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**Review of Terrence Deacon, *The Symbolic Species: The Co-evolution of Language and the Human Brain*. London: Penguin, 1997, pp. 527.**

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This is a brilliant book — original, well-informed, well-written and intellectually exciting. No doubt readers of this journal will disagree with some of the claims about language — I shall lay out some reservations below — but they can be sure to agree with even more, and to learn a great deal on the way. This is partly because Deacon is a distinguished neuroscientist and evolutionary anthropologist, so he can speak with authority about things that we linguists only know about second hand; but even when he is talking about language itself he forces us to see it in a much broader perspective than most of us are used to.

The leading idea is that what makes language special (and unique to humans) is the fact that it uses symbols, rather than the fact that it is complex. He starts with a question that an eight-year old asked him: ‘If animals can’t learn languages like ours because they’re too complex, why don’t they have simple languages?’ This stumped him, and apparently led to the rethinking contained in this book. His answer in turn generates three questions:

1. What are symbols, and why are they so special?
2. How do our brains handle symbols, and why can’t animal brains do the same?
3. How did our brains ‘co-evolve’ with language to produce the present situation?

The book is divided into three parts which deal with these questions in turn. The discussion goes into a great deal of detail (especially in part 2, about brains, where I’m afraid Deacon told me more than I really wanted to know), which is why the book is so long. This review is not the place to evaluate his ideas on brain structure or on co-evolution, nor am I the person to do so; I can merely take his word for the factual claims (though

I note that one expert reviewer questions his fundamental claim that the human prefrontal lobe is over-developed in comparison with other primates — Holloway 1998), and admire his ability to tell an entertaining and coherent story. Instead I shall focus on part 1, where linguistics is most relevant.

## Symbols as system-based indices

In thinking about symbols, Deacon has found his way into Peirce's version of semiotics. As readers are no doubt aware, Peirce (1931) founded one of the two main traditions in semiotics (for a helpful review of the field see Urban 1992) and is best known for his three-way division of signs: 'icons' are based on similarity between the sign and what it refers to, 'indices' are based on contiguity in space or time, and 'symbols' have no basis other than convention. Thus a map refers iconically to the territory that it covers, smoke refers indexically to the fire, and a red light refers symbolically to the need to stop — as does, of course, the word *Stop!*. This classification is what Deacon builds on in his theory of symbols, and he shows convincingly that animals can interpret both icons and indices, but are defeated by symbols. Why? To answer this question he has to analyse the nature of symbols and what cognitive demands they make which go beyond the demands of icons and indices. Not surprisingly, most of the discussion is about the best-known symbol system, language, and it is in this discussion that he shows most clearly that he is not a linguist.

He argues that the three classes of sign stand in a hierarchical relationship: icons are the foundation on which indices rest, and indices underlie symbols. Neat though this hierarchy looks, I am not convinced that indices rest on icons, because he seems to me to use 'icon' where other people simply talk of categorization (74). Clearly we can only recognise a recurrent indexical relationship if we can already classify events as 'same' or 'different' — e.g. if we can recognise distinct instances of the categories 'smoke' and 'fire'; but the relation between one bit of smoke and another one is not iconic, because neither of them is a sign which refers to the other (at least, not in any normal sense of 'sign' or 'refer'). We must surely be able to recognise classification and concept-formation as a mental activity in its own right, without squeezing it into the semiotic system. On the other hand, it does seem reasonable to see symbols as resting on indexical relations of co-occurrence. After all, the word *cat* very often does co-occur with a visible cat in a child's experience, so the link between the two may well be learned at first as an index, and to the extent that chimpanzees can learn 'words' it is explicable in terms of this kind of learning.

The crucial question, however, is what distinguishes symbols from mere indices. Deacon's answer is that it is the fact that a symbol is embedded in a system which connects it to other symbols. This is a strange claim to make, given the main thrust of his general explanation for the uniqueness of human language. As explained previously, he says that this uniqueness lies in the use of symbols, and not in complexity; but a symbol system must, by definition, involve some minimum degree of complexity, so complexity seems to have slipped back into the explanation. Moreover, if symbols must be embedded in a symbol system as a matter of definition, it is hard to see how a symbol system could get off the ground, either in the development of the child or in the development of our species; a single symbol could not exist on its own, so there can never be a first symbol. What solution is available which does not invoke pre-programmed symbols and all the apparatus of innateness that Deacon disposes of so successfully?

Given these apparent contradictions, we need strong evidence and argument for this position; but there is hardly any evidence or argument, nor even any concrete examples of how one symbol depends on another for its symbol-hood. It is not even clear what kinds of inter-symbol relations he has in mind, syntagmatic or paradigmatic (another important contrast which belongs to the other strand of semiotics that goes back to Ferdinand de Saussure, but which he does not mention). In some places he is clearly thinking of paradigmatic relations, as when he discusses activation:

“The symbolic basis of word meaning is mediated . . . by the elicitation of other words (at various levels of awareness). Even if we do not consciously experience the elicitation of other words, evidence that they are activated comes from priming and interference effects . . .” (64; also 82)

But elsewhere it is syntagmatic relations — i.e. syntactic co-occurrence patterns — that are in focus:

“Some sort of regimented combinatorial organisation is a logical necessity for any system of symbolic reference. Without an explicit syntactic framework and an implicit interpretive mapping, it is possible neither to produce unambiguous symbolic information nor to acquire symbols in the first place. Because symbolic reference is inherently systemic, there can be no symbolization without systemic relationships. Thus syntactic structure is an integral feature of symbolic reference, not something added and separate. It is the higher-order combinatorial logic, grammar,

that maintains and regulates symbolic reference; . . .” (100; also 136)

For a linguist this is a fundamental difference, as it is much easier to believe that paradigmatic relations (of contrast) are essential to symbolisation; if syntagmatic relations and syntax really are fundamental, how can the system ever get started? And yet the fact is that children do learn and use single words before they start combining them. In any case, why should we believe any of these claims about the importance of the system? In the context of modern linguistics it seems to be harking back quite unnecessarily to Saussurean claims about a language being a system consisting of ‘nothing but differences’.

## **An alternative: symbols as indices with mind-reading**

These complaints may seem to undermine Deacon’s main argument about the importance of symbols, but I don’t think they do because there is a better alternative at hand which makes his case even stronger. However they do require us to ‘do a Deacon’ by reversing the causal relationship that he sees between the use of symbols and the ‘theory of mind’. In Part 3 he suggests that the ability to read other people’s minds is “both mediated by symbols and dependent on many of the same mental operations and neural substrates as are critical to symbolic abilities” (427). He claims a neural link between the ability to use symbols and the ability to “build an independent mental representation of the subjective experience of another”, since damage to the prefrontal lobes affects both abilities (ibid); but his suggestion is that it is the ability to symbolise that creates the ability to mind-read. However let us suppose, for the sake of the following argument, that it could be the other way round: what our over-developed prefrontal lobe does is to allow us to put ourselves in someone else’s shoes. In contrast, this mind-reading ability is much less developed in other animals.

We also need a further assumption: that small children can work out what a companion is paying attention to (which we can call ‘attention-spotting’). This is a safe assumption because, first, it is clearly true, but secondly, it is an ability that we share with other primates. Primates naturally follow each other’s gaze, though unlike humans they do not naturally follow a pointing finger (Whiten 1994). The ability to identify the focus of someone else’s attention is of course itself one manifestation of the ability to read their

mind, but it is so specialised that it is worth mentioning separately. It is also important for our alternative account because it will allow the child to infer the referent of a word used by someone else.

If we take for granted this ability of mind-reading and its special case, attention-spotting, the essence of a symbol is that it allows the observer access to the symbolizer's mind. As Deacon points out, the same is true of various 'visceral' reactions such as laughter, but symbols are different because they are voluntary so they can be linked to experiences that do not evoke specific visceral reactions (such as seeing a cat). Thus the end-point of learning a symbol whose meaning is X is the knowledge that its use guarantees that the user is thinking of X — in more technical language, it guarantees that the user's concept for X is currently active. If the observer knows this, then their mind must also contain a link between the symbol and X, so observing the symbol also activates X in the observer's mind — in short, the meaning 'X' has been transmitted from the symbolizer's head to the observer's head.

Given these assumptions, it is easy to see how a child can learn symbols and their meanings, without any genetic programming for symbol-learning as such. The only learning mechanisms that we assume are:

- (a) the ability to learn indices (or more generally, to learn correlations between co-occurring events),
- (b) the ability to mind-read and its sub-case, to know what someone else is attending to
- (c) the ability to generalise across events.

To simplify I shall focus on the learning of one word, *cat*, and its meaning; the examples are of course hypothetical. Logically there are three stages in the learning of this symbol:

1. as an index for a co-present cat,
2. as an index for a co-present cat to which the speaker is paying attention and
3. as an index for a cat which is not co-present but which the speaker is paying attention to.

We can expand these steps a little:

1. The first step is that the child regularly hears *cat* used in the presence of a cat, and learns an indexical link between the two; in other words, the experience of hearing *cat* co-occurs with the experience of seeing a cat. In the following formulae, ‘::’ means ‘co-occurs with’:

‘me-hearing-*cat*’ :: ‘them-saying-*cat*’ :: ‘me-seeing-a-cat’.

This is a well-attested stage in semantic development, supported at least by anecdote. For example, the first word used by one of my own daughters was *tishoo!*, said when someone sneezed — an indexical link between a word and an observable event (sneezing); for further examples see Barrett (1986). Already at this stage the link between the two events is arbitrary, as required for classic symbols, because neither event causes the other and the word-form involved is irrelevant to the event denoted.

By simple generalisation from ‘them’ to ‘people’, and from one cat to all cats, the child can work out a formula which generalises across different tokens of *cat*:

‘X-saying/hearing-*cat*’ :: ‘X-seeing-a-cat’

This allows the child, as an instantiation of X, to say *cat* in the presence of a cat.

2. By attention-spotting, the child observes that when people say *cat* they are also paying attention to the cat that is visible:

‘me-hearing-*cat*’ :: ‘them-saying-*cat*’ :: ‘me-seeing-a-cat’ :: ‘them-attending-to-a-cat’.

Simplifying and generalising:

‘X-saying/hearing-*cat*’ :: ‘X-seeing-a-cat’ and ‘X-attending-to-a-cat’

This stage involves a more ‘social’ approach, because the other person’s behaviour (eye-gaze) is crucial; analytically it is a development of stage 1, because the child relates the use of *cat* to the speaker’s behaviour as well as to the presence of the cat, but it is a matter of fact whether or not stage 1 is ever distinct from this stage.

3. By mind-reading, the child observes that people sometimes say *cat* when no cat is in sight, but when the speaker is probably paying attention

to one (e.g. when making cat-like noises, or falling over the cat's sleeping basket):

‘X-saying/hearing-*cat*’ :: ‘X-attending-to-a-cat’.

This is fully social because the child is paying attention to the other person's inferred state of mind. This stage also allows another important characteristic of symbols — ‘displacement’, whereby a symbol may refer to an object or event which is not co-present.

The child has now acquired the symbol *cat*, because the link between the word *cat* and the actual cat is no longer purely indexical; there is an indexical relationship, but it is now between the observable word and the unobservable (and inferred) mental state of ‘attending to a cat’. This mental state can be interpreted cognitively in terms of activation: the speaker's ‘cat’ concept is active, and so is the hearer's. However, as far as the child is concerned, the point is that hearing *cat* is a guarantee that the speaker is thinking of a cat. This allows the child not only to interpret other people's behaviour, but also to use this device for letting other people know the state of its own mind.

This account of symbol-building is rather different from Deacon's. First, it makes no reference to the existence of other symbols — there is no requirement that *cat* should be embedded in a complete system of symbols before it can itself qualify as a symbol. And second, it does not replace the indexical relationship by a higher-order relationship (though as we shall see below, this may be a by-product of the development), but expands the list of indexical relationships by including inferred states of mind. However it does achieve Deacon's goal of explaining why humans find symbols so much easier to learn than other animals do; but in this explanation the main weight is borne by the human ability to read other people's minds.

## Learning the relations ‘name’ and ‘meaning’

The trouble with the account given so far is that the child has not ‘learned about symbols’, which Deacon describes as ‘the symbolic threshold’ (79), so that learning this much about the word *cat* will not help the child to learn other words. And yet the fact is that later words are learned more easily than earlier words, so presumably the learner has learned something general about words as symbols. This is where Deacon's account is helped by the assumption that symbols must be embedded in a system: the first system is hard to set up, but once it is established further additions are easy. I have

rejected this idea on the grounds that the first system is not just hard to set up, but impossible; so I owe an alternative explanation.

One answer is that we can leave it to whatever mechanism is responsible for generalisation (and its fellow, categorization). Once the child has gone through the stages listed above for a few dozen words, it will unconsciously ‘notice’ the similarities and take appropriate steps. This is how it built the concept ‘cat’ in the first place — by recording a number of cat-tokens and generalising across them. If this is possible for cats, why not also for words? We need not commit ourselves to any particular account of categorization — all we need to agree is that words will be covered by the ordinary mechanism.

This account certainly explains how we can learn the concept ‘word’, in the sense of ‘word-form’; and no doubt children are aware that the word *cat* and the word *mummy* are the same kind of event (in contrast with kissing, eating, running and so on). However it is less obvious how we should explain the notion ‘meaning’ (or ‘reference’, which for present purposes I assume to be synonymous), because this is not a category of objects or events, but a relationship. Moreover, this notion does not appear in our story about the learning of *cat* (where the only relationship involved was co-occurrence) so it is not available for generalisation. It will be recalled that the outcome of our story was the following pairing in the child’s mind:

‘X-saying-*cat*’ :: ‘X-attending-to-a-cat’.

What we really need is a direct link between (the word) *cat* and (the concept) ‘a cat’; that is what we mean by ‘meaning’. Once that is in place, it can be generalised to other words, so that whenever the child hears a new word it will know it has a meaning which it will then take appropriate steps to discover. Furthermore, the converse of the ‘meaning’ relationship is ‘name’, which will prompt the child to assume that everyone and everything has a name. It is easy to see how this generalisation constitutes a threshold in learning.

For Deacon the explanation lies in the creation of a new kind of relationship, ‘symbolic’, to replace ‘indexical’, but as we have seen this rests on the questionable assumption of a system of interlinked words. The alternative is to allow the child to create new relationships as ‘short-cuts’ between concepts that are related by a recurrent complex of relationships. In the present example, the child creates a direct link — the ‘meaning’ link -between *cat* and ‘a cat’, which are already linked indirectly by ‘X-saying-*cat*’ and ‘X-attending-to-a-cat’. So the final stage in the child’s hypothetical learning of *cat* is actually the simple fact “The meaning of *cat* is ‘a cat’”. In support of Deacon’s view that the whole system of symbols is important, we should



note that it plays an important part in the development of this relationship if, as I have suggested, the short-cut is only added when the indirect route between the items concerned is ‘recurrent’ — i.e. repeated in other words.

I do not wish to imply that the creation of short-cut relationships is trivially easy; on the contrary, I suspect it is an extremely high-level mental activity, which may even be beyond other species. However it is fundamental to much of our categorization and thought; for example, kinship terms are defined in terms of a chain of simpler relationships (e.g. ‘grandparent of X’ = ‘parent of parent of X’; ‘parent of X’ = ‘mother of X’ or ‘father of X’).

It is tempting to link this ability to another thread in Deacon’s fascinating story of evolution, where he suggests that language may have been intimately bound to the development of marriage, an essential ingredient in the biological development of our species because of the need for stable families to protect the slowly maturing young (399). For him the importance of marriage lies in the fact that it is based on a promise, and promising requires symbols. For me, however, the essential thing about it is that it involves the creation of a ‘short-cut’ relationship which summarises a combination of other relationships; moreover if it is embedded in a system of incest taboos, it presupposes a fully developed system of kinship relationships that can be named and attended to. As Deacon says (115), “language is a social phenomenon”, and one of the certainties of our social life is that it requires us to recognise and distinguish a wide range of relationships — friend, brother, colleague, etc.

What I am suggesting, therefore, is that the development of a more complex society in which social relationships had to be classified may have selected for genes which made cognitive relation-building easier. With that ability in place, it should be easy to build the short-cut relationships ‘meaning’ and ‘name’ which give the language learner such an important boost.

## **How syntax emerges from symbols**

Finally, what about syntax? As we have seen, Deacon asserts that syntax is essential for the development of our first symbols, but this implausible idea is not supported by evidence, and there is remarkably little discussion of syntax at all — remarkable given the importance of syntax in the arguments for Chomskyan innateness. It is easy to sympathize with a non-linguist who steers clear of syntax, but this is a gap that must be filled in order to provide a complete symbol-based account of language evolution and learning.

What Deacon does not mention, and perhaps did not know when he wrote this book, is that some linguists believe that syntax is not different in kind

from vocabulary — in short, that there is no boundary between ‘the lexicon’ and ‘the rules of grammar’. This view is typical of the movement known as ‘cognitive linguistics’, which includes several specific theories — Cognitive Grammar (Langacker 1987, 1990), Construction Grammar (Goldberg 1995, Kay and Fillmore 1999) and Word Grammar (Hudson 1990, 1999). One of the tenets that these theories share is that lexical items and syntactic constructions are patterns of the same kind, and differ only in terms of generality, so any mechanism which explains how lexical items are learned will generalise automatically to syntax.

Moreover, there are also linguists who believe that all of syntax is strictly lexical, in the sense that all the information about possible word-combinations is contained in the entries for individual words. Few would dispute this view in clearly ‘lexical’ matters, but it is much more controversial when applied to very general patterns of the kind that theoretical linguists generally discuss. Among cognitive-linguistic theories the view is most clearly represented in Word Grammar, where the whole of sentence structure consists of nothing but dependency relationships between pairs of individual words. For example, the structure of *She loves me* consists of a subject relationship between *she* and *loves*, and an object relationship between *me* and *loves*. Once we know what dependency relationship each word allows, we can work out what sentences are allowed; for example, we know that *loves* requires a singular subject before it, and any kind of nominal object after it, so we know that this example sentence is well-formed. These facts need not be learned word by word; they can be stored at a more general level and applied by default inheritance (e.g. the need for a singular subject is inherited from the general category of verbs that end in -s).

The point of giving this information here is to support Deacon’s theory against the charge that it ignores the main evidence for innateness, which lies in syntax. He argues on general principles (of natural selection) that grammar cannot possibly be innate (331-3), but he believes syntax is fundamentally different from vocabulary: “Chomsky argues that much of the child’s knowledge of grammar and syntax is not learned in the way words are. I agree. It is discovered, though not by introspection of rules already available in the brain.” (107) However he also thinks that the reason why syntactic patterns are learnable is that a small child’s very limited attention and memory span act as a filter for the ‘noise’ of irrelevant long-distance syntactic links (135). If theories like Word Grammar are right, this fact will help small children to learn syntactic facts about individual words, which means that syntax-learning is part of vocabulary-learning. This view of grammar-as-vocabulary has been confirmed by a number of empirical studies of language acquisition which have shown on the one hand that the development of grammatical con-

structions correlates very closely with the growth of the child's vocabulary (Bates and Goodman 1997), and on the other hand that children tend to restrict grammatical patterns to specific lexical items, rather than to use them as general templates into which any lexical items can be fitted (Tomasello 1992).

## Conclusion

*The Symbolic Species* is highly compatible with the non-innatist, non-modular paradigm of language research called 'cognitive linguistics', and probably also sits comfortably with more functional approaches, as with a pragmatics which is not tied to any particular theory of grammar. But even for such people it is a mind-changing book — speaking personally, I can't think of any other book that I have read in my forty years of scholarly life that has so deeply affected my view of language. On the other hand, it is a serious challenge for Chomskyan orthodoxy, and it would be a great pity if the lack of details about grammar (which is heavily criticized in one review — Poeppel 1997) were to obscure this fact.

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