Before-word: The Trick of Speech

Language comes so easily to us – almost as if it were an instinct – that we rarely stop to pay attention to what's going on when we open our mouths and talk. In many ways it's like the air we breathe: we only realise how important it is to us when we run out of it. Unlike the air, a lack of language won't kill us, of course. But not being able to speak, either through illness or not knowing the language of the people around you, suddenly makes life almost impossibly difficult. We may not find ourselves noticing it very often, but we depend on language for almost everything we do.

But it goes much deeper than that. For all its virtual invisibility, language is actually at the heart of what makes us so different from all our animal cousins. The ability to speak is all about communication, and in enabling the easy exchange and spread of ideas and information, the gift of the gab is the key to human civilisation – the one thing that has allowed us to become the dominant species on our planet, despite our relative physical weakness. Without language, no other animal – none – comes even close to what we have been able to achieve: language is what most makes us human.

Which makes it all the more surprising that we have absolutely no idea why we are the only species that can talk. Despite the progress we've made in learning about ourselves and our place in the universe, the origin of the very tool that makes all that possible continues to elude us. There are theories, to be sure – invoking everything from God to genetics – but the bottom line, as recently conceded by Noam Chomsky himself, is that it remains 'a mystery'. None of us has any trouble in making ourselves understood when we speak, even without any conscious knowledge of syntax, but we are still left speechless when it comes to explaining how humans first learnt to talk, when we started doing it – or why we are still the only ones who can.

The current academic consensus, such as it is, is that language must depend on a mental faculty unique to humans, presumably the result of some genetic change that has allowed us to process concepts and use grammar in ways that other animals

cannot. It is also widely presumed that this change must be a side-effect of the massive (and yet equally unexplained) growth of our brains since we stopped being chimpanzees some seven million years ago – a growth that eventually left us equipped, so the theory goes, with enough grey matter to be able to handle language.

But there is a problem, Houston. Two problems, in fact. One is that there is absolutely no evidence for this hypothesis. Even though our ability to understand the workings of the human brain is still in its infancy, there is nothing so far to suggest that any part of it is dedicated to language processing. On the contrary, it is becoming increasingly clear that the fundamental characteristic of any brain is its remarkably adaptive and plastic nature. Like those of all other animals, our brains are essentially pattern-recognition devices – a skill which comes in handy when processing language – but do not seem to have evolved specifically for language in any meaningful sense.

The second problem is that the archaeological record shows that the increase in the size of our brains (which have ballooned to over three times those of our nearest relatives in the space of the last two million years or so – an unprecedented rate in evolutionary terms) was accompanied by a downgrade in the rest of our physique. Our muscles shrank, our jaws got smaller, and we lost the more aggressive versions of our canine teeth. In other words, it seems that the trade-off for bigger brains was weaker bodies. This is a real puzzle. Just at a time when we would have been needing more food for our burgeoning brains, as individuals we appear to have been losing our competitive edge in the red-toothed, red-clawed Darwinian struggle for life.

Which means we must have been making up for the loss of physical strength with something that gave us a real advantage. Maintaining brains is an expensive business: ours gobble up some 20% of the energy our body gets from food and air, despite being only 2% of our body weight (most other primates manage on 8%, and many other animals much less.) For evolution to have pushed us so dramatically in the direction of bigger brains, the payoff must have been huge – let's not forget that our growing heads

eventually made childbirth so hazardous that we began to start having our babies prematurely, making them even more vulnerable to potential predators.

What could this irresistible advantage have been? Once again, the jury is out. One theory is that increased braininess helped us make better tools, weapons that allowed us to kill bigger prey, better defend ourselves, and improve our food supply – setting up an evolutionary virtuous circle. Others claim it encouraged the development of social skills that allowed us to hunt cooperatively and become more effective as a group – again, giving us a clear advantage. Still others think what pushed us to become smarter was the need to adapt creatively to climate change and unstable environments.

These may be ingenious suggestions, but they all suffer from a fatal flaw: we know that other primates living in the same environment as our ancestors, also starting to use tools, also living in large social groups, also having to respond to climate change, and surrounded by much the same food resources, did not grow bigger brains – nor did they get physically weaker. Our closest living relatives today, the chimps, orang-utans and gorillas, are pretty much the way they were when we parted company. Neither did our tool-making skills visibly improve over the first million years in which our brains doubled in size. There must have been something else going on – and the only really plausible explanation is that we somehow developed a better way to communicate. Because that really would have changed the game.

It would have changed the game because being able to communicate well is an advantage that's almost impossible to exaggerate. Without the ability to communicate, you're literally on your own – all you have to work on are your instincts and uncertain clues from the behaviour of those around you. But with even just a small vocabulary of simple words, ideas can be exchanged and developed. Being able to swap thoughts means you are effectively sharing another brain – and as that linking process spreads across a community, the benefits rapidly become exponential. That's a powerful motivation to keep getting smarter, as the upside is virtually limitless – not just for the individual, but for the entire species. It changes everything.

How could such a crucial threshold have been crossed, though? After all, at that early stage not much would have distinguished us from our evolutionary peers. To get to the point where we could start speaking, surely vast changes would need to have occurred in our primitive animal brains. We couldn't just have started talking straight away – without the enhanced perceptual and cognitive skills that come with a larger cortex, we were bound to have struggled with the daunting intricacies of generative grammar. That, at least, has always been the assumption.

But what if the essential trick of speech is actually much simpler than we've supposed? The focus of those who have been curious about language throughout history, from the thinkers of Ancient Greece, India and China to the gurus of modern linguistics, has been on understanding and explaining grammar. That is the most visible, obviously complex aspect of language – the thing we have the most difficulty with, and find the hardest to explain. What, though, if we've had the cart before the horse? What if the first step towards language was actually so simple it's been hiding in plain sight, obscured by our obsession with syntax? For language doesn't – can't possibly – begin with grammar.

It can't start with grammar because you can't have grammar without words. If that seems too obvious to need saying, it only shows the extent to which we take words for granted. We think of words as labels for things and ideas that we want to talk about – there doesn't seem to be anything particularly special or complicated about that. Associating sounds with meaning is something we know other animals do as well – be they warnings about of predators, mating calls, territorial marking or information about food. Signs are already part of the animal repertoire -- we humans didn't invent them.

But what we have invented – or simply stumbled on – is a cunning system for labelling them. For it is precisely our words – not our signs – that make human language so different. And not just slightly different: utterly, absolutely, game-changingly different. Because while almost all other animals use random, unstructured analogue calls to signal meaning to each other, the calls we use are essentially digital. What we've

effectively done is to bar-code noise – for words are nothing more, nothing less than a simple, easily understandable system for recognising and remembering many thousands of signs, making use of the so-called 'digital infinity' effect.

And here's why that's so different, and so important. Noises are just noises – you either remember them or you don't. We still communicate with them, of course -- if you blow a raspberry at someone, we all know you're expressing derision. We may not be able to write down the noise you're making, but we can all recognise, remember and reproduce it. Likewise, a scream is an unstructured analogue noise that is instantly understood by all those who hear it, even if you can't spell it. Other examples of such noises we use to communicate meaning include cheering, clapping, booing, hissing, sighing, tutting and even burping. Some of these signals are culturally sensitive and mean different things in different societies, but they are noises that stand alone and have a unique meaning.

But imagine all our 'words' were like that. Imagine we made a different noise for every meaning, and had no means of recalling the sound other than just remembering it. That's the world that most animals still live in, as we did before we had words. The first few dozen or so may be easy enough, but as the numbers grow, you're soon going to have trouble remembering which noise is which – or even just telling them apart. No matter how big your brain, there's a limit to the number of arbitrary noises you can remember without a system to help you. The crucial and transformative thing about words is that they function as a tagging tool. Because all the words we use are formed using combinations of a small number of easily-remembered sounds, they act as a simple digital system that allows us to keep track of them – endless numbers of them.

This means that the vital first step on the road to language need not have been some mysterious 'cognitive revolution', or a lucky mutation that miraculously prepared us for speech, but only the far simpler trick of controlling the noises we use to communicate, and using them in combination. Grammar requires a critical mass of words before it can emerge, and this digital shuffle is exactly what was needed to expand our vocabulary – a trick that, like any useful new technology, would be adopted and developed faster and

more easily by the children of each new generation. Grammar would then start to appear, spontaneously and quite naturally, once a certain level had been reached – as a simple consequence of the need to organise an increased number of words. And the smarter the individual – the bigger their brain – the greater the evolutionary advantage.

The idea that language is essentially a digital medium may seem hard to accept. To a native speaker, speech is such a fluid and personal means of expression that the concept seems completely counter-intuitive. But we shouldn't be surprised that we've evolved such a system for communication, or that it feels so natural: digitization is actually nature's default method for creating a complex system. It's an effective solution to the problem of information transfer: just as with broadcast media, digital signals are more efficient than analogue, because their component nature means they can convey more data more accurately in any given time frame. So it is with words – and the phonemes (vowels and consonants) we use when we speak actually combine in ways that mirror the behaviour of the very molecules that form our bodies.

Consider DNA, the master molecule of life. Our genome is nothing but a long string of just four nucleotide bases that code for specific sequences of the 20 amino acids which make up every part of you. This small number of amino acids in turn form the building blocks for all the 20,000 proteins found in your body: the base codes digitally control the order of the amino acids which 'spell' out protein 'words' that form the grammar of our bodies. The numbers compare remarkably well with the phonemes and vocabulary of languages (the proteins fold into secondary, tertiary and quaternary structures much like human grammar.) Yet DNA didn't need to be invented any more than language did: it simply evolved as a practical solution to a data management problem.

The building blocks from which the molecules of life are formed also interact digitally. All matter is made of combinations of a limited number of elements (there are around 90 on earth) which react with each other to form endless variations. These can then combine, divide and recombine again, expressing 'meaning' in the form of compounds that – like words – have characters very different from the properties of their constituent elements, be they letters or atoms. And on an even deeper level, we know that these elements are

in turn built up from a small toolkit of fundamental particles that behave digitally as well – the 'quantum' of quantum theory is simply a discrete unit. It's the same trick.

But if language originated from such a simple step, and emerged from strategies that other animals use, how come we're the only ones that have it? Well, one species had to get there first, and perhaps we just happen to be it. Even at the most generous estimate, we wouldn't have started using words before about 3.5 million years ago – and probably much more recently than that. In evolutionary terms, that's a mere heartbeat. It's less than one thousandth of the time since life began on earth, and still a tiny fraction of the time since we first crawled from the sea onto dry land. On that scale, it's a vanishingly small interval – and as we pay more attention to how other animals communicate, we can see signs of the same process. We're only just ahead of the game – but language is such a transformative change that the gap seems immense.

For this seemingly simple switch from analogue to digital is not just another incremental change in the march of evolution. It's a major transition, a trigger point – much like what happened when life first emerged through the action of DNA, what happened when organisms became multi-cellular, or what Ray Kurtzweil predicts will happen by 2045 – the merging of AI with human intelligence. Kurtzweil refers to this coming stage as The Singularity – a moment when human life will be "irreversibly transformed". But the birth of language was itself just such a moment. In allowing us to pool our species' collective intelligence, this critical step was clearly also an irreversible transformation: given how it changed life for us, it was effectively the human singularity – the thing that made us.

Because from this humble start, language went on to decouple us from the slow process that had determined the path of all life up until then. In terms of biological evolution, very little has changed since we became anatomically modern about 200,000 years ago. If anything, our brains have shrunk slightly as we domesticated ourselves, but most other changes are limited to superficial factors like skin colour, and greater tolerance to some foods and diseases. But in terms of how our mental horizons have evolved, there is an enormous gulf. At the dawn of human modernity, we were only just

preparing to leave our home continent of Africa, hunter-gatherers armed with stone tools and the use of fire. Yet just a few thousand generations later, we stand ready to leave our home planet, equipped with the secrets of the atom and the genome, masters even of gravity.

That's because language allows us to participate in the evolution of ideas – and our memes are a far more exciting, fertile and rapid ground for radical change than the occasional accidents of genetics. Memes spread knowledge. We may not yet know – and without a time machine may never know – exactly when the change first happened, but the runaway growth of our brains, and the eventual artificial expansion of our memories through more permanent media, tell the dramatic story of its consequences. It's a story that only picks up speed as technology develops: the path from writing to printed books, the electronic media, the internet and the emergence of AI traces a logical extension of this process, the unstoppable drive of intelligence to know itself.

For the trick of speech bestows an even more precious gift: in providing a simple system for remembering large numbers of words, it has also given us a tool to know ourselves. By virtue of their physical senses, all living things have awareness, but in enabling us to be aware that we are aware, language catapults us into consciousness. Instead of simply seeing, feeling and reacting, the tagging device of words allows us to over-ride instinct and measure it against other possibilities. It gives us options. Language lets us think because it gives us something to think with: with a voice inside our heads we can have a dialogue with ourselves as well as with others.

But there's something else. Copernicus and Darwin may have dealt powerful blows to our fond and long-standing belief that we humans must be exceptional in some way, but the demolition job is not done yet. Despite having been displaced from our cherished spot at the centre of the universe, and forced to accept that we are no more than modified monkeys, we still cling to the idea that our species – or, even more absurdly, our 'own' tribal cultures and languages – can somehow be innately special. And to be sure, we are still very different to the other organisms we share our planet with – not just

in the trivial sense of walking on two feet and having no body hair, but because homo sapiens alone, of all the animals on earth, is so powerful that it now threatens both its own and all other species with extinction.

That difference is something that even Darwin struggled to explain – and the discrepancy came to bother his co-evolutionist Alfred Russel Wallace so much that he eventually rejected his own conclusions as they applied to humans, stating that "*Nothing in evolution can account for the Soul of Man. The difference between Man and the other animals is unbridgeable… It is clear to me that the soul was a separate creation*." And that is the power of language – or rather the power of our ignorance about what language really is. Because we have so little understanding of the simple trick at the heart of the matter, we stand astonished by its results, like children at a magic show.

So perhaps an understanding of the true nature of language may also enable us to lay to rest what Nietzsche called 'the soul superstition': the idea that we are animated by something fundamentally different to that of our fellow animals, when this idea is really just a side-effect, an illusion born of ignorance at how language works on us. The purpose of this book is to show how the trick of speech has worked out for our species, and how our profound ignorance of what language is and how it plays us is what lies behind most of the problems that – for all its many benefits – still beset us. The good news is that, despite the damage it has wreaked along the way, language also contains the secret of our salvation. For it is our memes, not our genes, that will save us.