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## The Origins of Grammar (Lecture)

Like any good Pensions Administrator, I'm going to start with the disclaimers. This talk is advertised as 'The Origins of Grammar', but this isn't going to be a complex and impenetrable discussion of how we developed the passive pluperfect transitive. I think I have the answers to that one, but I realise that talking about it here is probably a little too anal, even for me!

Instead, I'm going to be talking about the features of human development that created the structure of grammar, and the features that allowed it to become part of human signalling. As we will see, they are very different things.

He first of these is self. Self is not a word with a single meaning, it is a concept which has a wide range of meanings. First, there are the selves that are not my own self, and these fall into two groups:

- the selves I am currently addressing and whose intentions I am modelling – **you**,
- and the selves that are being treated as unintentioned objects – **they**.

And, of course, there is the self that is doing the addressing and modelling – my own self.

These are the three persons in language: I, you and they. Trask describes them as follows:

The (personal) pronouns of English make a three-way distinction: the pronoun **I** means 'the speaker', **you** means 'the addressee', and **he, she and it** all mean 'somebody or some thing else'. We say that these forms distinguish persons: first person for I, second person for you, and third person for the others ... this three-way person contrast appears to be universal in languages.<sup>1</sup>

Yule adds that:

To learn these deictic expressions, we have to discover that each person in a conversation shifts from being 'I' to being 'you' constantly. All young children go through a stage in their learning where this distinction seems problematic and they say things like 'Read you a story' (instead of 'me') when handing over a favorite book.<sup>2</sup>

So we can see that the three persons of **I, you and they** are universal in the construction of language, but the linguistic concepts are not necessarily present at birth. The universality may well be non-genetic.

I now want to look at how the three persons in language relate to the general signalling process. The traditional view of signalling is that the **sender** wishes to draw the attention of the **receiver** to the **referent**; so the sender creates a **message** which stands for the referent.

In vervets this is all very simple: to represent a leopard, make the leopard call. The call "means" leopard and only leopard, so the intention associated with the call is explicit in the call.

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<sup>1</sup> R. L Trask, *Key Concepts in Linguistics and Linguistics*, p228

<sup>2</sup> George Yule, *Pragmatics*, p10

Human language, on the other hand, is complicated by the fact that the message as delivered may not be the message as intended. For instance, when I ask Philip “how was your day?”, I am actually telling him “ask me how **my** day was, unless you want to live in interesting times”. With language, the intention associated with the message can only be understood if you know the sender.

To put this in linguistic terms, the denotation – or ostension, or direct meaning, or message – is subordinate to the connotation – or inference, or indirect meaning, or metmessage. (That’s one advantage to being a linguist: you get to invent new ways of talking about the same old same old.) In language, the metmessages come from:

- The nature of the signal;
- The nature of the sender;
- The receiver’s perceptions;
- And the context in which the message is made.

Often the metmessages are more important than the message itself.

Moving on from the three persons and signalling, I have mentioned several times the concepts of intentions and modelling. These are important in understanding how we relate to others, so I will now expand on them a little.

Intentionality is the way we understand others as more than passive objects. If I see you as an object with intentions then I have to try to work out what you will do by modelling the way you are thinking.

For instance, if I want to work out if a thrown rock is going to hit me, I need to model the direction, speed and trajectory of the rock. There is nothing intrinsic to the rock itself that I need to worry about.

On the other hand, if I want to work out if Ug is going to throw a rock at me I need to model the intentions of Ug in relation to the rock and in relation to me.

Of course, we usually model unintentional events at the subconscious level: if we had to work out the mathematics of whether a rock is going to hit us then we would get hit by a lot of rocks. Relying on the ducking reflex is a lot less painful.

But we cannot always model the intentions of others at the subconscious level. By seeing another as having intentions we are also seeing them as having choices. If I have a fixed single response to each of the choices the other individual can make, then I can respond automatically (although I still have to decide which of the choices to respond to); but if I have a range of responses to each of the other’s choices then I need to consciously model those choices and the intentions behind them.

So seeing other beings as having choices does not automatically mean that I have to be able to model their intentions – I may only need to model their options; but seeing them as non-intentional means that I have no need for modelling.

Let’s go back to the three persons of language, and specifically the first person. In the boxes exercise I identified you (the second person) and they (the third person) as single things; but

I identified the first person as three different things. There is **I**, the self-who-knows; **me**, the self-who-views; and **myself**, the self-who-does. Sigmund Freud used a similar model of the self when he famously analysed the personality into the ego, the superego, and the id. For those of you steeped in Freudian theory, his divisions don't quite correspond with those I am using, but they offer a useful analogy. I will go into detail about the differences at the end, if anyone is really interested.

So what are these three selves? Rita Carter offers two useful descriptions of the self-who-knows and the self-who-does:

Let's start with the 'me' — the visible, public individual with an objective history ... This self is open to public scrutiny, in fact other people may be better able to give an accurate account of it than the person who inhabits it, who may be entirely deluded about how they appear from the outside.

So that's the self-who knows. And the self-who-does:

If you were asked to describe the 'components' that make up this self you would probably include your body, your 'personality' — that is the way you behave — your thoughts, feelings, perceptions and beliefs, and your personal history.<sup>3</sup>

The self-who-knows is the inhabited self. It cannot see itself because it is on the inside. However, it can make a model of itself, based partly on what it does and feels, but mostly on how others relate to it. This is the self-who-does.

There is a major issue with this model: in it, the only way we can know our real self is mostly through the eyes of others. Yet we all have the idea that we can examine ourselves directly. How can the model match with our perceived reality?

Daniel Dennett overcomes this problem by arguing that self awareness is a productive delusional state — really there is no continuous self, but the delusion that continuity of self exists is useful.<sup>4</sup>

Susan Blackmore blames it on our memes, units of information that pass from person to person like viruses, and which control the person to ensure their propagation. To Blackmore, consciousness is merely the outcome of some particularly productive memes concerning introspection.<sup>5</sup>

I find both of these arguments a little defeatist. True, we cannot examine our own core self, the self-who-knows, but is this proof that it doesn't exist? After all, it is not just me who has the delusion that my core self exists, most every other human I have met has the same delusion about me. Deluding myself about me may just about have an evolutionary purpose, but how would deluding myself about you be of any use to me? And, looking at it from another viewpoint, if the self-who-does is a model, then it must be a model of something.

I prefer Jerome Bruner's view of the self-who-knows, which he refers to as the **autobiographical self**. As Bruner expresses it:

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<sup>3</sup> Rita Carter, *Consciousness*, p212

<sup>4</sup> Daniel Dennett, *Consciousness Explained*, ch5

<sup>5</sup> Susan Blackmore, *The Meme Machine*, pp231-234

There is something curious about autobiography. It is an account given by a narrator in the here and now about a protagonist bearing his name who existed in the there and then, the story terminating in the present when the protagonist fuses with the narrator. The narrative episodes that compose the life story typically have strict adherence to sequence and to justification by exceptionality. But the larger story reveals a strong rhetorical strand, as if justifying why it was necessary (not causally, but morally, socially, psychologically) that the life had gone a particular way. The Self as narrator not only recounts but justifies. And the Self as protagonist is always, as it were, pointing to the future. When somebody says, as if summing up a childhood, “I was a pretty rebellious kid,” it can usually be taken as prophesy as much as a summary.<sup>6</sup>

If we see the self-who-knows as the narrator in this description, then the protagonist identifies with the self-who-views. The narrator is continuous while the protagonist is a series of instances – what Bruner describes as a “distributed self”. It does not have continuity and is modelled from instance to instance to reflect the needs of the self at each instance. However, the self-who-views has intentionality modelled into it, an intentionality that is missing from the models of the self-who-does.

So we have the three selves:

- First, the self-who-knows, which is the core self and is essentially unknowable to itself; but is knowable to anyone else who can model the intentions of others;
- Second, the self-who-does, which is modelled by the self-who-knows in order to plan actions, but which is seen as an object and not an intentional self;
- Third, the self-who-views, which is an intentional model of the self produced by the self-who-knows, and which can in turn contain a model of the self-who-does.

The self-who-knows is able to model the self-who-does directly; or it can model the self-who-views, which contains a model of the self-who-does. It is important to remember that all the modelling is done by the self-who-knows, but the ability to see the self-who-does as a model of a model introduces recursion. In theory, we can produce models within models within models, on to infinity. In practice we seem to have little use for this sort of recursion beyond the three selves given here.

The three selves also reflect the three persons, **I, you and they**. They create an internal dialogue of the self which reflects the external signalling model. **I** is the self-who-knows, the sender in any signal or internal dialogue; and **myself** is the self-who-does, the referent in any signal or internal dialogue.

The self-who-views is more complex, and shows the difference between external signalling and internal modelling of the self. It has to identify with **you**, the receiver, as the only remaining unmarried component; but, where the receiver receives a message from the sender, the self-who-views receives a model of the self-who-does from the self-who-knows. It's close enough to be able to say that signalling and self-modelling may have common sources, but they aren't the same.

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<sup>6</sup> Jerome Bruner, *Acts of Meaning*, p121

In theory, self-modelling gives the sender the ability to deceive the receiver very effectively, and therefore it should be the death of honest signalling for the species. In practice, only one species (that we know of) has achieved this state of self-modelling, so we should be looking for something unusual about humans which allows this state to be sustained. We know that other animals who live alongside humans, like pets, also seem to be able to partially join our communication community, so we should be looking for something that is not necessarily species-specific. I'll go into this in more detail later, because a self-sustaining anti-Darwinian feature like language has to be explained as part of a larger Darwinian feature that overcomes, neutralises or negates the negative aspects of language.

Before I move on to the next part of this talk, I should summarise the definitions given.

- First, there are three persons in language, and this seems to be a universal feature of language;
- Second, three of the components of signalling co-identify with the three persons;
- Third, there are three selves, and they also co-identify with the three persons;
- Fourth, nonlanguage signals rely on having only one meaning, while language constructs usually have several meanings simultaneously;
- Fifth, some animals are able to model events, but have no need to understand intentions; others can model the intentions of others; but only humans seem able to model others making models of them.
- Sixth, if I can make a model of someone making a model of me, then I am aware that there is a me to model, and I can then make models of me, too.

Let's now leave the three persons and the three selves to one side for a while, and look at how we got the modelling part.

Modelling is not a common occurrence in nature, and it is likely that only the more complex brains are able to do it. Although most of these brains became complex in order to handle the complexities of group living, one of the most intelligent animals on the planet bucks the trend. The octopus has no social structure at all, but it is able to quickly learn to solve complex human tasks like unscrewing a lid to get at food<sup>7</sup>. In doing this it is likely that it indulges in some sort of modelling process.

Merlin Donald refers to this type of modelling as mimesis, and describes it as a three-stage process<sup>8</sup>:

- First, there is rehearsal, in which a strategy is selected to achieve an end;
- Then there is enactment, in which the strategy is tried in the real world;
- Finally there is review, in which the success of the strategy is measured.
- From review you go back to rehearsal, to refine the existing strategy or to select a new one. So this is essentially a recursive process, going round and round until success is achieved or boredom sets in.

Mimesis would seem to be a simple thing to master, but it does not seem to happen that frequently in Nature. Most animals seem to adopt the principle "if at first you don't succeed,

<sup>7</sup> [http://www.sheddaquarium.org/watershed/octo\\_040102.html#](http://www.sheddaquarium.org/watershed/octo_040102.html#)

<sup>8</sup> Merlin Donald, *A Mind So Rare: the evolution of human consciousness*, p142

try the same thing louder or harder”. However, we do see examples of mimesis in birdsong, ape tool use, cetacean hunting, elephant food gathering – and, of course, octopus jam-making.

Obviously, humans can plan. We learn from our mistakes and refine our performance the next time around. Peter Cook said, “I can say that I have learned from my mistakes and, if called on, I can repeat them exactly”. We find this humorous because it is the exact opposite of the way things actually work.

So where does this ability to make models of future and past events, the ability to plan, come from? To answer this, we have to look at the sort of modelling that happens in nature.

It would seem that self-identification is a given for language. Indeed, it would appear that it is a given for all forms of communication: if there is no identity of self then there is no reason to favour the self; so an organism that had even the tiniest inkling of selfhood, even at the genetic level, would have a vast advantage over one that does not. This is the selfishness that Dawkins sees to be the sole driving force of evolution since the beginning: actions that favour the self lead directly to survival, actions that favour others do not. There may be an indirect path to survival by favouring others, but that indirection has to be advantageous enough to outweigh the direct path before self-sacrifice should occur.<sup>9</sup>

However, selfishness is different to sense of self, which in turn is different to self awareness. Selfishness is a default state that ensures survival, and requires no more knowledge of the self than that the world is divided into self and not-self. What is inside the line is the ends of survival (the self), the rest is just means. Of course, with a binary model such as this, only one of the items needs to be defined; the other is the rest of the Universe. It would seem that the self is the easiest to define, but it is also the least useful. The self is the part of the Universe that is already under control; much more important is that part of the Universe that has to be manipulated and negotiated. So a feature of evolutionary selfishness is a lack of comprehension of the self. *Sense of others* gives immediate advantages, it allows an organism to subvert the survival of those others to its own purposes; *sense of self* gives no such immediate advantages. This can be viewed as the level of sophistication used by bacteria: they require no theory of mind, but they remain the most successful group of species in terms of biomass and reproductive success.

Yet, if sense of others is already present, the sense of self has its own advantages: it allows an organism to exercise choice between strategies. In many situations there is usually more than one viable strategy of advantage to the organism, and the ability to choose effectively between them maximises the advantage of each strategy. Adopting a single strategy for a situation relies on there being no organism with effective choices at the other end of the strategy: as soon as a single strategy approach is met by a changed response (which an effective choice allows) then it ceases to work, and the productive single strategy becomes counter-productive. Alternative strategies will then become genetically dominant, and a range of genetically inspired responses in a population can give the appearance of choice being exercised. It is even possible for apparent choice to be coded at the individual level, if stimulus and response form fixed relationship pairs. However, these choices are just

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<sup>9</sup> Richard Dawkins, *The Selfish Gene*, ch5

appearances: being coded at the genetic level, they require no cognitive decision-making process, so no sense of self is needed.

In order to truly make choices, an organism must have a rudimentary understanding that there is a self to make the choices. This need be no more than a recognition that the other half of the binary relationship, self and non-self, exists: the tiniest degree of introspection is sufficient. It is likely that the major portion of vertebrate life, and maybe even invertebrates, operate at this level of awareness.

However, as soon as there is a sense of self then it becomes possible to model that self onto other organisms. It is possible to develop *other awareness*, a knowledge that others have choices that can affect your choices. The model of those other organisms (and their possible responses) cannot be greater than knowledge of the self, so greater sophistication in knowledge of the self leads to more sophisticated models of others. It is likely that some, maybe all, primates operate at this level of awareness.

*Other awareness* and *sense of self* bootstrap each other in an evolutionarily competitive environment: when a successful new strategy occurs in a population, it tends to propagate throughout that population. However, it then becomes part of sense of self and, if necessary, other awareness allows counter-strategies to be generated. Although new strategies will be rare, it will be even rarer for an existing strategy to fall out of use; the range of strategies and counter-strategies will slowly but steadily increase.

Yet the escalation created by the dynamic of other awareness and sense of self is not sufficient by itself to get to the next stage. With humans and language we have a new type of self to be recognised. Tomasello and Call label this *self as social agent*<sup>10</sup>, Pinker labels it *sentience*, giving it as one of the three definers of consciousness (the other two being *self-knowledge* and *access to information*)<sup>11</sup>, and Bruner calls it *the transactional self*<sup>12</sup>. In this dissertation the final stage will be labelled *self awareness*. However, in evolutionary terms, self-awareness is at best fitness-neutral, and at worst it is disadvantageous: what is the advantage of being able to treat the self as part of the means of survival, rather than the ends of survival? This important and difficult question will be put to one side at present.

The four stages of self-identification can be represented by a series of questions that can only be posed and answered by animals who have achieved the appropriate stage. They are:

- **Sense of others:** *What will they do?* Events outside the self dictate the responses of the self.
- **Sense of self:** *What can I do?* The self has optional responses.
- **Other awareness:** *What would they do if they were me?* The self is a model for predicting the behaviour of others. However, there is no intentionality, only comprehension that the range of options available to others is the same range available to the self. There is no need for recognition of the interpersonal structure of “me” and “you”.

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<sup>10</sup> Michael Tomasello & Josep Call, *Primate Cognition*, pp337-338

<sup>11</sup> Steven Pinker, *How the Mind Works*, pp134-136

<sup>12</sup> Jerome Bruner, *Actual Minds, Possible Worlds*, ch4

- **Self awareness:** *What could I do if I were them?* Others are the model for predicting both their own behaviour and my response: their range of options may well be different to mine, so I cannot model their behaviour solely on mine. Others have choices, so they must have intentionality – and, therefore, I must have it, too; and if there is intentionality then there must be a “me” and a “you” to have it.

Self awareness is essentially a process that enables, and is used for, social judgement, which is a cognitive and not communicative function. However, self awareness establishes the rules which make language so powerful: it allows the self to become a model for the actions of others, which simultaneously takes account of the intentionality of both the self and others. The self becomes identified with the other to such an extent that each can stand in place of either: I can see myself as simultaneously two objects, the thing that instigates an action and the thing that is the recipient of the action. I can also see you as both instigator and recipient, and both of us can be replaced in a construct by third parties: yesterday’s “you” becomes today’s “they”, which I can tell another “you” about.

Self awareness is, therefore, a function of socialisation. Malik shows that self awareness is intimately tied to language and social living – unless we have the knowledge that others have intentionality we can never have knowledge of our own intentionality<sup>13</sup>. This means that two further questions become possible with self awareness. The first of these is anticipation, or a second-guessing between intentionalities: I know your options, and I know my options, so I should choose the one that gives me the best result in response to your best choice. But then you know my options and you know your options, so you may choose the option that gives you the best result in anticipation of my best response to your best choice, so I should choose the best response to that option... There is a recursion between your intentionality and mine within both of our minds, and this recursion is within the rules that enable language – as was predicted by Hauser, Chomsky and Fitch in their model of the evolution of language<sup>14</sup>.

Language is essentially a segmented communication process, even though certain vital parts of language communication are unsegmented. These unsegmented elements cannot be dismissed lightly: they include the all-important indicators of agreement, *yes* and *no*, and many other important utterances that are expressible in single signs. These holistic utterances are often excluded from a grammatical discussion of language, but this leads to the somewhat circular argument that language can be defined as fully segmental if unsegmented language is excluded from the definition. This tells us less about language in use than it does about the agenda of the definition. As Alison Wray shows, formulaic language is pervasive, and may form the majority of everyday utterances<sup>15</sup>; to exclude it from a definition of language is arbitrary and limiting.

Nonetheless, in general, language is involved in the task of expressing segmented relationships between entities. A typical utterance involves two entities and an action occurring between them; the first entity is the instigator of the action and the second is the recipient of the action. For instance, the simple sentence *John saw Janet* has two entities, John and Janet, the first of which is instigating the act of seeing and the second of which is

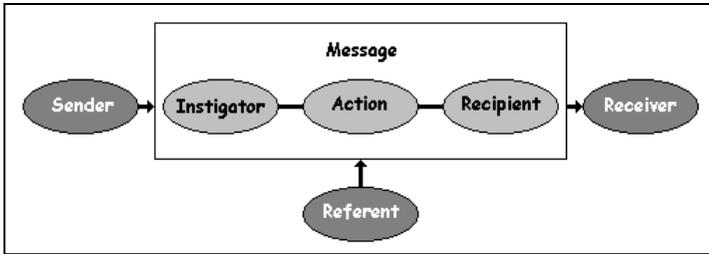
<sup>13</sup> Kenan Malik, *Man, Beast and Zombie: what science can and cannot tell us about human nature*, p220

<sup>14</sup> 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, pp1569-1579

<sup>15</sup> Alison Wray, *Formulaic Language and the Lexicon*

receiving the act (being seen). This structure expresses a primitive state that is recognisable in all languages: although there is some dispute about the classification of parts of speech and grammatical structures, it is generally recognised that the noun and verb distinction (entity and action) and the subject-verb-object structure (instigator-action-recipient) – although not necessarily in that order) are universals in language. It is these two features that enable language to express propositional relationships, another recognised language universal<sup>16</sup>.

We can redefine the standard semiotic model to show this segmentation within the message as follows:



**Figure 1 - The communication process model incorporating language components**

There are two ways figure 4 can be compared to figure 1, the standard semiotics model. The first is the discontinuous approach, identifying the segmented message components as present only in language and therefore the product of a qualitative differentiation between nonlanguage communication and language. The second approach is to try to merge the segmented message components back into the existing components, in order to see them as being present even in the unsegmented state. To do this, we need to consider the possible functions of the instigator, action and recipient in nonlanguage messages.

For instance, when a vervet issues a leopard warning signal, are there indicators within the signal that may indicate the presence of instigator, action and recipient? If we convert the call directly to English, the answer is no: the one word *leopard!* contains exactly the same message to English-speakers as the vervet call does to vervets. Well, perhaps not exactly the same message: within the vervet call is the demand for action, a demand that appears to be met at the subconscious level, perhaps at the genetic level. The vervet leopard call is intrinsically linked to the action of climbing a tree, where the English call has no such immediate association. The English call can contain the metessages “danger”, or “how unusual in Sussex”, or “take the photograph now” or even “well, I expected at least a pride of lions”. The vervet call has only one metessage, and this is so intrinsic to the signal itself that it is hard to know whether the main message is “leopard” or “climb a tree”. In fact, the two messages are co-identified in the signal: the leopard call is only significant, and only made, if there is both a leopard and another vervet to climb the tree<sup>17</sup>. Thus, within this vervet warning call, we can see co-identification of the action in the message and the external referent: the message has meaning equally in terms of the action and in terms of the

<sup>16</sup> Mark Richard, ‘Propositional Attitudes’. In *A Companion to the Philosophy of Language*, pp197-226

<sup>17</sup> Dorothy L Cheney & Robert M Seyfarth, *How Monkeys See the World*, pp144-146

referent itself. We should therefore express it in English not as *leopard*, but as *leopard/climb-tree*.

Where do the instigator and recipient fit in the nonlanguage model? If we return to the English sentence *John saw Janet*, we can easily identify instigator, action and recipient. However, if we look at the English sentences *John shaved*, *John knew* and *stop Janet!* we only have two signs to fill out all three components. Yet we know all the components are present, and we can rephrase all of the statements to make them “component complete”: *John shaved himself*, *John knew something* and *you stop Janet!* In the first example, *John* is performing the action on himself, so he acts as both instigator and recipient; in the second example, the action of knowing implies that something unspecified is known, so *knew* acts as both action and recipient; and in the last example, the English convention of the imperative form means that *you* is always the instigator of the action, so the imperative action must contain the instigator *you*.

If we try to do the same with a single-word utterance, such as *yes*, we see something very interesting at work. First, we can identify the action of the message, which is agreement; but who is agreeing with whom? The answer is simple and obvious: I, the sender, am agreeing with you, the receiver. The message can be expressed as [*I agree-with [you]*], where I and you are implicit in the signal.

If we now refer back to the vervet leopard call then we can see a similar operation at work: [*I leopard/climb-tree [you]*]. I and you are in the leopard call, but they are implicit. What is the mechanism that makes this possible? The answer lies in the components of communication outside of the message, and can be summed up with the formula: *within the message, the sender of the message is always “I” and the receiver of the message is always “you”*. This is a banal universal of communication: to the generator of the message, the generator of the message is in the role of first person and the receiver of the message is in the role of the second person.

Thus, in nonlanguage communication, and in some language utterances, the instigator and recipient do not need to be stated because they always co-identify with the sender and receiver. Action, instigator and recipient are not absent from nonlanguage communication, they are present in a way that means they do not need to be made explicit. The components of the communication process model are the same in language and nonlanguage communication, as is shown by the following merging of figures 1 and 4:

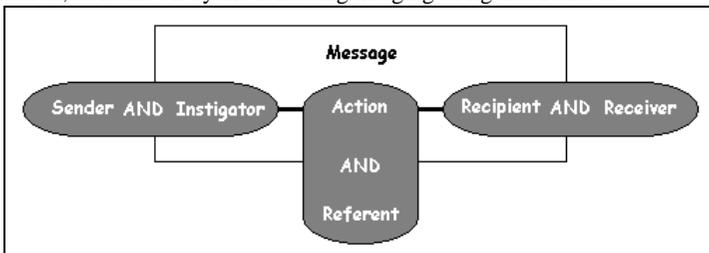


Figure 2 - The communication process model with language components co-identified

However, this leads on to the question: how did the communication model in figure 5 become the language model in figure 4? There would seem to be three separate dislocations necessary: sender and instigator, action and referent, and recipient and receiver. How, when, and why did these dislocations occur? Did all dislocations happen in a single event, or was it incremental? To answer this, we must first digress into theory of mind and self-identification.

### **Towards a Theory of Mind**

It would seem that self-identification is a given for language. Indeed, it would appear that it is a given for all forms of communication: if there is no identity of self then there is no reason to favour the self; so an organism that had even the tiniest inkling of selfhood, even at the genetic level, would have a vast advantage over one that does not. This is the selfishness that Dawkins sees to be the sole driving force of evolution since the beginning: actions that favour the self lead directly to survival, actions that favour others do not. There may be an indirect path to survival by favouring others, but that indirection has to be advantageous enough to outweigh the direct path before self-sacrifice should occur.<sup>18</sup>

However, selfishness is different to sense of self, which in turn is different to self awareness. Selfishness is a default state that ensures survival, and requires no more knowledge of the self than that the world is divided into self and not-self. What is inside the line is the ends of survival (the self), the rest is just means. Of course, with a binary model such as this, only one of the items needs to be defined; the other is the rest of the Universe. It would seem that the self is the easiest to define, but it is also the least useful. The self is the part of the Universe that is already under control; much more important is that part of the Universe that has to be manipulated and negotiated. So a feature of evolutionary selfishness is a lack of comprehension of the self. *Sense of others* gives immediate advantages, it allows an organism to subvert the survival of those others to its own purposes; *sense of self* gives no such immediate advantages. This can be viewed as the level of sophistication used by bacteria: they require no theory of mind, but they remain the most successful group of species in terms of biomass and reproductive success.

Yet, if sense of others is already present, the sense of self has its own advantages: it allows an organism to exercise choice between strategies. In many situations there is usually more than one viable strategy of advantage to the organism, and the ability to choose effectively between them maximises the advantage of each strategy. Adopting a single strategy for a situation relies on there being no organism with effective choices at the other end of the strategy: as soon as a single strategy approach is met by a changed response (which an effective choice allows) then it ceases to work, and the productive single strategy becomes counter-productive. Alternative strategies will then become genetically dominant, and a range of genetically inspired responses in a population can give the appearance of choice being exercised. It is even possible for apparent choice to be coded at the individual level, if stimulus and response form fixed relationship pairs. However, these choices are just appearances: being coded at the genetic level, they require no cognitive decision-making process, so no sense of self is needed.

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<sup>18</sup> Richard Dawkins, *The Selfish Gene*, ch5

In order to truly make choices, an organism must have a rudimentary understanding that there is a self to make the choices. This need be no more than a recognition that the other half of the binary relationship, self and non-self, exists: the tiniest degree of introspection is sufficient. It is likely that the major portion of vertebrate life, and maybe even invertebrates, operate at this level of awareness.

However, as soon as there is a sense of self then it becomes possible to model that self onto other organisms. It is possible to develop *other awareness*, a knowledge that others have choices that can affect your choices. The model of those other organisms (and their possible responses) cannot be greater than knowledge of the self, so greater sophistication in knowledge of the self leads to more sophisticated models of others. It is likely that some, maybe all, primates operate at this level of awareness.

*Other awareness* and *sense of self* bootstrap each other in an evolutionarily competitive environment: when a successful new strategy occurs in a population, it tends to propagate throughout that population. However, it then becomes part of sense of self and, if necessary, other awareness allows counter-strategies to be generated. Although new strategies will be rare, it will be even rarer for an existing strategy to fall out of use; the range of strategies and counter-strategies will slowly but steadily increase.

Yet the escalation created by the dynamic of other awareness and sense of self is not sufficient by itself to get to the next stage. With humans and language we have a new type of self to be recognised. Tomasello and Call label this *self as social agent*<sup>19</sup>, Pinker labels it *sentience*, giving it as one of the three definers of consciousness (the other two being *self-knowledge* and *access to information*)<sup>20</sup>, and Bruner calls it *the transactional self*<sup>21</sup>. In this dissertation the final stage will be labelled *self awareness*. However, in evolutionary terms, self-awareness is at best fitness-neutral, and at worst it is disadvantageous: what is the advantage of being able to treat the self as part of the means of survival, rather than the ends of survival? This important and difficult question will be put to one side at present.

The four stages of self-identification can be represented by a series of questions that can only be posed and answered by animals who have achieved the appropriate stage. They are:

- **Sense of others:** *What will they do?* Events outside the self dictate the responses of the self.
- **Sense of self:** *What can I do?* The self has optional responses.
- **Other awareness:** *What would they do if they were me?* The self is a model for predicting the behaviour of others. However, there is no intentionality, only comprehension that the range of options available to others is the same range available to the self. There is no need for recognition of the interpersonal structure of “me” and “you”.
- **Self awareness:** *What could I do if I were them?* Others are the model for predicting both their own behaviour and my response: their range of options may well be different to mine, so I cannot model their behaviour solely on mine. Others have choices, so they

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<sup>19</sup> Michael Tomasello & Josep Call, *Primate Cognition*, pp337-338

<sup>20</sup> Steven Pinker, *How the Mind Works*, pp134-136

<sup>21</sup> Jerome Bruner, *Actual Minds, Possible Worlds*, ch4

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must have intentionality – and, therefore, I must have it, too; and if there is intentionality then there must be a “me” and a “you” to have it.

Self awareness is essentially a process that enables, and is used for, social judgement, which is a cognitive and not communicative function. However, self awareness establishes the rules which make language so powerful: it allows the self to become a model for the actions of others, which simultaneously takes account of the intentionality of both the self and others. The self becomes identified with the other to such an extent that each can stand in place of either: I can see myself as simultaneously two objects, the thing that instigates an action and the thing that is the recipient of the action. I can also see you as both instigator and recipient, and both of us can be replaced in a construct by third parties: yesterday’s “you” becomes today’s “they”, which I can tell another “you” about.

Self awareness is, therefore, a function of socialisation. Malik shows that self awareness is intimately tied to language and social living – unless we have the knowledge that others have intentionality we can never have knowledge of our own intentionality<sup>22</sup>. This means that two further questions become possible with self awareness. The first of these is anticipation, or a second-guessing between intentionalities: I know your options, and I know my options, so I should choose the one that gives me the best result in response to your best choice. But then you know my options and you know your options, so you may choose the option that gives you the best result in anticipation of my best response to your best choice, so I should choose the best response to that option... There is a recursion between your intentionality and mine within both of our minds, and this recursion is within the rules that enable language – as was predicted by Hauser, Chomsky and Fitch in their model of the evolution of language<sup>23</sup>.

The final question (or series of questions) that self awareness makes possible is speculation on the intentions of third parties to other third parties, with no direct reference to the self’s own intentionality. The intentionality of other individuals is modelled, not to identify strategies that are directly useful to me, but simply to identify what is going on. It is this modelling that enables and informs the insatiable and disinterested curiosity of humans<sup>24</sup>.

So out of self awareness come these three further types of question:

- **Reflexion:** *what could I do if I were me?* A model of the self (the self-who-does) can be manipulated by the real self (the self-who-knows) via an intermediate model self (the self-who-views).
- **Anticipation:** *what should I do, knowing what you can do?* There is recursion between intentionalities.
- **Speculation:** *What could he do if he were her?* The intentionality of others is modelled into both the recipient of the action and the instigator.

The rather arbitrary four stages in a developing theory of mind given above take us from a barely aware reactive state to the ability to anticipate the thoughts of others. For Tomasello, it is only the last stage, self awareness, that qualifies as theory of mind, because it is the only stage at which the sender sees a mind at both ends of the equation. This is an important

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<sup>22</sup> Kenan Malik, *Man, Beast and Zombie: what science can and cannot tell us about human nature*, p220

<sup>23</sup> 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, pp1569-1579

<sup>24</sup> Ian Stewart & Jack Cohen, *Figments of Reality: the evolution of the curious mind*, pp163-164

consideration: a theory of mind cannot exist without minds to theorise about. However, Tomasello does accept that intention reading is “theory of mind, broadly conceived”<sup>25</sup>; it is reasonable to see the first three stages as part of the development of the theory of mind even if they are not part of theory of mind itself.

For Bloom, the last stage, self-awareness, is an important feature not just of being human but of language learning itself: children do not learn words by a process of association, they learn them by inference of the intended meaning of others. This is significant, because it means that children, when they begin to utter their first associative words, already have sufficient theory of mind to understand that the word-sign is a negotiation between them and other people. They also understand enough about intentionality to know that the meaning of a word-sign is in the intention of the speaker (sender), and it is the role of the listener (receiver) to try to apprehend that meaning and not make up their own. If the child is faced with an ambiguity of meaning for a single sound then both meanings must be accepted as contextual. If the child is faced with an ambiguity of sounds for a single meaning then both sounds must be accepted as contextual unless a differentiator can be imputed. Thus a family pet will be both *Rex* and *dog* until the child discovers that all *Rex* are *dog*, but only some *dog* are *Rex*. The child learns these contextual differentiators by imputing meaning to the intentionality of others<sup>26</sup>.

### **From Nonlanguage to Language**

Returning to the dislocation of language and communication components, if the above analysis of self-identification is correct then the sender-instigator dislocation should be the last to occur. At the other end of the process, the most likely first dislocation in the message occurred at the point where there is natural differentiation of the message; that is, where referent/action are identified. Can examples of referent/action dislocation be found in nature, either in communication or in general cognition? One obvious candidate is the use of tools: this requires the ability to visualise a task in terms of action and outcome, or action and referent. However, the outcome is temporally dislocated from the action, and the action itself may be subdivided into a series of tasks, such as: assess the need for a tool, find or make the tool, apply the tool. Tool use implies delayed satisfaction, because the use of the tool is related to the immediate action, but the purpose of the tool is related to the future desired outcome.

In the modular model of the mind there is a problem with tool use as a precursor of language: tool use is not communication. If we use a modular approach (epitomised by Fodor<sup>27</sup>, and Cosmides & Tooby<sup>28</sup>), there is no reason to believe that a skill in manipulation can induce or encourage a skill in communication. If language is an organ then it has developed its own set of processes, which can be similar to, but not the same as, processes used in other mental organs.<sup>29</sup> Just as the two kidneys in a human body can utilise the same filtration method but not the same devices, language can use a similar process of

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<sup>25</sup> Michael Tomasello, *Constructing a Language: a usage-based theory of language acquisition*, p3

<sup>26</sup> Paul Bloom, *How Children Learn the Meanings of Words*, ch3

<sup>27</sup> Jerry A Fodor, ‘Four Accounts of Mental Structure’. In *The Modularity of Mind*, pp2-38

<sup>28</sup> Leda Cosmides & John Tooby, ‘Cognitive Adaptations for Social Exchange’. In *The Adapted Mind: evolutionary psychology and the generation of culture*, pp163-228

<sup>29</sup> Steven Pinker & Paul Bloom, ‘Natural Language and Natural Selection’. In *The Adapted Mind: evolutionary psychology and the generation of culture*, ch12

referent/action differentiation as tool use, but not the same process. In the modular mind, everything has its purpose; exaptation is not possible. Every mechanism is working at full efficiency, or optimally, in its existing role and has no spare capacity to take on a new role in a new module<sup>30</sup>.

Mithen answered this problem by abandoning the modular approach to the mind in his explanation of the genesis of culture: according to Mithen, the *Homo sapiens* mind became a de-modularised, de-specialised, cognitively fluid device<sup>31</sup>. For Mithen, modularity is a good explanation for other primate minds, but not for human minds, which are different. However, Carruthers takes the view that cognitive fluidity is no reason to abandon modularity. The modules can remain intact, with “a minimum in the way of further a-modular apparatus” to provide communication between the modules<sup>32</sup>.

The usual solution to the module problem is to say that the modules are, and always were, leaky: they are conceptual and fuzzy rather than actual and bounded. This is the approach taken by Calvin and Bickerton in their model of the route between nonhuman communication and language: segmented mental articulation used in problem-solving is exapted for use in physical articulation, and also allows segmented linguistic articulation – phonological, semantic and syntactic<sup>33</sup>. This creates the new problem of what a module actually is: is it a poorly delimited physical entity within the brain, or is it a somewhat arbitrary explanation of a feature of mind after the event? Both explanations fit Calvin & Bickerton’s model. The view in this dissertation will tend towards the latter reasoning: the modular approach provides a useful model, but not necessarily a full explanation of synaptic reality.

It seems likely that many examples of cognitive referent/action dislocation exist in nature; but the question remains, does it occur in communication? To show dislocation in communication we must identify the form that a message with separated referent and action would take. Without dislocation the signal consists of a single message, which in turn consists of a single sign to represent the referent/action. This is what we find almost universally in nature: calls cannot be semantically segmented. With dislocation, communication must have at least two segmented elements; and it would also be useful if each of them could be combined with other elements to produce different messages. The elements need not be symbols, they can each have a sole and specific meaning; and they need not occur on the same transmission channel (for instance, one channel could be sound, the other gestural/visual). But the elements would have to be individually identified with different meanings; they would have to be of two classes that are mutually exclusive; and there would have to be some, albeit very limited, replaceability of elements within each class. In other words, there would have to be an identifiable referent/action syntax.

Zuberbühler has identified one natural example of signal dislocation: the diana monkey (*Cercopithecus diana*) uses a series of different warning calls for different predators, but it also prefixes calls with a boom signal, which makes the signal speculative rather than

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<sup>30</sup> Jerry A Fodor, ‘Caveats and Conclusions’. In *The Modularity of Mind*, pp119-129

<sup>31</sup> Steven Mithen, *The Prehistory of the Mind: a search for the origins of art, religion and science*, ch9

<sup>32</sup> Peter Carruthers, ‘Practical Reasoning in a Modular Mind’. In *Mind and Language*, 19 2004

<sup>33</sup> William Calvin and Derek Bickerton, *Lingua ex Machina: reconciling Darwin and Chomsky with the human brain*, ch11

immediate. The “probably” boom changes the receiver’s action from immediate flight to increased vigilance<sup>34</sup>. Another example of referent/action syntax is Chimpanzee begging behaviour. This requires the begged and the begged-for to be separately envisaged in the mind of the beggar, and there is evidence of this separation in the signalling used: the begging gesture is made towards the begged-for item, but the eye contact gesture is towards the begged<sup>35</sup>.

A good example of referent/action dislocation is deliberate deception. A deceptive signal involves a dislocation of the referent from the action of the receiver, at least in the mind of the sender. However, it also relies on the fact that this dislocation will not happen in the mind of the receiver, so it is arguable whether it can be considered communicative dislocation. There is also the question of whether the deception is consciously deliberate, unconsciously deliberate, or accidental: the answer chosen changes the perception of the mental state of the sender in the generation of the signal. However, deceptive signalling does show that a separation of referent and action in the mind of the sender which is *not* accompanied by a corresponding separation in the signal will create a deceptive signal<sup>36</sup>.

It seems counter-intuitive that deception should be a basis for a communicational development, unless the use of a dislocated signal could add some truth-value back into the signal; and there is no candidate mechanism in nonlanguage that would allow this to occur. Nonetheless, it seems reasonable to propose the following as a first stage of the development of language syntax out of general communication:

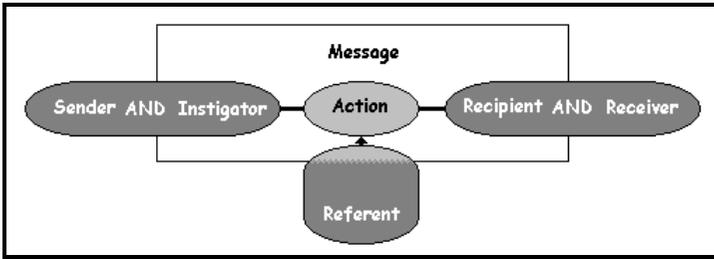


Figure 3 - The communication process model with dislocated referent and action

There is some indication of referent/action dislocation at the interface between humans and animals. The apes that have been taught various proto-languages or sign languages all display a clear knowledge of functional segmentation. The constructs for *hide peanut* and *hide tomato* both display two elements, one of which is similar between the two constructs. In addition, they demonstrate something that is not predictable from a structure consisting of paired, mutually exclusive, classes: they tend to use fixed word order. When Kanzi started signing he was as likely to sign *peanut hide* as *hide peanut*, but after a month he used the verb-object order almost exclusively<sup>37</sup>. Sarah displayed a similar understanding of word

<sup>34</sup> Klaus Zuberbühler, ‘A syntactic rule in forest monkey communication’. In *Animal Behaviour* 63: 293-299 2002

<sup>35</sup> Frans de Waal, *Good Natured: the origins of right and wrong in humans and other animals*, ch4

<sup>36</sup> Michael Tomasello & Josep Call, *Primate Cognition*, ch8.1

<sup>37</sup> Sue Savage-Rumbaugh & Roger Lewin, *Kanzi: the ape at the brink of the human mind*, pp160-161

order when she was able to correctly answer questions like “is red on green?”<sup>38</sup> The Premacks do not take this as an indicator that Sarah has mastered linguistic syntax; but if there is an understanding that *Sarah give Mary apple* implies a different world-state to *Mary give Sarah apple* then there is certainly a simple structure at work in the comprehension of the constructs.

Part of the problem here is simply the definition of *syntax*. The term *syntax* is used in this dissertation in the general sense of ‘a connected or orderly system: harmonious arrangement of parts or elements’<sup>39</sup>. Thus the terms ‘syntax of space’<sup>40</sup>, and ‘the syntax of social life’<sup>41</sup> would be recognised under this definition, and it is permissible to describe mental and communicational structures that rely on connection and order as syntactic. This wider definition of syntax should, therefore, not be confused with the narrow definition used by linguists. Where the linguistics definition places syntax as a subset of grammar, the wider definition used here places grammar as a subset of syntax.

Another example of referent/action syntax may occur in human children. The stages of language development are well-documented, starting from a one-word phase, moving into a two word phase and finally into full symbolic syntax. Hirsh-Pasek and Golinkoff provide a good model of these stages, when they occur, and the events happening in the child’s life at about the same time<sup>42</sup>. The one-word stage can be seen uncontroversially as an example of the unsegmented general communication model, where the one word subsumes all the components in the message. It is also tempting to see the two-word stage as referent/action syntax, but it is not that simple. The two word utterances can often be seen equally well as instigator/action/recipient constructs with any two of the elements elided<sup>43</sup>.

It is clear that referent/action syntax does not need to be symbolic. Using Charles Sanders Peirce’s triage of signs into icons, indexes and symbols<sup>44</sup>, the referent can be identified as purely indexical, with a one-to-many relationship between the sign and the thing referenced; and the action is identifiable as iconic, represented by a single sign and only that sign. While iconic actions form a stable and hard-to-change element, referents are easily mutated to a more symbolic form. A single referent sign can represent both a class of things as well as attributes of a single, specific instance of the thing itself. A prairie dog indicates the proximity and speed of a coyote as well as its presence<sup>45</sup>, and the bee waggle dance becomes more insistent when signalling a larger food source<sup>46</sup>. Thus referents have the intrinsic ability to extend upwards into classes and downwards into instances, which gives a simple one-to-many relationship that allows sign reuse. A sign for an action, on the other hand,

<sup>38</sup> David Premack & Ann James Premack, *The Mind of an Ape*, pp114-119

<sup>39</sup> <http://www.m-w.com/cgi-bin/dictionary?book=Dictionary&va=syntax&x=12&y=14>; Merriam Webster Online Dictionary.

<sup>40</sup> <http://www.spacesyntax.com/>

<sup>41</sup> Peter Abell, *The Syntax of Social Life: The Theory and Method of Comparative Narratives*. London: Clarendon Press, 1996

<sup>42</sup> Kathy Hirsh-Pasek & Roberta Michnick Golinkoff, *The Origins of Grammar*, ch7

<sup>43</sup> Michael Tomasello, *Constructing a Language: a usage-based theory of language acquisition*, pp98-100

<sup>44</sup> Charles Sanders Peirce, ‘Letters to Lady Welby’. In *Selected Writings (values in a universe of chance)*, pp391-392

<sup>45</sup> Charlotte Uhlenbroek, *Talking with Animals*, pp69-70

<sup>46</sup> James L Gould & Carol Grant Gould, *The Honey Bee*, ch5

represents a single action and only that action: there is no need to extend the scope of the meaning. An iconic representation of the action means that the functional intention of a signal is unambiguous, allowing the response to be instinctive and not a matter of judgement. There is oblique evidence for this in the signing of Washoe and Lucy: new actions are rarely lexicalised, whereas there is some redefinition of referents, both using limited analogy (an established sign gets an additional meaning) and by recombination (two signs are combined to give a new meaning)<sup>47</sup>. There is also some indication from the warning calls of vervets: when an eagle is attacking vervets on the ground the warning call given is sometimes the leopard warning call, because fleeing into the trees is a better response to the threat<sup>48</sup>.

In contrast to this, we know that Instigator/Action/Recipient (IAR) syntax in language is almost exclusively symbolic in all components. There has to be some way for signal syntax to change from one form into the other. The mechanism proposed here is the second dislocation in the move from nonlanguage signals to language: the separation of the recipient of an action from the receiver of the message. This dislocation did not create action-referent-recipient syntax, instead it created the possibility of the recipient in the message being treated as a referent in the message. The syntax remained binary, but the roles of recipient and referent became interchangeable.

To show why let us take, as an example, the vervet leopard warning. In ‘Vervetese’, a single unsegmented call gives the whole message, *[I] climb-tree/leopard [you]*; but, as we have seen, in diana monkeys the call has been dislocated so that action and referent are represented by separate signs: *[I] be-vigilant leopard [you]*. It thus represents the dislocated referent/action model of figure 6.

When we come to the receiver/recipient dislocation there is a complex mechanism involving two transformations. The first transformation is the dislocation of recipient from receiver: the receiver of the message (you) is no longer the recipient of the action in the message. The second, related, transformation is that the referent is no longer the reason for both signal and action; the referent remains the reason for the action but the reason for the signal is now the receiver. This may appear to be a subtle difference, but it represents an important change: from a signal that is made because of the sender’s preoccupation with the referent to one that is made to influence the receiver. It is a virtually undetectable change in signal content and structure, but a massive change in sender meaning. The step is more than just a semantic redefinition of terms: the sender has to become aware of the receiver as an entity. The sender has to have a theory of mind about the receiver at least at the level of other awareness, and has to be able to answer the question, *what would they do if they were me?*

Base IAR syntax takes theory of mind to the next level: *what could I do if I were them?* The sender is able to place others into the role of the instigator of the action. *[I] you climb-tree leopard [you]* or *[I] you climb/leopard tree [you]*. The sender is able to *tell*, and not just *command* or *beg*. The transformation of Base IAR syntax makes propositional language possible; but it is not permit full, modern language. further transformations are needed to allow recipient and referent to be simultaneously explicit in the message; and this is achieved

<sup>47</sup> Roger Fouts with Stephen Tukul Mills, *Next of Kin: my conversations with chimpanzees*, pp156-159

<sup>48</sup> Dorothy L Cheney & Robert M Seyfarth, *How Monkeys See the World: inside the mind of another species*, pp107-108.

by de-merging the action into main and subordinate aspects, to give full IAR syntax. This is set out in the figure below:

	(You)	tree	climb	leopard	(because-of)
'Vervetese'	Receiver	Call <i>climb-tree/leopard</i>			
R/A syntax	Receiver	Action <i>climb-tree</i>		Referent <i>leopard</i>	
R/R syntax	Receiver	Recipient <i>tree</i>	Referent/Action <i>climb/leopard</i>		
Base IAR syntax	Instigator <i>(you)</i>	Recipient <i>tree</i>	Referent/Action <i>climb/leopard</i>		
	Instigator <i>(you)</i>	Recipient <i>leopard</i>	Recipient/Action <i>climb-tree</i>		
Full IAR syntax	Instigator <sub>1</sub> <i>(you)</i>	Recipient <sub>1</sub> / Instigator <sub>2</sub> <i>tree</i>	Action <sub>1</sub> <i>climb</i>	Recipient <sub>2</sub> <i>leopard</i>	Action <sub>2</sub> <i>because-of</i>

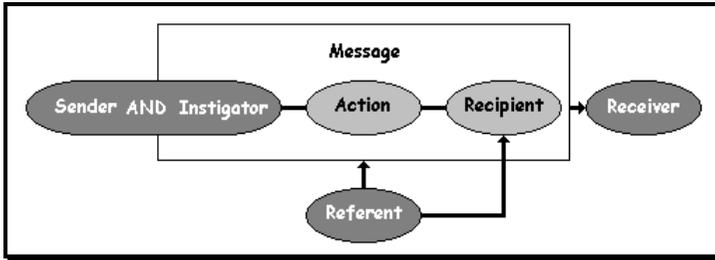
**Figure 4 - Transformations from a nonlanguage call to the language equivalent**

Of the syntaxes intermediate between vervetese and base IAR syntax, it is possible to see apparent value for the receiver in segmenting a signal into referent/action (R/A syntax): a single action can be associated with different referents. However, when considered more closely, this remains an unusual occurrence: although the referent is the cause of the message, the useful information is the action. The segmented calls *climb-tree leopard* and *climb-tree human* are, for the receiver, unnecessarily complex; the unsegmented call *climb-tree* is all the information the receiver needs. Yet if the call does not have a directly associated referent then it becomes possible for the sender to use the call without any referent at all – the call becomes deceptive, and therefore valueless to the receiver. Thus, in one of the few known cases of a segmented call (the diana monkey “probably” boom), the segmentation allows a fixed referent to be associated with different actions, and not a fixed action to be associated with different referents. The meaning of the default call remains *climb-tree/leopard*, but adding the “probably” boom changes the action, and the now-segmented call becomes *be-vigilant leopard*. This adds value to the call for the receiver without allowing useful deception by the sender.

With the dislocation of receiver and recipient and the redefinition of recipient as referent and *vice versa* (R/R syntax), it is hard to see any communicational value for either sender or receiver. We still have only two segmented components in the message, so the action must be co-identified with the referent or recipient: the component identified with the action is both more intimate to the action and less useful in the message. For instance, in the example given in figure 7, the recipient is *tree*, the goal of the climbing; the referent and cause of the signal remains *leopard*, so the action can be glossed as *climb-because-of-leopard*. This, in theory, leaves the possibility of a different action (and sign) to be associated with *tree*, such as *climb-because-of-fruit*. R/R syntax can be expressed as a process in figure 5 below.

We can see this effect at work in language: the recipient of the action is often tacked onto the end of a sentence as an adpositional construct. In *John gave a book to Mary* we can see *John* as instigator (grammatical subject), *Mary* as recipient (grammatical indirect object) and *a book* as the referent (grammatical object) of the action of *giving*. We can also view the construct as having a “super-phrasal verb”: *John gave-a-book-to Mary*. *Mary* becomes the recipient of the action of *giving-a-book-to*, and the action *giving* and the referent *a book*

become co-identified. If we recast the construct into the model above, co-identifying the sender with the instigator as “I”, it becomes [I] *give-a-book-to* Mary, a construct which (like the model) has two components, the referent/action and the recipient.



**Figure 5 - The communication process model with dislocated recipient and receiver**

However, there is no reasonable argument that can be advanced to explain a communicational move from R/A syntax to R/R syntax. Identifying the recipient of the act of climbing (*the tree*) imposes an unnecessary condition on the action of the receiver. As far as the receiver is concerned, anything climbable counts as *tree*: it is not *tree* itself that is the recipient, it is *the thing climbed up*. The act of climbing itself identifies the recipient of the act, so there is no need to make it explicit in the message. The concept *this tree* has less value than the concept *any tree*, so it is a communicational change that will be resisted by the receiver. It is also hard to see what advantage the sender gets from this form of syntax: why would the sender have a particular interest in the specifics of how the receiver reacts to a call, as long as they do react?

If we look at the constructs permitted by a dislocation of action and referent only (R/A syntax), we see the following types of signal:

- **Action** [by Receiver] [because of] **Referent** (e.g. warning)
- **Action** [by Receiver] [of] **Referent** (e.g. encouragement or begging)

Example constructs would be: *climb-tree [by receiver] [because of] leopard*; and *request-to-donate [by receiver] [of] food*. In terms of theory of mind, at least a sense of self is needed to formulate these constructs: while the receiver need be considered as no more than a tool, there has to be an understanding of the ways in which the tool can be manipulated.

Constructs permitted by a dislocation of receiver and recipient only (R/R syntax), take the form:

- **Action+Referent** [by] **Recipient** [to Receiver]
- **Action+Referent** [to] **Recipient** [by Receiver]

*Action+Referent* is a single sign. However, as has been argued, there is no communicational reason for this syntax to be used. In fact, there is only one context where this syntax has a purpose, and its purpose is not communicational: that context is social calculus.

Example constructs for R/R syntax in social calculus would be: *grooming-by-me [to] Mary*, and *grooming-to-me [by] John*. If the *me* in the first construct is John and in the second construct is Mary, then these constructs both carry the same third-party semantic value. However, the minds in which the two constructs are instantiated are different: the first

construct is the meaning of the thought as constructed in the mind of the sender (the groomer); the second is the meaning as constructed in the mind of the receiver (the groomed). The constructs represent the two meanings permitted by the shared knowledge state. Effectively, the meanings in the minds of the sender and receiver are different; but it is this difference of meanings which provides the constructs needed to establish a mental environment where social calculus can operate.

Grooming is a signal which creates a structure of duty, such that the groomed owes the groomer. In the mind of the receiver of the grooming, the sender of the grooming signal is the receiver of the duty signal – in English, it is not just a message from the groomer of *[I] am-owed-by [you]*, it is a message from the groomed of *[I] owe [you]*. Thus the sender's reason for creating the signal (performing the grooming) is deferred rather than current gratification: memory and limited temporality are part of the formulation. The receiver of the grooming is also the recipient of the debt, but the recipient of the debt is temporally separated from the receiver of the grooming: payback time is later, not now. This, in turn creates the possibility of promising: because the recipient need not be temporally immediate to the receiver, the recipient can be the receiver at a different time. This is not to imply that grooming primates have a concept of contract, but it does raise the possibility that the value of a signal could be in its intention and not in its immediate delivery – what Austin calls *performatives*<sup>49</sup>. However, it is important to note that the signals exchanged in grooming are unsegmented constructs. It is only within the individual minds of the grooming partners that segmented R/R syntax occurs; it does not occur between them.

### Social Calculus and Syntax

For examples of receiver/recipient dislocation (R/R syntax), as we have seen, we need to look at social animals and the social calculus that gives structure to their societies. However, not all social animals use social calculus – it is not an inevitable outcome of socialisation; a range of other attributes must be present to allow the calculus to work. As Calvin and Bickerton say:

WHAT WAS NECESSARY FOR SUCH A CALCULUS? It would require at least the following ingredients: (1) an ability to distinguish individuals of the social group, (2) an ability to distinguish different types of action, and (3) some kind of abstract representation of the roles of participants in actions.<sup>50</sup>

The third requirement in the above quote is a little fuzzy, and actually represents two different types of representation – and, therefore, two different stages of calculus. The first stage of social calculus is more like social book-keeping, allowing the animals to mentally maintain balances of social “debts and credits” against the members of their tribe. This enables them to build alliances and avoid enemies, and gives them a side to take in the event that they should need to do so. To build a list of social obligations requires the recognition that the *you* receiving a grooming today is not the *you* that was groomed yesterday. While the receiver of the grooming is still *you*, *you* have to be differentiated from the other *you*'s – essentially, all the *you*'s have to be separately identifiable and identified (requirement 1 in the quote above). In this way a dislocation between receiver and recipient is established, although within thought and not within communication.

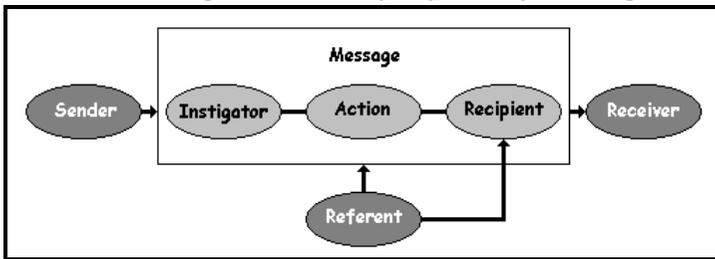
<sup>49</sup> J L Austin, *How to Do Things with Words*, Lecture V

<sup>50</sup> William H Calvin and Derek Bickerton, *Lingua ex Machina: reconciling Darwin and Chomsky with the human brain*, p129

To illustrate this as an evolutionary process, consider a group of social animals, such as primitive monkeys, that groom each other as a food supplement. The monkeys may well evolve a call to avoid aggression along the lines of [I] *want-to-groom X [you]*, where X represents the referent. In this case the referent is also the animal being signalled, the receiver; so X is always “you”, which means that a single call with directed gaze will suffice to signal this intention to any member of the group. The co-identification of referent and receiver here is trivial: the receiver is an iconic given and the referent is undifferentiated from the action. However, while neither is actually identified in the communication, together they provide the potential for co-identification in the minds of sender and receiver. Social calculus turns the trivial association of referent and receiver into a relevant one, creating the construct [I] *groom X*, where X is a range of differentiated recipients. Initially this is only in the mind of the groomer, but if the social calculus is to be based on any form of social contract then it also has to become an association in the mind of the groomed – there has to be at least a rudimentary sense of reciprocity.

The second stage of social calculus gives us the dislocation of sender and instigator. In order to realise a full social calculus a species must be capable of maintaining a “spreadsheet” of social relationships. As well as knowing the balances on their own column of allies and opponents they need to be aware of the relationships between those allies and opponents and other members of the tribe. The mental model [I] *groom X* must become capable of expressing *Y grooms X*, thus dislocating sender and instigator. However, this simple structure cannot stand alone, it must be supported by a basic understanding of worth. It is not enough to know who has “brownie points” with whom, it is necessary to know the value of those brownie points, too. If a particular member of a group is not good at reciprocation then any brownie points owed by them have less value than those owed by a high reciprocator: the high reciprocator is more likely to pay back promptly. Also, some individuals may pay back points by reciprocal grooming, others may pay them back by physical support in a fight, and others may pay them back by increased warning signals (requirement 2 in the quote above). It is important to know not just how much currency is owed by an individual, but how it will be repaid, and with how much interest; so the spreadsheet of social relationships has to be backed up by an understanding of the personalities of all of the individuals on it (requirement 3 in the quote).

Both the dislocation of sender/instigator and the ability to evaluate the worth of others requires a theory of mind at the level of self-awareness. The sender has to be able to answer the question *what could I do if I were them?* However, the dislocation of sender/instigator cannot replace R/R syntax because it relies on R/R syntax to work. It must be capable of working with the receiver/recipient dislocation, giving a message of three parts, as follows:



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**Figure 6 - The communication process model with sender and receiver dislocations**

The spreadsheet approach to social calculus has limitations. In order to keep a full spreadsheet of the social relations in a group of 30, a matrix of  $30 \times 30/2$  or 450 is needed. Each “cell” in the matrix does not represent a single function but a series of functions related to the methods of reciprocating, and it must be supported by models of the personalities of everyone on the matrix. As the social group gets bigger, so does the matrix; but the increase in the matrix is exponential – the eleventh member of a group requires an extra eleven “cells” in the matrix, the twenty-first member requires an extra twenty one “cells”, and so on. There are only two direct ways to deal with this: limit the group size, or increase the brain size.

However, there is an indirect way to deal with spreadsheet limitations, and that is to introduce hierarchical structure into the calculus. Instead of allocating a set of features to each individual, the individuals are associated with the features. This allows the features to act as a grouping of the individuals, and the group can then be treated as a single entity in the social matrix. The more socially distant that group members are from the owner of the social matrix, the less the owner needs to know about them as individuals, and the more they can be treated as segments of a group. The treatment of groups as “macro-individuals” allows a social stratification to be developed in the mind of the matrix owner and then, by extension, in the real world itself. This stratification permits large social groups to exist by allowing individuals to react to others not as individuals but as sub-group members. The use of stratification within social models would definitely seem to be a feature of human social calculus; and, once the concept of hierarchical structure is used in a social matrix, it allows the possibility for it to be used in general thought.

The spreadsheet stage of social calculus appears to the human mind to be ludicrously simple, and so obvious that our fellow primates must surely use it. However, this brings us back to the question left hanging in section 2.3 above: the suppression of the self implied in the separation of instigator and sender represents not just a change of mental model, it represents an enormous evolutionary sacrifice. By placing others in the position of self, the self is adopting a role of disinterested, unbiased observer; but how is the self served by disinterest? How can an individual defend their corner if they are unbiased? There would seem to be only one mechanism that could generate the necessary level of disinterest required for the dislocation of sender and instigator: if an organised group could force its members to put aside individual self-interest for long enough to allow group interest to become established, then self-disinterest could become a viable fitness strategy. However, this group would have to be something very strange and unDarwinian. Only in eusocial animals and humans has the necessary level of self-disinterest been achieved. In the case of eusocial animals it is a simple product of the suppression of self-interest by sterility, but in humans it required some kind of external co-operative mechanism to allow the internal separation of self into self-who-knows and self-who-does.

Merlin Donald gives a circumstance which would appear to be an ideal candidate for sender/instigator dislocation: rehearsal and review of action<sup>51</sup>. Here, the action is supplemented by a rehearsal stage and a review stage: the self-who-knows is able to practice

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<sup>51</sup> Merlin Donald, *A Mind So Rare: the evolution of human consciousness*, p142

and evaluate the actions of the self-who-does, and then feed the review back into further rehearsal. It is a facility that Donald believes to be natural for human children and adults, but missing from all other animals: other primates do play repetitive games, but they do not review and refine their performance.

Dunbar's gossip hypothesis also fits into a structured social matrix model<sup>52</sup>. Leaving aside the considerable problems of co-operation and truth-values in gossip messages<sup>53</sup>, in order to convey meaning in a message about others as instigators there has to have been a dislocation of sender and instigator. In addition, it would be useful if the instigators in the message could be allocated to groups, indicating their social status and their status in relation to the sender of the gossip. However, this does tend to show that the message structure of gossip (three part segmented) is considerably different to that of grooming (one part unsegmented), and it seems unlikely that the considerably simpler grooming message could directly spawn the gossip message. Within the model proposed in this dissertation, the gap between grooming and gossip in the structural evolution of language would seem to require a rather large bridging explanation.

Barkow argues that the appearance of social stratification has to have been a relatively recent phenomenon: it is not a requirement for small groups, and large social structures have only developed in human history during the past 12,000 years<sup>54</sup>. However, the temporal association of social expression with mental process is a dubious procedure. As Ulbaek shows, the cognitive structures required for language production appear to predate language production itself by a large margin, because the cognitive structures are only part of the story<sup>55</sup>. The dynamite of language may be the cognitive structures, but the fuse is co-operation. Similarly, large social structures may be the fuse for the stratification of human societies, but the dynamite of the cognitive structures could be much older.

The stratification of social calculus introduces the concept of hierarchy, which allows the final dislocation (a replay of the first dislocation): the referent or recipient in the action can be separated from the action itself. This creates a problem for a linear communication channel like speech: with a three component structure (IAR) it is possible to analyse the relationships into a one dimensional series, but with a four component structure such as the simple semiotics model (figure 1) this is not possible. In language the components of instigator, action, recipient and referent have to be expressed in a one dimensional form (speech), and this is achieved by reducing the relationship to two three-component relationships. The instigator, action and recipient or referent form the main triad, and are therefore the independent components of language. The remaining item (referent or recipient) is then related to the main triad, or to an item in the main triad, by a secondary action (in English, usually an adpositional). The remaining item itself then takes the role of recipient in a secondary triad, while one of the components of the main triad becomes the instigator of the secondary triad. One-dimensionality is preserved by the transformation of

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<sup>52</sup> Robin Dunbar, *Grooming, Gossip and the Evolution of Language*, p5

<sup>53</sup> Camilla Power, *Old Wives' Tales: the gossip hypothesis and the reliability of cheap signals*. In *Approaches to the Evolution of Language*

<sup>54</sup> Jerome H Barkow, 'Beneath New Culture is Old Psychology: gossip and social stratification'. In *The Adapted Mind: evolutionary psychology and the generation of culture*, pp627-637

<sup>55</sup> Ib Ulbaek, 'The Origin of Language and Cognition'. In *Approaches to the Evolution of Language*, pp30-43

four into  $3+3 \Rightarrow 5$ , and the subsuming of the referent into a recipient role – something we have already seen in R/R syntax.

So we now have a series of transformations that allow the general communication model to become the language model, as follows:

STAGE 1: [Sender/Instigator="I"] + Referent/action="Call" + [Receiver/Recipient="you"]  
becomes

STAGE 2: [Sender/Instigator="I"] + **Action + Referent** + [Receiver/Recipient="you"]  
becomes

STAGE 3: [Sender/Instigator="I"] + **Referent/action + Recipient** + [**Receiver="you"**]  
or

STAGE 3: [Sender/Instigator="I"] + **Recipient/action + Referent** + [**Receiver="you"**]  
becomes

STAGE 4: [**Sender="I"**] + **Instigator** + Referent/action + Recipient + [Receiver="you"]  
or

STAGE 4: [**Sender="I"**] + **Instigator** + Recipient/action + Referent + [Receiver="you"]  
becomes

STAGE 5: [Sender="I"] + Instigator + **Action** + Recipient + **Referent** + [Receiver="you"]

The items that change between the stages are in bold and the invariant items are in square brackets.

It seems unlikely that there are alternative orders in this five-step transformation process. The first transition (dislocation of action and referent) works on the only explicated part of the general communication signal. The second transition (dislocation of recipient and receiver) relies on a social calculus that is not a requirement of the first transition. The third transition (dislocation of sender and instigator) relies on an even more complex social calculus; and the final transition requires a mind that can understand hierarchy as well as complex social calculus. Each stage requires everything in the stage before, plus something more. The most likely order of transitions and stages is, therefore, as given above.

This model still leaves one significant issue unaddressed: why would social calculus have evolved in the first place? It has already been said that social calculus is not an inevitable outcome of socialisation and, although Calvin and Bickerton identify the three features that characterise social calculus, there remains the question of why these three features became evolutionarily successful.

One solution is that presented by Huizinga,<sup>56</sup> Knight<sup>57</sup> and Bromhall<sup>58</sup>: play is a state in which reality is suspended in favour of a shared fantasy. Real bites become play bites, real aggression becomes faked aggression, and victory becomes unimportant. Play creates an atmosphere of reciprocity, where yesterday's victor is obliged to become today's vanquished in order to allow the game to go on. Players need to know that their turn will come in order to retain interest in the game. In our lineage, increased neoteny allowed for the games of childhood to become more deeply established in the memories of individuals, and increased brain size allowed both clearer distinction of individuals and more detailed remembrance of

<sup>56</sup> Johan Huizinga, *Homo Ludens: a study of the play element in culture*

<sup>57</sup> Chris Knight, 'Sex and Language as Pretend Play'. In *The Evolution of Culture*

<sup>58</sup> Clive Bromhall, *The Eternal Child: an explosive new theory of human origins and behaviour*

debts. Thus play is the engine that allowed social calculus to become a viable evolutionary factor: playful reciprocity became the much more serious reciprocity of social calculus.

The tokenistic nature of play also allowed the evolution of a symbolic form of meaning. However, as Tomasello shows, the evolution of grammar and symbolic meaning did not have to occur in lock-step<sup>59</sup>: they are two separate processes that can exapt the same function in different ways. This dissertation will, therefore, take the view that play was exapted into an internalised social calculus which led to grammar, and also exapted into an internalised, propositional, tokenistic system (*a stands for b*) which led to symbolic meaning. As the thesis proposed here is concerned with the evolution of grammar, the significance of play for semanticity will be addressed only tangentially.

### **The Model: Summary**

The theory proposed in this dissertation is that language is continuous with nonlanguage communication, and that the components of language are detectable in nonlanguage, too. The genesis of language out of nonlanguage did not involve any new components, nor did it require a single qualitative leap to come into being.

However, this does not mean that there are not discontinuities in the model. For each of the five proposed stages of syntax there is a discontinuity or dislocation with the previous stage. This is inevitable because the components being dislocated are themselves discrete, and the dislocation itself is binary: it is either present or it is absent, there are no intermediate states. There is also an important discontinuity in communication itself: the first stage is demonstrably present in nonlanguage communication, and the last stage is demonstrably present in language; but the second stage (R/A syntax) has few known communication instantiations, while the third and fourth stages have no known communication instantiations. In addition, there are cogent arguments for believing that the third stage (R/R syntax) is not possible as a communication method, so has to have been instantiated as an uncommunicated mental process. It is, therefore, possible that the fourth stage was also uncommunicated, and language (the fifth stage) appeared to spring into being fully-formed and without progenitors in nonlanguage communication. Language would appear to be completely discontinuous with nonlanguage but, as Aitchison argues, the continuity-discontinuity dichotomy can be more ideological than real<sup>60</sup>.

This leads on to the inevitable question: what could make a mental process suddenly useful as a communicative process? The possibility that it was a genetic change cannot be dismissed, but the most likely fit to this model would be a cultural explanation: something happened in the way humans used social calculus and theory of mind that allowed language to become an explicit representation of that social calculus. This will be looked at later in the dissertation.

By now, you should all know Chris's model of how the female solidarity came into being, so I won't cover that territory again. However, its significance for the genesis of grammar needs stated. I believe that you can't get to grammar without it.

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<sup>59</sup> Michael Tomasello, 'On the Different Origins of Symbols and Grammar'. In *Language Evolution*

<sup>60</sup> Jean Aitchison, 'On Discontinuing the Continuity-Discontinuity Debate'. In *Approaches to the Evolution of Language*

With the ritualization of menstruation comes metaphoric association (females can be females, but they can be monsters, too), thinking in levels (a monthly cycle of change is contained in an unchanging historical process), symbolic translocation (these females are standing in place of animals), recursion (the symbolic translocations are reversible, repeatable and interchangeable with other symbolic translocations) and even entertainment (the signal no longer needs to be loud or long to be clear, but the females seem to enjoy giving it and the males seem to enjoy getting it). However, perhaps the most important feature of ritual in terms of language is the inherent recognition of the motivation of others. It represents the point in human history at which we became able to answer the question *what could I do if I were them?* The females, in the ritual, are placing themselves in the position of both the men and the animals. They are enacting their desires for the men (go hunt) and their desires for the animals (go get caught). There is a realisation that the men and animals have their own agendas and have to be persuaded to fulfil the female agenda; but there is also a realisation that, if the women can see the point of view of the men and animals, then the men can be physically persuaded, and the animals ritually “persuaded”, to see the point of view of the women. This is an indicator that a level of recursive and abstract thought is involved in the ritual signal: We know what you want; we want you to know what we want. It is what Catherine Snow describes as intersubjectivity: the ability to perceive and communicate the mental activity, conscious awareness, motives, cognitions, and emotions of others<sup>61</sup>.

The ritual signal is still costly, but it involves an emergence of consensus as part of the ritual cycle. First there is consensus between females in staging the ritual, then between the female group and the male group in accepting the ritual, then between the males in enacting the ritual with a hunt, and finally between individual females and males in fulfilling the ritual with feasting and sex. With consensus the interests of parties in communication converge, and it becomes possible to cheapen signals. With cheap signals it becomes possible, in turn, to digitise the signal – small changes in form can stand for large changes in meaning because the sender and receiver are co-operating in the signalling process. This co-operation also allows for turn-taking as the sender and receiver negotiate their way to meaning, rather than the receiver resisting the meaning of the sender. Co-operation also releases the power of metaphor, with the receiver actively seeking relevant meaning from apparently unrelated symbols; and this allows signals to become innovative and productive, and allows the combination of signs to generate combinatorial meanings.

By this stage, human communication behaviour has become volitional, digital, symbolic, combinatorial, innovative, productive and synchronous: even without a formalised linguistic rule structure, the miracle of language has already happened. Signals cannot be both cheap and trustworthy (as they are in language) unless the interests of sender and receiver converge; this is rare in nature, and can never happen in signals between the sexes. Yet through a process of selfish genes, kin selection, reciprocal altruism and handicap selection, precisely this circumstance has been brought about in humans.

We can even see in this model a hint of the differing linguistic strategies used today by men and women<sup>62</sup>. Females would need to share internal details of their life as part of a solidarity,

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<sup>61</sup> Catherine E Snow, ‘Social Perspectives on the Emergence of Language’. In *The Emergence of Language*, ch9

<sup>62</sup> Deborah Tannen, *You Just Don't Understand: women and men in conversation*

and social conversation would be important to quickly identify females who were subverting the solidarity. The strength of the female solidarity lay in their internal agreement and external cohesion. For males, language would be a tool for demonstrating fitness (both immodesty and modesty are easily served by language) and for passing around out-group information. Because of the importance of face, there would be little use for social conversation in male coalitions. Only if there was differentiation in male and female socialisation could such disparate uses of language have become institutionalised, possibly at the genetic level<sup>63</sup>.

### Passive Pluperfect Transitive

The transitive passive form:

**Mary had been given a book**

Is generated from the active form:

**John had given a book to Mary**

The normal passive converts the direct object to the new subject and converts the old subject to an adpositional (or loses it). The verb in these cases becomes intransitive:

**A book had been given to Mary [by John]**

In most constructs the direct object is the recipient while the indirect object is the referent:

**John had placed a book on the pile**

Where **a book** is the recipient of the placing and the direct object; and **the pile** is the referent and the indirect object.

In **John had given a book to Mary**, the direct object is the referent (**a book**) while the indirect object is the recipient (**Mary**). This type of construct can sometimes be rephrased (but only if the adposition is **to**):

**John had given Mary a book**

In these cases a second passive is possible, using the indirect object as new subject and leaving the direct object in place. The verb in these cases is transitive:

**Mary had been given a book [by John]**

This transformation does not work for the usual form:

\* **John had placed the pile a book**

\* **The pile had been placed a book [by John]**

It also only works with some meanings of **to**:

**John had taken the book to heart**

\* **John had taken heart the book**

\* **Heart had been taken the book [by John]**

Thus we can see that the transformation is rule bound, but it is not just a grammatical limitation: it is semantically delimited, too.

<sup>63</sup> Simon Baron-Cohen, *The Essential Difference: men, women and the extreme male brain*, pp105-111