as emotional expressions because they evolved to signal emotional information in situations that posed fitness challenges for our hunting and gathering hominin ancestors. Experiments from the last decade have called this particular evolutionary hypothesis into doubt by studying emotion perception in a wider sample of small-scale societies with discovery-based research methods. We

replicate these newer findings in the Hadza of Northern Tanzania; the Hadza are semi-nomadic hunters and gatherers who live in tight-knit social units and collect wild foods for a large portion of their diet, making them a particularly relevant population for testing evolutionary hypotheses about emotion. Across two studies, we found little evidence of universal emotion perception. Rather, our findings are consistent with the hypothesis that people infer emotional meaning in facial movements using emotion knowledge engrained by cultural learning.

<https://www.nature.com/articles/s41598-020-60257-2>

THOMAS A. PÜSCHEL et al – The biomechanical importance of the scaphoid-centrale fusion during simulated knuckle-walking and its implications for human locomotor evolution

Inferring the locomotor behaviour of the last common ancestor (LCA) of humans and African apes is still a divisive issue. An African great-ape-like ancestor using knuckle-walking is still the most parsimonious hypothesis for the LCA, despite diverse conflicting lines of evidence. Crucial to this hypothesis is the role of the centrale in the hominoid wrist, since the fusion of this bone with the scaphoid is among the clearest morphological synapomorphies of African apes and hominins. However, the exact functional significance of this fusion remains unclear. We address this question by carrying out finite element simulations of the hominoid wrist during knuckle-walking by virtually generating fused and unfused morphologies in a sample of hominoids. Finite element analysis was applied to test the hypothesis that a fused scaphoid-centrale better withstands the loads derived from knuckle-walking. The results show that fused morphologies display lower stress values, hence supporting a biomechanical explanation for the fusion as a functional adaptation for knuckle-walking. This functional interpretation for the fusion contrasts with the current inferred positional behaviour of the earliest hominins, thus suggesting that this morphology was probably retained from an LCA that exhibited knuckle-walking as part of its locomotor repertoire and that was probably later exapted for other functions.

<https://www.nature.com/articles/s41598-020-60590-6>

New Scientist

NEWS

Thousands of Denisovan tools reveal their Stone Age technologies

Excavations at the Denisova cave in Siberia have uncovered almost 80,000 stone artefacts that extinct humans left over a 150,000-year period. Collectively, they seem to show how technology developed by Denisovans evolved through the Stone Age, culminating with the production of spectacular bracelets, beads and tiaras about 50,000 years ago.

<https://www.newscientist.com/article/2235308-thousands-of-denisovan-tools-reveal-their-stone-age-technologies/#ixzz6FuCRm36C>

PNAS

PAPERS

KRISTIAN TYLÉN et al with MARLIZE LOMBARD – The evolution of early symbolic behavior in Homo sapiens

How did human symbolic behavior evolve? Dating up to about 100,000 y ago, the engraved ochre and ostrich eggshell fragments from the South African Blombos Cave and Diepkloof Rock Shelter provide a unique window into presumed early symbolic traditions of Homo sapiens and how they evolved over a period of more than 30,000 y. Using the engravings as stimuli, we report five experiments which suggest that the engravings evolved adaptively, becoming better-suited for human perception and cognition. More specifically, they became more salient, memorable, reproducible, and expressive of style and human intent. However, they did not become more discriminable over time between or within the two archeological sites. Our observations provide support for an account of the Blombos and Diepkloof engravings as decorations and as socially transmitted cultural traditions. By contrast, there was no clear indication that they served as denotational symbolic signs. Our findings have broad implications for our understanding of early symbolic communication and cognition in H. sapiens.

<https://www.pnas.org/content/117/9/4578.abstract?etoc>

Research on Language and Social Interaction

PAPERS

LEELO KEEVALLIK & RICHARD OGDEN – Sounds on the Margins of Language at the Heart of Interaction

What do people do with sniffs, lip-smacks, grunts, moans, sighs, whistles, and clicks, where these are not part of their language's phonetic inventory? They use them, we shall show, as irreplaceable elements in performing all kinds of actions—from managing the structural flow of interaction to indexing states of mind and much more besides. In this introductory essay we outline the phonetic and embodied interactional underpinnings of language and argue that greater attention should be paid to its nonlexical elements. Data are in English and Estonian.

<https://www.tandfonline.com/doi/full/10.1080/08351813.2020.1712961>

MARK DINGEMANSE – Between Sound and Speech: Liminal Signs in Interaction

When people talk, they recruit a wide range of expressive devices for interactional work, from sighs, sniffs, clicks, and whistles to other conduct that borders on the linguistic. These resources are used in the management of turn and sequence and the marking of stance and affect, and they represent an aspect of the interactional machinery that is as elusive as it is

powerful. Phenomena long assumed to be beyond the purview of linguistic inquiry emerge as systematically deployed practices whose ambiguous degree of control and convention allows participants to carry out subtle interactional work without committing to specific words. While these resources have been characterized as nonlexical, nonverbal, or nonconventional, I propose that they are unified in their liminality: They work well precisely because they equivocate between sound and speech. The empirical study of liminal signs shows the promise of sequential analysis for building a science of language on interactional foundations.

<https://www.tandfonline.com/doi/full/10.1080/08351813.2020.1712967?scroll=top&needAccess=true>

EMILY HOFSTETTER – Nonlexical “Moans”: Response Cries in Board Game Interactions

This article examines nonlexical vocalizations in board game interactions, focusing on “moans.” Moans are prolonged, voiced, response cries. Moans react to game events where the player has suffered in some way. Despite the complaint-relevant nature of moans, game actions are never withdrawn in response to a moan, Moans are treated as laughable, while lexical complaints invoke arguments and apologies. This article suggests that moans are a manifestation of managing Bateson’s play paradox in that they denote suffering but also willingness to continue play and a validation of the prior event. Moans are suggested to be a contextualization cue for “this is play.” Given the relative unconventionality of the form of moans, these tokens are suggested as evidence that lack of conventionalization may be a members resource rather than a problem. The article analyzes a corpus of 34 hours of video-recorded board game play (169 tokens) in English (Canadian, American, and British).

<https://www.tandfonline.com/doi/full/10.1080/08351813.2020.1712964>

Science Advances

PAPERS

SILESHI SEMAW et al with DIETRICH STOUT – Co-occurrence of Acheulian and Oldowan artifacts with Homo erectus cranial fossils from Gona, Afar, Ethiopia

Although stone tools generally co-occur with early members of the genus Homo, they are rarely found in direct association with hominins. We report that both Acheulian and Oldowan artifacts and Homo erectus crania were found in close association at 1.26 million years (ma) ago at Busidima North (BSN12), and ca. 1.6 to 1.5 ma ago at Dana Aoule North (DAN5) archaeological sites at Gona, Afar, Ethiopia. The BSN12 partial cranium is robust and large, while the DAN5 cranium is smaller and more gracile, suggesting that H. erectus was probably a sexually dimorphic species. The evidence from Gona shows behavioral diversity and flexibility with a lengthy and concurrent use of both stone technologies by H. erectus, confounding a simple “single species/single technology” view of early Homo.

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