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Why Me? Cognition at the Origins of Grammar

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As a signalling system in nature, language is really odd. Yes, it involves a sender producing a signal which is apprehended by the receiver, and which contains information of value to the receiver. In this respect it is just like any other natural signalling system; but there are two extra features in language which are largely missing from other signalling systems.

First, the signal is segmented, and the arrangement of the segments can drastically alter the messages in the signal. To give a simple example, "Speak in hope and not fear" has a very different meaning to "Speak in fear and not hope".

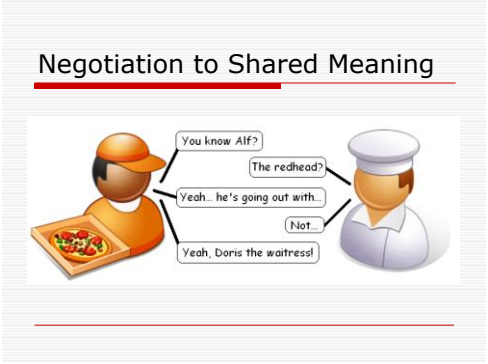
In contrast, very few signals in the rest of nature are segmented. One exception is the diana monkey (*Cercopithecus diana*) "probably" boom, identified by Klaus Zuberbühler[1]. The diana monkey leopard call produces two different responses in other dianas, depending on whether or not it is preceded by a "probably" boom. Without the boom the dianas rush up the nearest tree, with the boom they increase vigilance but do not stop doing what they are doing. This warning call therefore consists of two components, and is clearly segmented – but it still represents the presence of a leopard in both cases, there is no drastic change of meaning, as in the language example.

If there is segmentation then there could be a syntax dictating the order of components. This is the case with the diana monkey leopard warning, where the probably boom always precedes the leopard cough. This, however, is a syntax of necessity. The "probably" boom is a warning about the value of the leopard cough, if it followed the cough it would be too late – the other dianas would already be galloping for the trees. Language syntax is not like this, we are happy saying either "probably a leopard" or "a leopard, probably",

[1] Klaus Zuberbühler, Referential Labelling in Diana Monkeys. In *Animal Behaviour* 2000 59, doi: 10.1006/anbe.1999.1317, pp917–927

knowing that our listener is willing to suspend their comprehension of the utterance until they have the whole of it.

The second feature of human language missing from other signalling is a negotiation between sender and receiver toward a shared meaning. The sender is aware of the receiver's capacity for understanding, and will adjust their message to suit those capacities. In speech, for instance, we exaggerate tone and range when we talk to infants, we use shorter, simpler constructs when talking to children, and we shout at our deaf parents. We also constantly monitor the receivers of our signals to ensure that the meaning of our message is getting through; and our receivers co-operate in this process, providing back channel cueing to the sender. Negotiation to common meaning between sender and receiver is, therefore, a major feature of language.

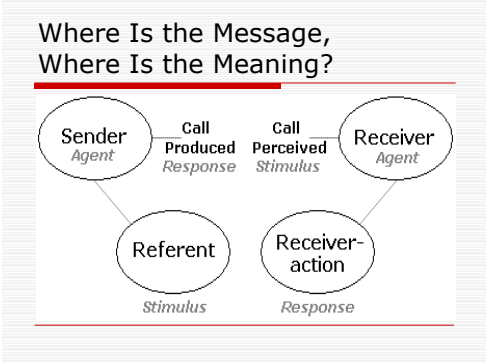


In contrast, negotiation is unnecessary in other signalling. For instance, warnings need a reliable relationship between the signal and the presence of the thing warned against. If the warning is to remain reliable, no negotiation to meaning can be permitted: when I give the leopard call it has to represent, on some level, a real leopard; it cannot mean "like a leopard's fur". There is also no negotiation possible in reproductive fitness displays: the displayed-to sex (usually the one with the higher child-rearing cost, most often the female) wants only the fittest partner available. The displaying sex will therefore succeed with nothing less than their finest, most costly display.

Negotiation to a common meaning is also redundant in non-language signals because there is no need for a common meaning. In fact, in most signals the sender and receiver do not need to know what the signal signifies to each

other. When a vervet monkey (*Cercopithecus aethiops*) makes its leopard call, for instance, it is a response to seeing a leopard. When a vervet monkey hears a leopard call it is a stimulus to climb a tree – the sending vervet does not need to know what the call does, and the receiving vervet does not need to know why the call was produced for the signal to work.

A warning signal is produced by the sender in response to an identified threat; but it is perceived by the receiver as a stimulus to action. There is no negotiation to a common meaning because the signal does not need to mean the same thing to sender and receiver. In fact, there is no need for there to be "meaning" in the signal in the way it is viewed in language – signals are not made because they mean something, they are made because they work[2]. In these signals there is no message shared between sender and receiver, and no identifiable meaning.



At first view, language would seem to be highly advantageous compared to other signalling systems: the negotiation to meaning creates the possibility for considerably more complex signals with both meaning and message. Language signals can be exchanged in chunks, with negotiation between each "chunk-exchange" to ensure that the sender's intention in the message matches the receiver's comprehension. Language would seem to be a perfect system for accurately transferring information between individuals.

This, however, misses an important disadvantage that renders language useless to other animals: it is designed to lie. The very negotiation to meaning

[2] Stephen Budiansky, *If a Lion Could Talk: how animals think*, pp135-139

implies that there is no pre-existing equivalence between words and meanings in language. Messages consist of words, but the meanings within these messages rely on context and the relationship between sender and receiver. In language, no utterance stands alone, and no utterance has an unequivocal meaning.

In nonlanguage signalling, the signal's value to the sender is that it reliably creates a disposition in the behaviour of the receiver; the signal's value to the receiver is that it reliably reflects an environmental fact. Note the word *reliably*: if a signal does not reliably reflect a particular environmental fact then it becomes problematic for a receiver: if some signals are false how can any signals be trusted?

An example from the real world illustrates this very well. Dorothy Cheyney and Robert Seyfarth have spent a large part of their lives observing monkeys and baboons in the wild, and they were the first to identify that vervets used a range of predator-specific warning signals[3]. In one case they observed a dominant male making the leopard warning when no leopard was in the area. The other vervets were responding to this call as if there was a real leopard. What was going on here? It turned out that another male was in the area, and attempting to approach the dominant male's troop. By uttering the leopard call the dominant male was keeping the intruding male away from his females.

This example shows that volitional calls really can be subverted; but what happens when this subversion is discovered? In this case, the dominant male continued calling while he himself remained on the ground, clearly not avoiding the putative leopard. The females realised that the dominant male's call was deceptive and started ignoring it. The subverted call worked for a short while, but eventually led to that particular sender-call combination being ignored. As a result, the sender blew his reputation and lost his harem.

In the rest of nature, signals must be honest. If there is no reliable link between the signal and its cause (or, to use Saussurean terminology, the

[3] Dorothy M Cheney & Robert L Seyfarth, *How Monkeys See the World: inside the mind of another species*, pp139-144

signifier and the signified[4]) then the signal is meaningless. This is clearly not the case with language: humans are at home with the phrases *what if*, *could have been*, and *once upon a time*.

So we are now at the key question in relation to language origins: how could a cheap, volitional signalling system have appeared? Clearly this evolutionary paradox was overcome – we have language. This paper does not provide a mechanism to solve this paradox, but it does provide some clues by looking at the cognitive modelling available to humans before and after language appeared.

We need to start with pre-linguistic humans – what was cognitively important in their daily lives? It is likely that they were highly social by this stage, perhaps more similar to baboons than to chimpanzees. They lived in large social groups and required some formal mechanisms to ensure that the group remained cohesive. It is also likely that, unlike baboons and chimps, they engaged in joint social enterprises, such as big-game hunting, requiring yet another layer of co-operative behaviours.

Yet despite all this co-operation, there would have been no need to treat other humans as humans. True, it would be advantageous to recognise that they were intentional beings with agendas, and that my life was easier when my intentions coincided with the intentions of others, but my self would remain a vitally different thing to other selves. In fact, my self was the baseline of existence, it was not something of which I needed to be consciously aware.

Yet, while self-awareness was not necessary, there would have been some discrimination between self and other: genetic selfishness, when considered at the phenotypic level, means that there must be a self to be –ish about. This self, however, is part of a process of action, not cognition: there is a contrast in the universe between self and non-self, and a contrast between ends – why something needs to happen – and means – how something can be made to happen. These two binary divisions coincide: the self is the ends, why things need to be done; the rest of the Universe is the means of bringing this about. This definition of self I will call *sense of self* to differentiate it from the more

[4] Ferdinand de Saussure, *Course in General Linguistics*, translated & annotated by Roy Harris, pt1, ch1

introspective *self-awareness* of humans; and I will call the awareness that others have intentions, *other-awareness*.

Awareness and Intentions

- **Sense of Self –** awareness that the Universe is divided into self and other, ends and means.
- **Other-awareness –** awareness that others have intentions, toward me and toward others.
  - Allows the **relationship-A** model (A has intentions toward me – one-argument form)
  - Allows the **A-relationship-B** model (B has intentions toward A – two-argument form)
- **Self-awareness –** awareness that I have intentions
  - Allows self-modelling

An example of sense of self and other-awareness at work is given by Richard Byrne[5]. An infant baboon, named Paul by the observers, saw another baboon digging out and eating food that he wanted. So, after checking no other baboons were watching, Paul made a distress call. His mother, a dominant female, immediately chased the other baboon away from her infant and away from the food – allowing Paul to feast.

Others Have Intentions

- Richard Byrne, *The Thinking Ape: evolutionary origins of intelligence*, p125
- Baby Paul (A) sees adult with food (T); wants food; makes distress call to get mother (TOOL) to chase away the other adult; Paul eats food.
- IT WORKED! But is this what went on in Paul's mind?

Byrne points out that the level of forward planning implied by this cartoon probably exaggerates the baboon infant's machiavellian capacities. Whether the infant is truly manipulating the mother's intentions is open to

[5] Richard Byrne, *The Thinking Ape: evolutionary origins of intelligence*, p125

interpretation; but it does require that the infant has a sense of self – "I'm hungry" – and possibly an other-awareness – "mama has the intention of protecting me".

With other-awareness there is a need to understand that others have emotions toward each other, and that others have emotions toward me. There is no need for me to see myself as having emotions toward others, this only leads to me trying to second-guess myself and trying to treat myself dispassionately. These are not traits which favour the self in the Darwinian fitness wars being waged out there.

So we are left with the need for two cognitive modelling structures: the first to allow modelling of the relationships that others have to me, and the second to model the relationships between two others. The nature of these two models is essentially segmented. As time goes by, and relationships change, I need to be able to swap the components in the *relationship-A* and *A-relationship-B* models. I also have to be able to generate new versions of the model as the social group changes: every new "other" in my life has to be integrated into my existing "other" models and their relationships.

There are thus two social models available to pre-linguistic humans: the one-argument form, recognising others and their relationship to me; and the two-argument form, recognising others and their relationship to each other. These two forms are likely to have been modelled separately in the pre-linguistic mind; but they can clearly be seen as cognitive forerunners of linguistic form.

Having basic linguistic forms available as cognitive models does not, however, place us within reach of language. My cognitive models represent information which is valuable to me – they contain all that I need to survive and thrive as part of the group. So why would I be willing to give this valuable information away? If I tell you what I know about a relationship in the group then I am giving away the cost I have paid to get that information, and I am giving away the fitness I have gained from having that information.

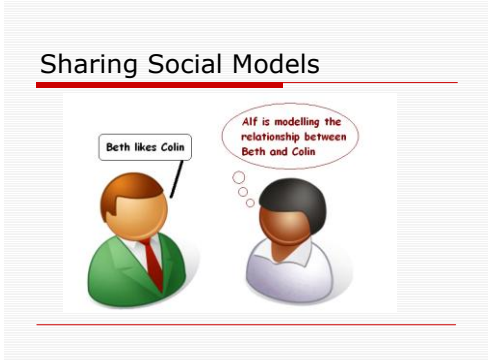
And if you were giving away that information to me, why would I listen to it, or believe it? You gain nothing by giving me true information, but you would gain if you gave me false information and I believed it. I must assume that you are looking out for number one, so anything you tell me I should check. If I cannot check then disbelief is a safer strategy than belief. Life is not kind to

the gullible. As WC Fields said, “Never give a sucker an even break, and never wise up a chump”.

As we have seen, the *me* in this cognitive modelling is an unremarked constant, it does not need to be modelled or considered. In fact, modelling *me* means that I have to take a disinterested view of myself, I need to see myself as others see me. But where is the advantage in this? Treating myself in the same way I treat others does not favour the self over those others; it does not look like a fit Darwinian strategy for genetic survival. The unconsidered self seems likely to create a better evolutionary strategy for survival than the considered self.

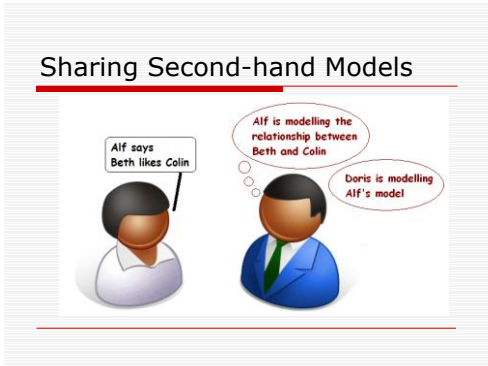
So we have a pre-linguistic humans, able to model others but not themselves; and able to model one- and two-argument forms, but unable to share those models. For now, I will gloss over the major problem of how communication began and, like many language origins theories, assume a miracle. I do have my own theory of how and why we began to communicate our social models, but it is not part of the story being told here.

What happens when social communication does appear? First, it will involve the sharing of social models of the A-relationship-B form rather than the relationship-A form. The relationship-A model is both more personal and more valuable to the sender, and less informative and less valuable to the receiver, than the A-relationship-B model. Even today we tend to accept the form “Alf doesn’t like Beth” as more valuable and truthful than “I don’t like Beth”.



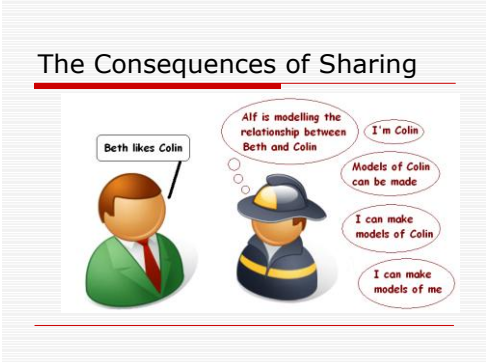
However, the communication of A-relationship-B models creates a new role in the mind of the sender. As well as all the *theys* which are modelled in the A and B slots of the model form, there is a *you* receiving the communicated model. This *you* is, in the first instance, as unconsidered as the *me*; but, at some stage, there is likely to be an awareness that the intentions of the being in front of me can be manipulated by the way the A-relationship-B model is shared. There is now a cognitive three-argument form available to me in making my message: A-relationship-B-to-you. I am now modelling *you* as a separate role, into which can be slotted the same components as can occupy the A and B roles – but I am still only communicating two-argument models.

Of course, there is now nothing except signalling convention to stop a three-argument form from being communicated, giving yet more social information.



There is recursion within the reported speech model, and this is the type of recursion predicted by Hauser, Chomsky and Fitch[6] as the primary motivator for language; but, in the developmental system proposed in this paper, recursion is not what enabled language to happen, it is an emergent feature of language happening. Of course, it is possible to argue that "Beth likes Colin" is not real language, only proto-language, but that is rather splitting hairs. In this description, recursion is not needed until after the social models are already being communicated.

There is also something else happening in this reported speech event: truth is being presented on more than one level. On the first level is the truth of the sender's utterance – which, presumably, the sender wants the receiver to accept, whether it is the truth or a lie. On the second level is the truth of Alf's utterance. The sender and receiver's commitment to the truth of that utterance is much more equivocal. It is more language-like than the simple two-argument factual presentations, inviting the receiver into a dialogue in which a shared meaning can be negotiated.



There is another scenario that the sharing of social models permits, and that is the recognition of self within the model shared. If sharing of social models becomes widespread then eventually (probably sooner rather than later) the receiver will be offered a social model including themself. Let us assume in

[6] Marc D Hauser, Noam Chomsky & W. Tecumseh Fitch, The Faculty of Language: what is it, who has it, and how did it evolve? In *Science*, vol 298 22 November 2002, pp1569-1579

this instance that the admiration of Beth was spotted by Alf but that Colin was oblivious to it. Alf's utterance to Colin is then justified in terms of useful information for Colin, but it is the process of self-recognition that goes on in Colin's mind that is of interest here: Colin identifies Alf's *you* as Colin's *me*. Alf's capacity to model Colin, and the communication of that model, creates the need in Colin to model himself as a third party if he is to understand the communicated model. As well as the unconsidered self, Colin must have a considered self to understand Alf.

So the communication of other-modelling clears the way for self-modelling. These self-models may not necessarily be accurate, but they allow me to have the same level of self-awareness as I have other-awareness. This creates the situation where I am aware of myself as an intentional being, but it also reflects back on my awareness of others: I become aware that I am a more immediate case, but not necessarily a special case, in my understanding of the universe.

As my self-awareness is based on my models of others' models of me, it can amount more to self-delusion than true self-awareness. The accuracy of my self-model relies on the accuracy of my perception of others' models of me, and this can be inaccurate in two ways: the view of others could itself be inaccurate, or my interpretation of their view could be wrong. It is no surprise, therefore, that Benjamin Franklin should say "There are three things extremely hard: steel, a diamond, and to know one's self".

The communicated three-argument structure thus creates a major change in cognition; but it also creates a problem for the one-dimensional stream of speech used to express it: the three argument structure is essentially two-dimensional. Whether this is seen as the attachment of three objects to an action, or a hierarchical inclusion of a two-argument form as an argument within another two argument form, a one-dimensional stream of speech needs to have rules imposed upon it to allow the complex structure to be expressed within the simple speech channel.

It is not therefore necessary to see language grammar as a separate evolutionary development, it can be viewed as an emergent requirement of the complexity of the messages to be communicated. This still leaves open the question of why we use particular grammatical forms; but the explanations for these forms do not need to invoke language-specific evolutionary features, more general cognitive features can be invoked instead.

The approach to language evolution used in this paper has been strictly Darwinian. To use Tinbergen's tests, language has been viewed as a behaviour that needs to be explained in terms of function, cause, development and fitness[7]. Not all of these have been addressed to the same level of detail, but a sketch has been given of how language could have developed as a social lubricant. If this sketch is correct then it has a surprising outcome: personhood is implicated in the origins of grammar.

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