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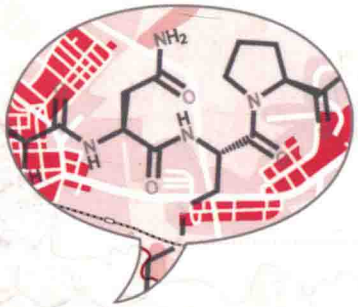

THE ORIGINS OF LANGUAGE

A slim guide

JAMES R. HURFORD

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The Origins of Language

'This short guide to modern empirical research on language evolution provides a breezy and readable introduction to the many issues involved in understanding how humans came to possess one of our most prized capacities: our ability to acquire and use language.'

Tecumseh Fitch, University of Vienna

'Jim Hurford has produced a work of stunning depth and breadth, expertly condensed in this slim guide. These are notoriously difficult questions: How did the capacity for language evolve in the deep history of our species? How do different languages evolve in the more recent histories of our societies? Hurford is one of the few scholars with the authority and interdisciplinary reach to give us compelling and plausible answers. *The Origins of Language* is a rare achievement, and highly recommended.'

N. J. Enfield, Max Planck Institute, Nijmegen, and University of Sydney

'Hurford has written a delightful little book, an ideal point of entry into the range of complex issues facing anyone that wants to understand how human language evolved. Darwin himself would have cherished this guide.'

Cedric Boeckx, ICREA/Universitat de Barcelona

'No one has thought more deeply about the evolution of the human language faculty than James Hurford, and no one writes about the topic more engagingly. In this book he explains and synthesizes the most important findings concerning language evolution from across a wide variety of scientific disciplines, including linguistics, biology, ethology, psychology, and cognitive science. His writing is always grounded in evidence-based argumentation, yet is informative and clear for the non-specialist reader. To introduce in such a short work all the major aspects of the evolution of language—from the beginnings of a special human type of communication to the emergence of sound systems, through meaning to symbolic words to sentence structure—is an impressive feat. To make it not only thorough but thoroughly readable is a real achievement. A lovely little book: great fun, cogent, and scientifically solid.'

Maggie Tallerman, Newcastle University

James R. Hurford is Emeritus Professor at the University of Edinburgh, where he was previously Professor of General Linguistics from 1979 until his retirement in 2009. Over the last 25 years he has pioneered the rebirth of serious scientific interest in the origins and evolution of language. He co-founded with Chris Knight the biennial international conferences on the evolution of language (known as EVOLANG), with Simon Kirby the Language Evolution and Computation Research Unit at the University of Edinburgh, and with Kathleen Gibson the OUP series on language evolution. His previous publications include *The Origins of Meaning* (OUP 2007) and *The Origins of Grammar* (OUP 2011).

For Rosie and Sue, and in Eve's memory.

This *Slim Guide* aims to be non-technical, readable, and short, while still conveying what is unique and special about language and its continuity with non-human life. It shows the tips of many icebergs, which can be explored by further detailed reading, suggestions for which are given at the end of the book.

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The prehistory of a very special ape

In this chapter I make a flying start, compressing millions of years, from the first bipedal ape to the first *Homo sapiens*, into a few pages. Some of the history of our lineage is now well agreed, but many details are uncertain, debated, and open to revision by the next fossil discovery. In outline, the history goes from the split with the chimpanzee lineage about 7 million years ago, through Australopithecine apes, through two *Homo* species, *habilis* and *erectus*, to the emergence of our own species about 200,000 years ago. From the scant fossil remains, we know a little about our remote ancestors' sizes and shapes, and for the more recent ones even just a little about their ways of life. In the last few years, it has been possible even to infer, albeit speculatively, a little about their ways of communicating, as we shall see later in this book. Researchers sometimes suggest that *Homo erectus*, a tall, robust ape from about 1.5 million years ago, may have had a 'protolanguage', a meaningful learned vocabulary but no grammar—just 'words' strung together. We have no direct way of knowing whether this was the case, but recently acquired knowledge does tend to point in that direction. Noam Chomsky has dismissed all talk of language evolution as 'fairy stories'. There are no fairies in this book, nor any other imaginary entities. We will reason only from real brains, real genes, real vocal tracts, real acoustic patterns, real fossils, and real social interaction, in humans or other animals. Indeed, we can only speculate about how and why languages and the human capacity for language got to be the way they are. We can't travel back in time to observe, and there are no literal echoes

of people speaking way back then. This applies to all speculation about the past, from the geological formation of the earth to what happened right after the Big Bang that made the universe. There are better and worse stories, in terms of internal coherence, economy, and consistency with available facts.

Researchers in language evolution try to collect as much relevant information as they can from genetics, child language development, neuroscience, palaeontology, anthropology, comparative psychology, linguistic typology, historical linguistics, and computer modelling to build as coherent a picture as possible of how and why languages and the unique human capacity for language evolved. The interdisciplinary nature of the quest is challenging and exciting in itself. I hope this book will persuade you that sensible things can be said about language origins and evolution. We will not be able to answer many 'When?' questions, such as when words or complex sentences were first used. To any 'Where?' question, the only, very vague answer is 'Somewhere in Africa'. Just as important are the 'How?' and 'Why?' questions. Considering these questions adds satisfyingly to our understanding of what language is. We will see language in the light of evolution—a perspective interestingly different from other views. Some knowledge of our prehistory after diverging from the other apes is useful as background, and I will now whizz through those seven million years, summarizing consensus views and noting what we can glean from the palaeontological record, relevant to the origins of language.

We humans are primates, a zoological order that includes the monkeys and apes. We are great apes, and most closely related to the chimpanzees and bonobos. Much research has found greater cognitive capacities in apes than in monkeys. Within the apes, lesser apes, e.g. gibbons, are distinguished from the great apes, the chimpanzees, bonobos, gorillas, and orang-utans. Chimpanzees and bonobos are evolutionarily close to each other; indeed, bonobos were only recently recognized as a separate species. The line leading to humans split off from that leading to bonobos and chimpanzees about 7 million years ago. It is usually assumed that there have been fewer changes in the bonobo/chimpanzee lineage than in ours.

So, with caution, we assume that our ancestors of 6 million years ago had something like the body shape, behaviour, and cognitive capacities of modern bonobos and chimpanzees. Bonobos may be a bit more like us cognitively than chimpanzees, but bonobo/chimpanzee differences are slight.

A prominent landmark in the human lineage was the advent of habitual bipedalism. The extant non-human apes sometimes walk upright on two feet. Bonobos even seem to do it with some ease, when they need to, as when they have their hands full, but it's not their normal mode of getting around. The *Australopithecus* (literally 'southern ape') genus, consisting of one or more species (nobody knows how many) was the first definitely habitual bipedal ape, living in eastern and southern Africa. The transition from occasional bipedalism to habitual bipedalism was not abrupt but gradual, like everything else in evolution. Given the long time periods involved, and the scarcity of specimens, transitions may seem abrupt. Australopithecines have been dated to a long period, between about 4 and 2 million years ago. The specimen known as Lucy was an Australopithecine, as was the so-called Taung child, and Australopithecines left their footprints in the volcanic ash at Laetoli, in what is now Tanzania. Our knowledge of Australopithecines is based on a small sample of partial skeletons, including about half a dozen more or less complete skulls, and some knee joints. Australopithecines walked on two feet, though probably not as upright as us, as can be inferred from the shapes of the pelvis and knee joints and the base of the skull (basicranium). This first bipedal gait started the process of freeing the rhythm of breathing from that of walking and running, a helpful step toward the production of speech, much later in evolution. Bipedalism also freed the hands for potential meaningful gestures. Australopithecines had brains no bigger than those of modern chimpanzees. No relics exist of tools made by them, but chimpanzees make tools, so probably Australopithecines did too, and they have not survived; only stones survive from so long ago, and as far as we know Australopithecines didn't make stone tools. They were sexually dimorphic, with males bigger than females, like modern gorillas, from which we can infer that their social and family

arrangements were unlike ours. Even the males were small, less than 1.5 metres tall, and weighing only up to about 50 kilos. They appear to have had a vegetarian diet. Apart from the bipedalism, this genus has less in common with modern humans than with other modern apes; its significance is as our remote ancestor.

After the Australopithecines, *Homo habilis* 'clever man' is the species often (though not with great certainty) held to be next in the human lineage. *Habilis*, the first *Homo* species, lived in East Africa between about 2.5 and 1.5 million years ago. *Habilis* is so named because the species were the first to make stone tools, which were very crude, basically pebbles with enough knocked off to make a sharp edge. This tool industry is known as the Oldowan industry, after the Olduvai gorge in Tanzania where many specimens have been found. Oldowan tools are not complex enough to suggest any language-like skills. The very fact of making stone tools indicates patience, postponement of gratification, a mind capable of foresight into future needs, and constructive planning, qualities found only in limited ways in modern non-human apes.

Next in the story of our lineage is *Homo erectus* 'upright man', who were robust and as tall as well-nourished modern humans. There is debate over how *erectus* and (possibly) another species, *Homo ergaster*, are related. Both lived in Africa during the same period, between 1.8 million and 1 million years ago, and some of them are associated with a more advanced stone technology, the Acheulian industry. Making Acheulian tools demands much more time, patience, and foresight than the Oldowan technology, indicating a mental advance over *Homo habilis*. Starting in Africa, some groups of *erectus* migrated out to Europe and Asia. Specimens have been found in Java ('Java Man') and Zhoukoudian, China ('Peking Man'), but not in the New World. This was the first migration of hominins out of Africa. 'Migration' is the usual term, but may misleadingly suggest a planned movement of a whole settled group to a new predetermined settlement site quite far away. More likely is that regular nomadic cycles slowly shifted their range, with new places being visited more and more often, gradually pushing out the edges of the distribution of these hominins. *Homo erectus* probably made use of controlled

fire, from about 1 million years ago, consistent with the beginning of reduced dentition and gut size, as cooking partially takes over the function of chewing and digestion. According to one theory, a reduced gut can be compensated for by a bigger brain, keeping the overall metabolic demands of the body constant. *Homo erectus* was the ancestor who shed his fur, leaving us relatively naked, over a million years ago. There is no completely satisfactory explanation for the move to nakedness. Possibly it helped keep the animals cool in the hot savannah, or perhaps sexual selection favoured a bare skin. The skin colour at this time may have been light, like chimpanzee skin under the fur, and quickly evolved blackness to protect against the African sun.

Clearly, *erectus* was a more successful species. Some of their success can reasonably be attributed to their living and working in cooperative groups, as they are believed to be the first hominins to hunt and forage cooperatively, roughly like modern hunter-gatherer groups. Advanced in-group cooperation suggests somewhat developed communication systems, though we cannot justify any claim less vague than this. The topic of cooperative hunting is fraught, as several other species, including modern chimpanzees, also hunt in groups. The issue is how much conventionally organized cooperation there is in the group; this will be discussed in Chapter 3. Beside being our own ancestor, *Homo erectus* was probably the ancestor of other later robust types, such as the Neanderthals (of whom more below), *Homo heidelbergensis* found in Germany, and Boxgrove Man from southern England, both dating to around half a million years ago. *Heidelbergensis* is associated with some large and exquisitely balanced wooden throwing spears dating from about 400,000 years ago, and also with even more ancient stone spear-tips found in South Africa and dating from about 500,000 years ago. Both types of spear show fairly elaborate planning, and spare time to carry it out.

There is complete consensus about the ultimate origin of our species in Africa, as descendants of the *erectus* living there. All agree that there was a first migration out of Africa by *erectus*, probably a trickle starting as early as 1.8 million years ago and ending as late as 800,000 years ago. And all agree that there was a much later wave out

of Africa, around 100,000 years ago, or later, by *Homo sapiens*. For what happened when the *sapiens* incomers met the earlier *erectus* settlers, a majority view and a minority view exist. The long-held majority view, now challenged by DNA evidence, is that we modern humans completely eliminated the descendants of the earlier *erectus* populations who had moved out of Africa. Thus Java Man and Peking Man, for instance, are said to have no modern descendants; their lineages died out. This is the 'Recent Out of Africa' scenario. The 'recent' here is important, because nobody doubts that our earlier *erectus* ancestors came from Africa. Recent Out of Africa is a strong hypothesis, highly vulnerable to falsification. It makes an extreme claim: total elimination of one population by another. And it turns out, as we will see, that it is not tenable in its absolute strong form. The alternative, minority view is the so-called 'Multiregional Hypothesis', mainly pursued by anthropologist Milford Wolpoff. It is argued that there is enough similarity between *erectus* remains in Asia and the modern humans living there to conclude that the modern populations are in part descended from these Asian *erectus*. So the Asian *erectus* were not displaced by the new wave of *Homo sapiens* coming out of Africa in the last 100,000 years, but interbred with them. According to this view, there was some gene-flow between the earlier strains settled in Asia and later invading *sapiens* strains, fresh out of Africa. In this view, populations in Asia, Europe, and Africa were not totally isolated from each other during the million-year period we are talking about; there would have been sporadic contacts. Such contacts must have been rare, however, due to the sparsity of the population over vast distances. The relative homogeneity of modern human cognitive abilities is also partially explained, in this view, by parallel evolution converging on modern traits by independent natural selection in the different regions. The Recent Out of Africa explanation for the cognitive homogeneity is the more plausible one that these aspects of modern humanity were all present in a very small population that existed in Africa 100,000 years ago. It is not inconsistent to suggest that limited genetic intermingling with populations already outside Africa did nothing to upset the advantageous cognitive traits that had evolved inside Africa.

We don't know for sure whether it was biologically possible for Asian *erectus* to breed with incoming *sapiens*, but it doesn't seem unlikely, and if opportunities arose, then it probably happened. People don't need to like each other or live together to generate offspring. It is possible, even likely, that some genes that first appeared outside Africa, after the *erectus* exodus but before the later *sapiens* wave, have persisted into some modern human populations. The popular concept of ancestry, dominated by family tree metaphors, focuses too much on whole individual organisms and too little on genes. Evolutionary biologist Richard Dawkins has written: 'every gene has its own tree, its own chronicle of splits, its own catalogue of close and distant cousins . . . individuals are temporary meeting points on the criss-crossing routes that take genes through history.' Recent Out of Africa makes the strong claim that no modern human has any genetic material descended from the pre-100,000 *erectus* population living outside Africa. It is a highly falsifiable claim (a good thing in science).

For our purposes, concentrating on 'Why?' and 'How?' questions about the origins of language, we don't need to choose between these two competing hypotheses. The modern human population is indeed extremely homogeneous genetically, and no significant differences have been found between different populations in their inborn capacity to acquire complex language. Certainly there are individual differences between people within any given population, but nothing that correlates with a particular region of the world. Africans and non-Africans are born equally language-ready. A baby born anywhere in the world can be adopted in any distant corner of the globe by genetically very distant parents and will learn the language of its adoptive parents perfectly. So whatever genes contribute to the human language faculty, they at least would have been present in Africa before any relevant split by migration. On the whole, because of the uniformity of modern human innate language capacities, the Recent Out of Africa scenario is more attractive, for the relevant traits. But a relatively uniform language capacity across modern humans could conceivably be accommodated to the Multiregional Hypothesis, and would imply that even at the *erectus* stage,

a biologically given capacity for language was in place. It's not a claim made with conviction by any theorist, because *erectus* left us no fossil clues as to their communication skills, but it is a possibility, if a remote one. This all underscores the position that answers to 'When?' questions about language origins are beyond the scope of current investigation.

Genetics has an advantage over palaeontology, because we know that any modern DNA has ancestors, while we can't be certain, without invoking genetics, that any fossil has modern descendants. Recent genetic comparisons of people from across the world have shed interesting light on our ancestry. The clearest results come from mitochondrial DNA and Y-chromosome DNA, which are passed exclusively down female and male lines, respectively. Mothers pass their mitochondrial DNA (mtDNA) on to all their offspring, but only their daughters pass it on to the next generation. Sperms have far less mtDNA than ova, and whatever they have doesn't survive the fertilization process. In humans, paternal mtDNA is not inherited. Similarly, fathers pass their Y-chromosome DNA down only to their sons, and not to their daughters, because women have no Y-chromosome. This interesting genetics sheds some light on human ancestry, specifically on matrilineal and patrilineal ancestors, as I shall now outline.

For mtDNA, a large sample is collected from people all over the world, using individuals representative of populations who have lived in their region for a long time, e.g. Native Americans for the Americas, rather than people with Old World ancestry. This sample will show some variation, and the specimens can be grouped into subgroups and subsubgroups by similarity. Thus a family tree can be drawn for all the mtDNA in the sample, with each group or subgroup having its own branch or twig of the tree. The root of the tree will be a (perhaps hypothetical) specimen such that the smallest number of possible mutations lead from it to all the collected specimens. (So an outlier specimen with rather different mtDNA from many others in the sample is unlikely to be the root of the tree.) This root specimen represents the mtDNA of the purely matrilineal ancestress of all the other specimens. Some woman with that mtDNA

was the matrilineal Ur-great-grandmother of all the people sampled, and the literature has provocatively called her 'Mitochondrial Eve'. The mutations from the Mitochondrial Eve specimen to the most distant specimen can be counted, and assuming a regular rate at which mutations in mtDNA occur, the approximate date and place at which Mitochondrial Eve lived can be inferred from the similarity of the root specimen to existing specimens from various parts of the world. A similar exercise works for the Y-chromosome, leading to a postulated 'Y-chromosome Adam'.

Mitochondrial Eve has been dated to about 200,000 years ago, give or take 50,000 years, and her mtDNA is more like that of modern Africans than that of people from elsewhere. This strongly suggests that she lived in Africa around the time when *Homo sapiens* was emerging as a species. Y-chromosome Adam also lived in Africa, and more recently than Mitochondrial Eve, at around 100,000 years ago, give or take 40,000 years. The most likely date here puts this individual also in the period before the migration of *sapiens* out of Africa. This Adam and this Eve never met, of course. And they were not alone. It's just that their companions didn't pass any mtDNA or Y-chromosomes down to us.

Fascinating as these results are, they can be very deceptive. The results are so nice and clear because they avoid the complications of sexual reproduction. Mitochondrial Eve was only the purely matrilineal most recent common ancestor (MRCA) of modern humans. Likewise, Y-chromosome Adam was only our purely patrilineal MRCA. If you have researched your own genealogy, you may have been frustrated by the historical concentration on male-to-male inheritance, with less record of mothers, sisters, and daughters. Your real family tree branches out backwards in time to four grandparents, eight great grandparents, and so on exponentially until, way back in time, you could seem to have more ancestors than populated the Earth. Your family tree and mine, whoever you are, and whatever your background, almost certainly share at least one individual who lived only 5,000 years ago. Any two people on the planet very likely have a common ancestor who lived much more recently than the Adam and Eve we have introduced.