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Puzzles and mysteries in the origins of language

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ABSTRACT

Language evolved in no species other than humans, suggesting a deep-going obstacle to its evolution. Could it be that language *simply cannot evolve* in a Darwinian world? Reviewing the insights of Noam Chomsky, Amotz Zahavi and Dan Sperber, this article shows how and why each apparently depicts language's emergence as theoretically impossible. Chomsky shuns evolutionary arguments, asserting simply that language was instantaneously installed. Zahavi argues that language entails reliance on low cost conventional signals whose evolutionary emergence would contradict basic Darwinian theory. Sperber argues that a symbolic expression is, literally, a falsehood, adding to the difficulty of explaining how – in a Darwinan world – systematic reliance on language could ever have evolved. It is concluded that language exists, but for reasons which no currently accepted theoretical paradigm can explain.

'Thus semiotics is in principle the discipline studying everything which can be used in order to lie.'
Umberto Eco (1976: 7)

1. Introduction

Language evolved in no species other than humans, suggesting a deep-going obstacle to its evolution. One possibility is that language simply cannot evolve in a Darwinian world – that is, in a world based ultimately on competition and conflict. The underlying problem may be that the communicative use of language presupposes anomalously high levels of mutual cooperation and trust – levels beyond anything which current Darwinian theory can explain.

Representing radically divergent disciplines, Noam Chomsky, Amotz Zahavi and Dan Sperber are major figures whose insights have a bearing on this problem. Chomsky shuns evolutionary arguments, asserting simply that language was instantaneously installed. Zahavi argues that language entails reliance on cost-free social conventions whose evolutionary emergence would contradict basic Darwinian theory. Sperber argues that a symbolic expression is, literally, a falsehood, adding to the difficulty of explaining how – in a Darwinan world – systematic reliance on language could ever have evolved. It is concluded that language exists, but for reasons which no currently accepted theoretical paradigm can explain. Language evolved in no species other than humans, suggesting a deep-going obstacle to its evolution.

2. Noam Chomsky

'Language is, at its core, a system that is both digital and infinite', writes Noam Chomsky (1991: 50). 'To my knowledge', he adds, 'there is no other biological system with these properties.' Chomsky attributes the capacity to deploy finite

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means to express an unlimited array of thoughts to a uniquely human organ installed in our species by a single genetic mutation.

A mutation occurs in an individual, not a group. The first speaker, reasons Chomsky, must therefore have been talking to itself. A critic might object that this makes no sense: Why talk when no one else existed who could understand? But the objection is invalid. 'Actually', explains Chomsky,

> 'you can use language even if you are the only person in the universe with language, and in fact it would even have adaptive advantage. If one person suddenly got the language faculty, that person would have great advantages; the person could think, could articulate to itself its thoughts, could plan, could sharpen, and develop thinking as we do in inner speech, which has a big effect on our lives. Inner speech is most of speech. Almost all the use of language is to oneself… So if one organism just happens to gain a language capacity, it might have reproductive advantages, enormous ones. And if it happened to proliferate in a further generation, they all would have it.' (Chomsky, 2002: 148)

Once everyone shared the same faculty, they could use it in various ways – for example, for purposes of communication. But, insists Chomsky,

> '…. language is not properly regarded as a system of communication. It is a system for expressing thought, something quite different. It can of course be used for communication, as can anything people do – manner of walking or style of clothes or hair, for example. But in any useful sense of the term, communication is not *the* function of language, and may even be of no unique significance for understanding the functions and nature of language.' (Chomsky, 2000b: 76)

Language, insists Chomsky (2011: 276), emerged in 'one fell swoop':

> 'To tell a fairy story about it, it is almost as if there was some higher primate wandering around a long time ago and some random mutation took place, maybe after some strange cosmic ray shower, and it reorganized the brain, implanting a language organ in an otherwise primate brain' (Chomsky, 2000a: 4).

Gradualist scenarios involving intermediate steps can be excluded on logical grounds. This is because there are no intermediate positions between a mind capable of a bounded range of expressions and one capable of an infinite range. Any supposed incremental step – any imagined part of infinity – is no part at all. From the moment of its installation, therefore, language must have existed in perfect form (Chomsky, 1996: 29–30).

Chomsky concedes that apparent imperfections abound. 'One massive case', he notes, 'is the phonological system: the whole phonological system looks like a huge imperfection, it has every bad property you can think of' (Chomsky, 2002: 118). The requirement for audibility – for phonology – makes the world's natural languages *sound* all too different. But the fault lies not with language. It resides, rather, in people's insistence on using it for communication:

> '… a large range of imperfections may have to do with the need to 'externalize' language. If we could communicate by telepathy, they would not arise. The phonological component is in a certain sense 'extrinsic' to language, and the locus of a good part of its imperfection, so one might speculate.' (Chomsky, 2004: 405)

We have, therefore, a paradoxical situation. Language 'is, fundamentally, a system of sound-meaning connections' (Hauser et al., 2002). Yet its scientific study involves isolating it from any connection with externally audible sounds.

Might we say, then, that there exists just one language spoken to this day across the world? Leaving aside variability in speech sounds, which are extraneous, this is indeed what we find: 'the basic structure of language is essentially uniform and is coming from inside, not from outside' (Chomsky, 2002: 93). 'The Martian scientist might reasonably conclude that there is a single human language, with differences only at the margins' (Chomsky, 2000b: 7).

Can it further be claimed that since the speciation of *Homo sapiens,* every human individual has come into the world endowed genetically with one and the same set of word meanings? This, too, is scientifically confirmed:

> 'There is overwhelming reason to believe that concepts like, say, *climb, chase, run, tree* and *book* and so on are fundamentally fixed.' (Chomsky, 2000a: 75)

But what about, say, 'carburetor' or 'bureaucrat'? Can these, too, be genetically determined? Surprisingly, the answer is yes. 'Furthermore', as Chomsky (2000b: 65–66) explains,

> 'there is good reason to suppose that the argument is at least in substantial measure correct even for such words as *carburetor* and *bureaucrat*… However surprising the conclusion may be that nature has provided us with an innate stock of concepts, and that the child's task is to discover their labels, the empirical facts appear to leave open few other possibilities.'

Variation occurs, but only on the superficial level of 'labels' – arbitrarily agreed sounds associated with particular concepts. The concepts themselves don't change.

Chomsky doesn't often team up with evolutionary biologists, but in 2002 made an exception to this rule. In a widely discussed collaborative article published in the journal *Science*, Marc Hauser et al., (2002) distinguish between 'FLB' – the language faculty as broadly construed – and 'FLN', the system's narrowly defined computational core. Only the unseen, unheard, crystalline and unchanging component – FLN – is of perfect design. The rest – FLB – includes equipment for sound production, movement, cognition and so forth not necessarily restricted to language or to the human species. 'FLN is the

abstract linguistic computational system alone', explain the authors, 'independent of the other systems with which it interacts and interfaces'. Alternative terms for FLN are 'discrete infinity', 'digital infinity' and the more technical term, 'recursion'.

FLN involves taking two digits, merging them into one unit and repeating the operation, merging the combined unit with another – and so forth. The faculty suggests some kind of digital computer, installed – however surprisingly – in an otherwise non-digital brain. 'That is rather surprising', notes Chomsky (1999: 589),

> 'because you wouldn't have expected a biological organ to work like a precisely constructed computational system with rigid, logical, deductive operations yielding very sharp interpretations going this way or that way depending on the nature of the rules and representations'.

FLN, then, is biology – but not biology as we know it.

'The proper way to think of the brain is as a digital computer', the philosopher Hilary Putnam (1988: 73) began arguing in the 1950s. Putnam, Chomsky and other intellectual leaders of the post-war 'cognitive revolution' in linguistics and related sciences established this metaphor as the dominant one for much of the second half of the century. A central attraction was that it breathed new life into the Cartesian distinction between 'body' and 'mind': the physical brain was now the computer's hardware, while 'mind' was the software installed.

The modern concept of a 'digital computer' is usually attributed to Alan Turing. The term 'digit' derives, of course, from the Latin *digitus* – 'finger'. A finger is something real, it is attached to your hand, it is part of your body, you can make it move. In other words, it's 'hardware'. But you can count on your fingers. Counting presupposes a brain willing to accept a patent fiction – the fiction that all fingers are the same. In a well-designed, smoothly functioning machine, differences within certain limits don't matter. It's as if a certain kind of trusting acceptance – *machine-like* trusting acceptance – could be assumed in advance. Humans are not the only species with cognitive abilities of this kind (Harnad, 1987; Lakoff, G. and R. Núñez, 2000).

Digital entities are, then – strictly speaking – non-existent. It's a point emphasised by Turing (1950) in his discussion of *discrete-state machines*. 'These', he explains,

> 'are the machines which move by sudden jumps or clicks from one quite definite state to another. These states are sufficiently different for the possibility of confusion between them to be ignored. Strictly speaking, there are no such machines. Everything really moves continuously. But there are many kinds of machine which can profitably be thought of as being discrete-state machines. For instance in considering the switches for a lighting system it is a convenient fiction that each switch must be definitely on or definitely off. There must be intermediate positions, but for most purposes we can forget about them'.

No physical entity, then, can be digital in itself. An object's changing states may *serve* as digits, but only to a receiver programmed to ignore intermediate states.

It's easy to see why Chomsky, unlike Putnam and other philosophers, was less than enthusiastic about the computer metaphor. After all, it might suggest that the brain as 'hardware' lacks digital structure until the necessary 'software' – the ambient language – had been installed by cultural transmission. Axiomatically, for Chomsky, cultural transmission is not a concept which can be entertained. Overriding the software/hardware boundary, he therefore insists on digital structure as an innate feature of the 'mind/brain'. The linguistic component of this conflated entity is 'a system of rules and principles' which exists already in the head:

> 'The rule system is something real, it is in your head, it is in my head, it is physically represented in some fashion'. (Chomsky, 1988: 590)

Meanwhile, what other people call 'language' – the constellation of shared understandings known as, say, 'French' or 'Swahili' – does *not* exist:

> 'It is only in the last couple of years that I have … begun to suggest that we simply overthrow the whole terminology and start over again, now using the term "language" to refer to the system of rules and principles, what has previously been called grammar, and dismissing entirely what has previously been called language, because it is a concept with no use, corresponding with nothing in the physical world'. (Chomsky, 1988: 591)

Note that if something does not exist *physically*, it does not exist at all.

Rules and principles can exist irrespective of whether they are used. They might exist even in a brain unable to access them at all. To clarify this last point, Chomsky (2000a: 17–18) presents us with an ingenious thought experiment. Maybe, he writes, *H. sapiens* was not the only species to be endowed with Universal Grammar:

> 'In fact it is conceivable, it is an empirical possibility, though extremely unlikely, that higher primates, say, gorillas or whatever, actually have something like a human language faculty but they just have no access to it.'

Owing to some mutation, an ancestral gorilla might have found itself equipped with an organ 'capable of providing an infinity of expressions'. But a difficulty immediately arose. 'To be usable', as Chomsky (2000a: 17) explains, 'the expressions of the language faculty (at least some of them), have to be legible by the outside systems'. In this thought experiment, the creature's previously evolved sensorimotor and conceptual-intentional systems – systems external to language – were unable to *access* the new organ. Hence, to this day, gorillas remain incapable of speech.

Chomsky narrates this 'fairy tale' (as he calls it) in order to drive home his philosophical point: it's *theoretically possible* for a system of rules and principles to be installed in the head without the rest of the brain even noticing. Indeed, he continues, given a random mutation we'd *expect* such an imperfect outcome. It's against this background that Chomsky (1996: 30) makes his boldest and most astonishing claim – the core intuition inspiring his 'Minimalist Programme'. In the human case, extraordinarily, not only do the new and old brain components fit together nicely. They interface so perfectly as to suggest the work of a 'divine architect'! 'That is very strange', concedes Chomsky (2000a: 20). 'There's nothing in biology to suggest that anything like perfect design in this sense is a possibility.' Yet the impossible stares us in the face.

3. Amotz Zahavi

For much of the twentieth century, theoretical linguistics was dominated by Noam Chomsky. Meanwhile, since the 1980s, the theory of signal evolution in the animal world has been decisively shaped by another controversial figure – the Israeli ornithologist and theoretical biologist Amotz Zahavi. Like Chomsky, Zahavi has provoked controversy almost as much when scorned as when acknowledged as the visionary leader of his field. Chomsky has never found reason to acknowledge Zahavi's existence; neither is there any indication that Zahavi knows or cares about Chomsky. Their approaches seem utterly at loggerheads, yet converge from opposite ends. The principles of language and animal communication, both agree, have nothing in common.

Chomsky, as we've seen, defines FLN as alien to the primate brain. A further posited mismatch separates nonhuman cognition from communication. 'A wide variety of studies', explain Hauser et al. (2002),

> 'indicate that nonhuman mammals and birds have rich conceptual representations. Surprisingly, however, there is a mismatch between the conceptual capacities of animals and the communicative content of their vocal and visual signals. For example, although a wide variety of nonhuman primates have access to rich knowledge of who is related to whom, as well as who is dominant and who is subordinate, their vocalizations only coarsely express such complexities.'

But *why* do we find such a 'mismatch'? *Why* do primate vocalisations 'only coarsely' reflect the complexities of primate cognition? Chomsky and his colleagues express surprise – as if perplexed by a deficit lacking any adaptive rationale. For Zahavi, the fact that a signal is insulated from cognitive control is not a deficit – any more than the watermark in a banknote is a deficit. It's proof that it's not a forgery.

Zahavi's contribution is best understood in historical context. Until the 1970s, biologists tended to view animal societies as morally regulated systems. In a hugely ambitious and influential book, V. C. Wynne-Edwards (1962) claimed that bird flocks, wolf packs and other animal societies were held together by collectively enforced regulations which included conventional systems of communication. Human language, from this perspective, posed no special theoretical challenge: it was another essentially honest system of communication. Biological signals exist to pool good information. Signallers don't cheat or lie because that might endanger their species. Darwinian competition, for Wynne–Edwards and his 'group selectionist' colleagues, pits group against group. The survivors are those groups or races most successful in enforcing cooperative behaviour among themselves.

By pushing this argument to its limits, Wynne–Edwards unintentionally exposed the entire paradigm as impossible and absurd. Critics pointed out that cooperation is not the point of departure for Darwinian theory. The notion of competing 'races' makes no biological sense. Darwin arrived at this theory after reading Thomas Malthus: individual members of *the same* species compete in a struggle which pits each against all. Cooperation occurs, but this must be explained, not just assumed. In particular, any observed altruism must somehow be reconciled with the fundamental replicatory 'selfishness' of genes (Hamilton, 1964; Trivers, 1971; Dawkins, 1976). Where animals do cooperate generously, this is everywhere mixed up with selfish competition. No animal society operates harmoniously as a morally regulated whole.

Zahavi's contribution was to specify how *signals* evolve in a Darwinian competitive world. His fundamental move was to divide 'natural selection' into two distinct categories. First, 'utilitarian selection' – selection for ever greater efficiency in, say, locomotion, circulation or vision. The other category is what Zahavi terms 'signal selection', whose logic is the reverse. Signal selection (which includes sexual selection) is selection for 'wastefulness'.

To illustrate, Zahavi describes a gazelle that has just noticed an approaching wolf:

> 'One would expect the gazelle to freeze or crouch and do its utmost to avoid being seen. But no: it rises, barks, and thumps the ground with its forefeet, all the while watching the wolf. The thumps of the gazelle's hooves carry through the desert ground over long distances; its curved horns and the dark-and-light pattern on its face clearly reveal that the gazelle is in fact looking at its enemy.
>
> If the wolf comes nearer, one would expect the gazelle to flee as fast as it can. But no again: often the gazelle jumps high on all four legs several times and only then begins to run, wagging its short black tail against its conspicuous white rump, which has a black border.' (Zahavi and Zahavi, 1997: xiii)

Why does the gazelle waste time and energy jumping up and down – 'stotting' – instead of quickly running away? Zahavi (1977) offered a seemingly counter-intuitive explanation. The gazelle is under pressure, paradoxically, to signal that it is not under pressure – that it has time and energy to spare. Proving this entails a cost – it means taking on a handicap – but no wolf would be convinced by anything less.

Like the watermark in a banknote, stotting is persuasive because it's very difficult to fake. The confident gazelle's behaviour is convincing because a weak animal – one with reason to doubt its chances of escape – would avoid wasting time and energy in that way. It would just run. Field research in the Serengeti (FitzGibbon and Fanshawe, 1988) soon confirmed Zahavi's theoretical insight. Some gazelles stotted repeatedly when threatened by a predator; others did not attempt to stot but rather fled straight away. Spotted hyenas and hunting dogs went after those gazelles that did not stot, or stotted only a little; they avoided chasing those who gave an impressive display of stotting before their escape.

'Stotting' is a particular illustration of the general principle of 'costly signalling'. Zahavi and Zahavi (1997: 59) explain:

> 'In signals, cost is of the very essence; it is necessary to the existence of the signal. If there is no cost, nothing prevents cheaters from using a signal to their benefit and to the detriment of the receivers, and that signal will lose its value *as* a signal.'

In other words, what looks like 'inefficiency' is inevitable:

> 'We say that by its very nature, the reliability required in signaling militates *against* efficiency. Handicaps increase the reliability of signals not *despite* the fact that they make an animal less efficient, but *because* they do. Any improvement in a signal *must* be accompanied by a cost to the signaler – that is, must make the signal's bearer less well-adapted to its environment'. (Zahavi and Zahavi, 1997: 91)

It is this – the requirement for 'wastefulness', for 'inefficiency' – which prevents animal communication from being either 'digital' or 'infinite'.

Consider again the scene of the gazelle and the wolf. Instead of jumping up and down to advertise its ability to escape, couldn't the threatened animal find a quicker, cheaper way? Wouldn't it save time and energy if predator and prey could agree on a set of abstract conventions – say, three wags of the tail to indicate 'high' escape capacity, two for 'intermediate' capacity and one for 'low'? Merely to imagine such a system is to see at once why it wouldn't work. Gazelles would select 'high' irrespective of their actual capacity – and wolves would take no notice. In real life, only costly signals can be accepted as reliable currency – and these can be weighed only on an analog scale (Zahavi and Zahavi, 1997: 64–5; 222–223; 244n).

What does it mean, then, to say that human language is 'digital', whereas animal communication is 'analog'? Human verbal language, as Zahavi points out, combines digital with analog features. Listeners in real life care about feelings and emotions, gleaning information from body-language much as other animals do. Yet Chomsky's point remains valid: insofar as language is special, the system is abstract and digital. Zahavi and Zahavi (1997: 244n) compare two types of speedometer:

> 'An analog speedometer's needle lets us estimate speed pretty precisely, even if there are only two or three numbers on the face of the speedometer. A digital speedometer, which displays numbers, is limited to the precision of these numbers. If the digits change with only every 5 additional miles per hour, the digital speedometer will not show the difference between, say, 11 mph and 14 mph – while an analog speedometer will.'

Animals reject digital format because it's inconsistent with their demand for reliability. No wolf observing a gazelle's performance would be prepared to ignore intermediate states.

Zahavi's theory also explains why infinite scope is impossible. Graded signals allow listeners to judge their intrinsic quality:

> 'These "judges" force the competitors to compete in a standard manner in order to better evaluate the differences among them. It is precisely this standardization that brings out crucial differences in performance, which in turn reflect accurately the different abilities and motivation of the competitors'. (Zahavi and Zahavi, 1997: 65)

The need to compare two or more performances, evaluating subtle differences between them, forces signallers to restrict themselves to a fixed repertoire. In one sense, the number of possible choices remains 'infinite': there is no limit to the gradations allowed. But analog variability within a fixed signal category is a far cry from 'digital infinity'.

All this can be summed in the statement that animal signals – unlike linguistic signs – are hard-to-fake *body language* as opposed to 'head language':

> 'If we assume that the body is the resonator, the sounding board, then it stands to reason that the quality of vocalizations is affected by the state of that body. Vocal pitch, too, reflects the tension of the muscles of the body and face. This relationship between vocalizations and the body that produces them makes them hard to fake. To make a deceitful call, one has to adopt the posture necessary to produce the fake message; since each action has its own optimal starting position, changing position to produce a false message may make it extremely difficult to carry out the action really intended. Thus what one gains by cheating does not make up for what one loses by assuming an improper posture – and so the phoney message is not worth its price.' (Zahavi and Zahavi, 1997: 70)

Signals of this kind are not necessarily loud and extravagant. Soft, intimate primate vocalizations – sometimes misleadingly termed 'cheap talk' (Silk at al., 1999) – are hard-to-fake body language, too.

None of this rules out categorical perception or an element of 'syntactical' creativity in vocal signalling. Bird song is a learnt behaviour used by males to attract females and to protect territories. Bengalese finches are unusual in that a male can produce 'an infinite variety of songs' (Okanoya, 2002: 48). In each case, two to five minimal elements – acoustically distinct notes – are

organized into a 'chunk'. Chunks are further organized into phrases by parsing in accordance with species-specific rules. Variety is generated by choosing different pathways through this system of 'syntactical' constraints.

Marler (1998: 11–12) describes 'syntactical' birdsong as 'impoverished in referential content, but rich in idle emotional content'. 'The variety', as he explains,

> 'is introduced, not to enrich meaning, but to create diversity for its own sake, to alleviate boredom in singer and listener, perhaps with individual differences serving to impress the listener with the singer's virtuosity, but not to convey knowledge'.

Meaningfulness is, then, *inversely related* to syntactical complexity. Take a wild bird whose peep or chirp has a definite meaning. Now breed from it a domesticated variety, removing predation pressures while allowing sexual selection to do its work. To impress female listeners, the male's song may now increase dramatically in 'syntactical' complexity. By the same token, the incorporated peeps or chirps lose whatever meanings they may originally have had. The logic here, as Okanoya (2002: 58) explains, is simple:

> 'As soon as a signal is under voluntary control, it can be produced both honestly and for the purposes of deceit. Thus, it is no longer *reliably* honest like a reflex, limbic signal is. It follows that there is no possibility of creating voluntary strings of semantic tokens (that is, meaningful language) without sacrificing the guarantee of honesty.'

Only where meanings don't matter is 'syntactical' complexity free to evolve. Females are not interested in meanings: they care only about overall male stamina and performance. As long as the intended audience maintains this stance, each token – each note sequence in the larger song – is automatically bleached of meaning. Conversely, should sounds once again require attachment to meanings, their production would have to be insulated from volitional control – automatically excluding 'syntactical' creativity (Okanoya, 2002: 58)

Okanoya's inverse law prohibits language on principle: you can't raise both ends of a see-saw at once. Combining syntactical complexity with complex, combinatorial semantics – the breakthrough characteristic of speech – is on this basis *theoretically* impossible. By a roundabout route, then, we are brought back to Chomsky (2002: 146):

> '… there is a taxonomy of possible systems and language does not belong. The possible systems include non-human primate calls, bird songs, etc. There are systems related to survival, mating, and reproduction. That's about it. Language doesn't fit in… So, it's a total dead end. There is essentially nothng to say, language is off the chart.'

4. Dan Sperber

In 1975, the French anthropologist Dan Sperber published 'Rethinking Symbolism'. This short essay set out to demolish 'semiotics' – the idea, first proposed by Saussure (1983 [1915]), that language boils down to communication through a conventional code, and that rituals, beliefs, customs and so forth should be analysed in the same way. Sperber developed his alternative approach during fieldwork among the Dorze – a group of 20,000 people living in the Gamo Highlands, west of the Rift Valley in Ethiopia.

For the Dorze, leopards are Christian animals who observe the fasts of the Ethiopian Orthodox Church (Sperber, 1975: 93). Animals must be killed by a sacrificer who only slits their throats after having thrown them down on their right sides. Like the Dorze, the leopard knows how to sacrifice, killing first and eating the meat only afterwards. 'Further, it is thought to slit the throats of its prey, and only to consume those that fall on the right side' (Sperber, 1975: 133). When a Dorze explains all this, 'it is not a manner of speaking: he takes it literally' (Sperber, 1975: 94).

As a social anthropologist, Sperber was on the look-out for linguistic, ritual and cultural symbolism. But how to decide what counted as 'symbolism' and what did not? The clue lay in his own personal reactions:

> 'Someone explains to me how to cultivate fields. I listen with a distracted ear. Someone tells me that if the head of the family does not himself sow the first seeds, the harvest will be bad. This I note immediately…
>
> My assistant says he is tired in the middle of the afternoon and goes to lie down. What a waste of time! He awakes, feels bad, and suspects the evil eye. Not such a waste after all…
>
> Or to take still another example, when a Dorze friend says to me that pregnancy lasts nine months, I think, "Good, they know that." When he adds, "but in some clans it lasts eight or ten months", I think, "That's symbolic." Why? Because it is false.'

Not all falsehood, however, is symbolic. Suppose a Dorze informant described the stars as tiny points of light. That wouldn't strike Sperber as symbolic, even though western science says stars are big. The ethnographer would only scent symbolism if it was explained to him that the stars are really larger than the earth, that some are perhaps inhabited and so forth. Why? Because in that second case, the speaker would be expending intellectual effort in an extravagant, non-parsimonious way.

Instead of choosing the simplest hypothesis to account for the apparent facts, symbolism piles hypotheses on top of one another without caring to put them to the test. Sperber's (1975: 4) criterion, then, is inefficiency:

> 'I note then as symbolic all activity where the means put into play seem to me to be clearly disproportionate to the explicit or implicit end, whether this end be knowledge, communication or production – that is to say, all activity whose rationale escapes me. In short, the criterion I use in the field is in fact one of irrationality. I don't know that other anthropologists proceed differently.'

By way of example, Sperber offers a Trobriand Island myth about the origin of humanity – a complex narrative telling of miraculous births and other unlikely events. According to Malinowski (1926) the meaning is simple: this or that clan has a *right* to the privileges that it in fact exercises. But in that case, asks Sperber, why not just say it? Why go through such a long, complicated and obscure route to make such a simple point?

When we consider how myths are bound up with their ritual re-enactments, the problem gets worse:

> 'The disproportion between means and end, clear in the case of mythology, becomes truly exorbitant in the case of ritual. When we think of the time, the tension, the passion, and the expense necessary to put on the smallest ritual, how can we believe that the uncertain attribution of a semantic interpretation – one therefore paraphrasable in ordinary language at a comparatively non-existent expense of energy – can account in any fashion for the nature of the phenomenon?' (Sperber, 1975: 7–8)

You don't have to be a scientist to check out alternative hypotheses, seeking the simplest explanation for the data observed – that's how rational cognition works. But 'the symbolic mechanism', as Sperber calls it, does the opposite. Wilful profligacy and extravagance are its hallmarks. Symbolism revels in paradox and contradiction. Point to a mismatch between belief and experience – and it doesn't care.

To illustrate this last point, Sperber (1975: 95) returns to the Dorze belief that leopards observe the fasts of the Orthodox Church. Wednesdays and Fridays are fast days. So shouldn't animal herders relax on those days? They don't:

> 'A Dorze is no less careful to guard his animals on Wednesdays and Fridays, fast days, than on the other days of the week. Not because he suspects some leopards of being bad Christians, but because he takes it as true both that leopards fast and that they are always dangerous. These two statements are never compared. If an anthropologist pesters an informant about this, the latter reflects and replies: leopards don't eat meat killed on fast days, or perhaps they only eat it the next day. The problem of the long fasts that last several weeks remains to be resolved. But precisely, the informant views the question as an enigma, as a problem whose solution perforce exists, and whose premises must be correct. Leopards are dangerous every day; this he knows from experience. They are also Christians; this is guaranteed by tradition. He need not seek the solution of this paradox; he knows that there is one.'

Paradoxes of this kind are intrinsic to the human condition. Each of us inhabits a realm of 'institutional facts' on the one hand, 'brute facts' on the other (Searle, 1996). Since institutional facts are socially agreed fictions, no amount of imaginative effort – no amount of philosophy or mythology – can possibly square them with the 'brute' facts of the physical and biological world.

Through immersion in an environment of fictions, the thinking of *H. sapiens* becomes distinctively 'metaphorical' (Lakoff and Johnson, 1980, 1999; Lakoff, 1987; Sweetser, 1990). Imagery and metaphor are not peripheral aspects of human mental life, but *constitutive* of it (Langacker, 1987: 5). Scientific and mathematical concepts – 'digit', 'infinity' and so forth – are invariably metaphors (Lakoff and Núñez, 2000).

But what exactly *is* metaphor? 'Calling one thing by another' captures the idea, but it's important to realise that metaphor is *falsehood*:

> 'Generally it is only when a sentence is taken to be false that we accept it as a metaphor and start to hunt out the hidden implication.' (Davidson, 1979: 40)

The 'hidden implication' is a chosen *aspect* of reality – an abstraction – which for joint purposes we take as 'truth'. When a metaphor becomes common currency, we forget its original incongruity, which was the quality necessary to provoke thought. In becoming conventionally accepted, previously striking metaphors become interpreted 'literally' – that is, as settled features of the linguistic code. The cyclical logic through which metaphors arise, fade, die and are replaced by novel metaphors accounts quite generally for the creativity of language and its restless unfolding over historical time (Deutscher, 2005). Metaphorical 'mapping' from one conceptual domain to another is the secret of grammaticalization – the process by which speakers converge on conceptual shorthands to express abstract relationships between ideas (Meillet, 1903; Heine et al. 1991; Hopper and Traugott, 2003). Scientific and mathematical notation systems evolve in essentially the same way (Lakoff and Núñez, 2000). Metaphor requires no special interpretive abilities – just a willingness to accept patent falsehood on trust.

Humans routinely *expect* literal meanings to be false, uninformative, banal and/or irrelevant. We may have recourse to a shared code, but that's never enough. In real life, successful communication presupposes *inferential* abilities. The listener must draw on contextual cues, memory and imagination to reconstruct the speaker's intent (Grice, 1969; Sperber and Wilson, 1986). If language works at all, in other words, it's because humans have a sense of humour, can detect irony, cope with metaphor, enjoy the absurd. The system works, in short, because we are willing to rejoice in patent falsehoods, valuing them as windows into our own and one another's minds.

The difficulty for any evolutionary account should now be evident. It's not just that symbolism *'can be used in order to lie'* (Eco, 1976: 7). The deeper problem is that language is constructed out of building blocks which – from a Zahavian standpoint –

are already 'lies', irrespective of how they might subsequently be used. The entire symbolic domain is – if not 'falsehood' in the sense of exploitative deception – a realm of enduring fictions unimaginable in the natural world.

5. Why language cannot evolve

When Zahavi first suggested his 'Handicap Principle' in 1975, it was almost universally rejected. Many papers were published using formal, explicit mathematical models 'proving' that the Handicap Principle doesn't work (Davis and O'Donald, 1976; Maynard Smith, 1976; Kirkpatrick, 1986), or that it might apply only under very special conditions (Eshel, 1978; Pomiankowski, 1987). This situation changed in 1990, when Alan Grafen (1990a, b) published two papers using different mathematical models to show that the Handicap Principle is generally valid. In order to be effective, signals have to be reliable; in order to be reliable, they have to be *costly*. To convince a potentially sceptical audience, the signaller must take on some handicap, demonstrating that it can afford the costs. Digital conventions, being cheap and correspondingly unreliable, just cannot evolve (Zahavi, 1993).

But the notion of a 'cost' needs discussion. The crucial distinction is between 'efficacy cost' and 'strategic cost' (Maynard Smith and Harper, 2003). 'Efficacy cost' (Guilford and Dawkins, 1991) is the amount needed to ensure transmission of a perceptible signal. If you are printing a banknote, it's the cost of clarifying that it's supposed to be ten pounds sterling as opposed to five, twenty or fifty. In a game of 'Monopoly', that's essentially no cost at all. If the originals get lost, it's enough to scribble numerals on pieces of paper. 'Strategic cost' is the component needed to ensure honesty and prevent cheating. That would be the cost of the special inks, watermarks, metal strips and so forth required to prove that a 'real' banknote is not a forgery. Compared with strategic costs, the efficacy costs in a banknote are low. The same applies to most signals in the animal world.

Why is it that the *vocal-auditory* channel – the very one which in humans is *most* strikingly subject to cognitive control – is in primates the *least* flexible, the *least* controllable? Why is it that primate gesticulations are so much easier to shape and manipulate?

The arguments favouring *sound* as the default modality for fast and efficient communication are well known. Gesticulations work only under good lighting conditions, at relatively close range and between signallers who must already be observing one another and interacting. By contrast, sounds go round corners, work in the dark, carry over distances – and don't require receivers to be facing the right way. Among primates, these advantages help explain why predator alarms rely so heavily on sound.

From a Zahavian perspective, however, we can immediately discern a problem. Messages arriving from around corners, in the dark or over distances will not be so easy to check out. This must surely be the explanation for the striking fact that it's only primate *vocal* communication which appears – by human standards – 'inflexible'. Visible gesticulations work as signals only between parties already in close contact, making deceptive abuse unlikely or impossible. Let's consider examples such as the infant chimpanzee 'nursing poke' (Tomasello et al. 1994), the juvenile 'raised hand' invitation to play (Tomasello and Call, 1997: 299–300) or the self-referential 'pointing' gesture used by a chimpanzee asking to be scratched (Pika and Mitani, 2006). What possible advantage might an infant gain by 'deceptively' reaching for its mother's breast? How might any young chimp benefit from 'deceptively' inviting its partner to play? In the case of the 'directed scratch', a signaller indicating the wrong part of its body would be cheating only itself. Visual gesticulations work best when each party is in full view of the other and neither has anything to hide. In this narrow subset of functional contexts, issues of honesty and reliability don't arise – which is why cognitive control can be allowed.

Language, however, is the great exception to Zahavi's rule. Language is not restricted to any subset of communicative contexts. Reference is 'displaced' – it can't be contextually corroborated – yet the system isn't reliable at all. In language, as we know from Saussure (1983 [1915]: 118), only efficacy costs apply:

> 'Everything we have said so far comes down to this. *In the language itself, there are only differences.* Even more important than that is the fact that, although in general a difference presupposes positive terms between which the difference holds, in a language there are only differences, *and no positive terms.* Whether we take the signification or the signal, the language includes neither ideas nor sounds existing prior to the linguistic system, but only conceptual and phonetic differences arising out of that system …. '

Deacon (1997) makes essentially the same point. Language consists of digital distinctions which – like banknotes in a 'Monopoly' game – are fictional entities costing nothing to produce. At the phonological level, this is especially clear. Excluding intermediate states, the lips are either 'open' or 'closed', features such as nasalisation, palatisation or voicing either 'off' or 'on'. In reality, when examined closely, the corresponding movements are continuous. 'Distinctive features' (Jakobson et al. 1952) don't really exist. But speakers have an interest in speed and efficiency, driving them to restrict *relevant* variation to a choice between alternative states. As Zahavi points out, efficiency is not what drives animal communication: reliability comes first. It is this which actively obstructs the evolution of language-like communication in the animal world.

Recall the complaint, so often voiced, that 'words are cheap' – that 'actions speak louder than words'. Expressions of this kind, central to folk wisdom everywhere, come close to denying the theoretical possibility of language. Instead of taking words on trust, those following this logic should insist on signal-by-signal evidential proof. In no human community do people pursue reliability quite that far, but under Darwinian conditions, this is precisely what happens. As Zahavi (1993: 227) explains:

> 'Reliability is crucial for the functioning of signals, as there is an inherent potential for conflict in all social interactions and the communicating parties may use the signals to cheat…. It is difficult to imagine any social interaction in which there is no potential for conflict at some time or other. Hence, receivers of signals act in their own best interests if they check the reliability of information encoded in all signals they receive, and do not respond to signals which do not carry a component of reliability'.

Linguistic signs carry *no* 'component of reliability'. Strategic costs in this case are zero, as if trust could somehow be infinite. Exploding the entire framework of Zahavian constraints, efficacy costs alone apply. As a result, selection pressures favour communicative speed and efficiency – leading to digital signal form. In a Darwinian world, signals of this kind would be ignored and so don't evolve. The very notion of language is in this sense Utopian – like trusting people to print their own banknotes. It won't work because, in the real world, trust cannot be extended in this way.

Chomsky avoids such issues by dismissing the entire topic of communication, re-defining language – specifically 'internal' or 'I-language' – as 'discrete infinity', 'recursion' or 'FLN'. Theoretical abstractions, by definition, lie outside space or time. 'FLN' cannot evolve, any more than 'zero', 'infinity' or the numeral '2' can evolve.

For the rest of us, the Darwinian challenge remains real. Language is impossible not simply by definition, but – more interestingly – because it presupposes unrealistic levels of trust. Infinite trust may seem natural for an automatic translation machine (Locke and Booth, 1955), a language acquisition device (Chomsky, 1957, 1965) or for self-organised language-using robots (Steels, 2009). But that's because man-made computers and robots lack competitive interests of their own. Infinite trust is not a valid concept in biology. Even when genetic kin cooperate (Hamilton, 1964), conflicts of interest are likely to arise. Even when friends form a cooperative pact (Trivers, 1971), the possibility of cheating remains. To guard against the very possibility of being deceived, the safest strategy is to insist on signals that *just cannot* be lies. This rules out not only language, but symbolic communication of any kind.

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