

The Role of Communication Structure in the Progressive Evolution of Grammar

Martin Edwardes
University of East London

Email: martin.edwardes@btopenworld.com
Website: <http://www.btinternet.com/~martin.edwardes/>

Contents

1. INTRODUCTION	2
2. MODELLING COMMUNICATION	3
3. LANGUAGE WITHIN NONLANGUAGE	5
4. A THEORY OF MIND	7
5. FROM NONLANGUAGE TO LANGUAGE.....	11
6. SOCIAL CALCULUS AND SYNTAX	16
7. CONCLUSION	20
REFERENCES	22

Figures

Figure 1 - Communication process (standard semiotics) model.....	3
Figure 2 - Communication process model mapping the four referents	4
Figure 3 - Language communication process model mapping the four referents	4
Figure 4 - The communication process model incorporating language components	6
Figure 5 - The communication process model with language components co-identified	7
Figure 6 - The communication process model with dislocated referent and action	12
Figure 7 - Transformations from a nonlanguage call to the language equivalent	14
Figure 8 - The communication process model with dislocated recipient and receiver.....	15
Figure 9 - The communication process model with sender and receiver dislocations	18

1. Introduction

For many years now, one idea has defined the relationship between general communication and language: the idea that they are very different phenomena. This doctrine of differentiation has had many instantiations, from Chomsky's view that language is something new and discontinuous with previous communication strategies,¹ through Bickerton's view of two-step discontinuity,² and into Pinker's view that a series of small, imperceptible steps led from general communication to language.³ Although the processes described in these three theories are very different, they all take the view that language is not just a new type of communication, or communication writ large, it is qualitatively as well as quantitatively different to general communication.

It is indisputable that there are aspects of human language that are not present in non-language communication. Knight has identified an important contradiction in the nature of language, involving cost and trust: the cheap, volitional signals of language can be faked; and, unless there is a compelling evolutionary reason to keep them honest, they will be faked.⁴ As a signal becomes subject to fakery it ceases to have meaning or function; so cheap, volitional signals remain an unstable strategy in any species' communication repertoire. Signals can be cheap and non-volitional, so fakery doesn't arise; or they can be volitional but expensive – being able to make the signal means that a cost has been paid up-front to ensure its honesty.⁵ Language is both volitional and cheap, yet is also trusted, an apparent evolutionary impossibility.

Hockett,⁶ Aitchison⁷ and Knight⁸ have also identified several dichotomies between language and non-language communication, three of which are very significant to this paper. The first is that language is rule-bound – order and structure dictate meaning. The second is that language is combinatorial – individual units of meaning can be combined and recombined to create new macromeanings. The third is that language is symbolic – the units of meaning are arbitrarily associated with the units of sign. In contrast, non-language communication relies on simplicity and regularity: a signal means exactly what it means, neither more nor less; and it is as simple as it can be in order to convey the unitary meaning quickly and clearly. Non-language communication cannot be rule-bound, because rules impose a cost of translation on the receiver, a cost the receiver has no reason to pay; it cannot be combinatorial, because this introduces unnecessary complexity; and it cannot be symbolic, because this interferes with unitary meaning. Rule-boundedness, combination and symbols are often seen as the Rubicon that human language alone has somehow crossed.

However, within the dichotomous discontinuities in all the lists, it is possible to identify underlying continuities; and it is this search for continuity that has recently proved so productive. In what follows, it is the continuities of rule-structure, or grammar, that are most of interest.

¹Noam Chomsky, *Language and the problems of knowledge: the Managua lectures*, pp183-184

²Derek Bickerton, *Language and Species*

³Steven Pinker, *The Language Instinct*

⁴Chris Knight, Ritual/Speech Coevolution: a solution to the problem of deception. In *Approaches to the Evolution of Language*

⁵Amotz & Avishag Zahavi, *The Handicap Principle: a missing piece of Darwin's puzzle*

⁶See David Crystal, *The Cambridge Encyclopedia of Language*, 2nd edition, pp400-401

⁷Jean Aitchison, *The Articulate Mammal: an introduction to psycholinguistics*, p27

⁸Taken from lectures by Chris Knight. A similar list for comparison of speech and ritual is given in: Chris Knight, Sex and Language as Pretend Play. In *The Evolution of Culture*, p231

2. Modelling Communication

Let us start with a reasonably uncontroversial model of general communication. In this model we can identify the players in the “communication game”, the purpose of the game, and the method by which it is played. The players are the generator of a message, who will be referred to as the sender, and the receiver of the message; the purpose of the game is for the sender to bring an event or object (the referent) to the attention of the receiver; and the game is played by the sender creating a message. This can be summed up in the following standard semiotics model.

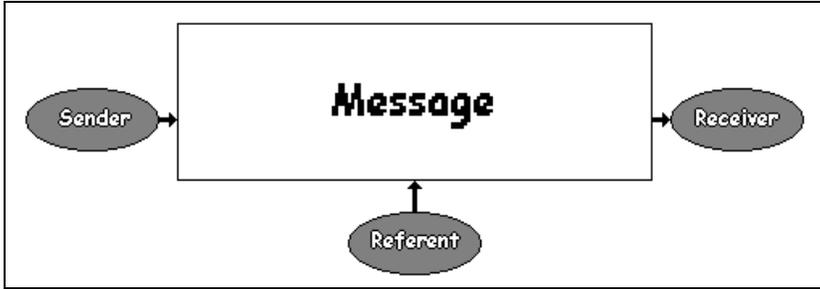


Figure 1 - Communication process (standard semiotics) model

The sender generates a message about the referent, which is received by the receiver. This structure corresponds to Jakobson’s language model, except that Jakobson included context and contact.⁹ In non-language, contact is not part of the structure: there is no need for the sender to ensure the receiver is phatically involved in the communication process, nor are there translation issues to be constantly addressed. There is also no need for context to be made explicit: the context is here and now, and does not vary.

It is clear, therefore, that this model also represents language communication, albeit in an abbreviated and incomplete way. But what are the features of language that are missing from this model? To investigate this, we should look at a detailed semiotic model of non-language communication, and compare it to a similar model of language communication.

Semiotics is concerned with the sign involved in a signal, and the way this sign is interpreted by sender and receiver.¹⁰ As we have seen, in non-language communication, the sign and the message co-exist: the sign means the message and only the message. However, the sign also represents the referent of the message, and this cannot be the same for both sender and receiver: while the sender is aware of the real-life referent, the receiver is initially aware only of the referent represented in the message. If the receiver was already aware of the real-life referent then there would be no reason to generate the message in the first place – telling a receiver what they already know is pointless. This relationship of referent meaning can be summarised in the following diagram:

⁹Roman Jakobson, *Language in Literature*, ch7

¹⁰Umberto Eco, *A Theory of Semiotics*

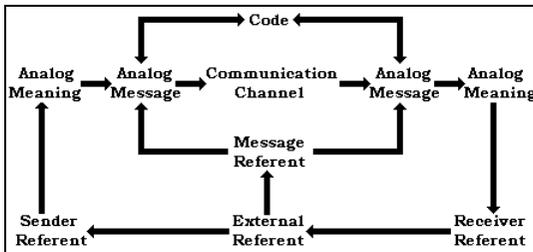


Figure 2 - Communication process model mapping the four referents

Here, the external referent is noticed by the sender and becomes a sender referent in the mind of the sender. This referent has an analog meaning to the sender, and will generate emotions on continuously variable scales, depending on the status of the external referent. The sender will express these variable emotions using a variable scale medium, thus creating an analog message; the medium and the meaning are predefined (usually genetically) so a code does not need to be negotiated with each message. Within the analog message is the message referent, which is an exact allusion to the sender referent. The message referent also corresponds to the external referent to a high level of fidelity, but it is not exact: if the sender has misunderstood the external referent (such as a young vervet monkey mistaking a vulture for an eagle¹¹) then the sender referent will be wrong, and so will the message referent.

At the other end, the analog message generates an analogue meaning in the receiver. The message is not interpreted or translated: the meaning is intrinsic to the message, and the message causes an unavoidable reaction in the receiver. The reaction is to the message referent, which automatically generates the receiver referent, and not to the external referent; thus the receiver and sender referents are directly co-identifiable with the message referent. The external referent is also identifiable with the message referent, although subject to misunderstandings in perception of the external referent by the sender, and misunderstandings in perception of the message by the receiver.

When language is introduced, the semiotics model changes significantly:

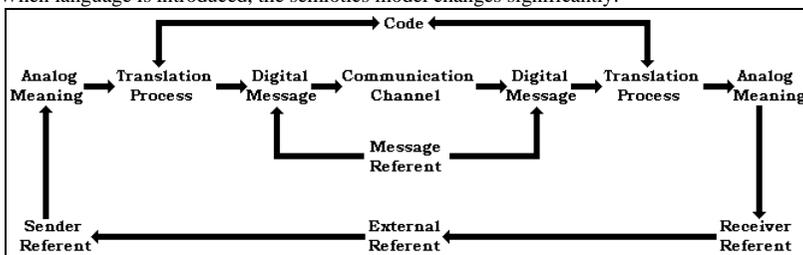


Figure 3 - Language communication process model mapping the four referents

Language is an essentially digital medium: small changes to a sign do not change the intensity of the sign, they change the nature of the sign completely. For instance, the meaning of the sentence *she was constantly underlining his authority* is considerably different to that in the sentence *she was constantly undermining his authority*. The orthographic difference is less than

¹¹ Dorothy L Cheney & Robert M Seyfarth, *How Monkeys See the World*, pp129-130

3%, but the meaning is very different. However, while the medium of communication is digital, the meaning to be communicated remains analog, which means that there has to be an analog-to-digital translation process. This, in turn, means that the code used to transfer the message from sender to receiver can no longer be intimately tied to the meaning: the code has to be an agreed system which, while itself digital, can encode analog meanings. In turn, this means that the code cannot be genetically enforced, it needs to be negotiated between sender and receiver at every instance: for instance, if you refer to something as *wicked*, I cannot know whether you consider it good or bad without contextual information about you and about the discourse. No utterance stands by itself, every utterance defines and is defined by every other utterance and its context.

Another important difference in the language model is that there is no link between the message referent and the external referent. The external referent, and its sender representation, are both analog; but the message referent has to be digital, because the message itself is digital. Yet somehow the correspondence between the analog sender referent and receiver referent has to be maintained. The translation process has to produce a sufficient, culturally agreed patterning at both ends of the communication, and it does this partly through the use of phatic contact and back-channel communication, and partly through context. However, it can never produce the fidelity of an analog signal. We can see this with generic words, like *bird*: it is unlikely that this evokes the same analog impressions in both sender and receiver, but they are similar enough to ensure that the word *bird* has common meaning to both. This is further complicated by the fact that the context of language is not all “here and now”, so the external referent identified by the sender may not be available to the receiver for checking. Thus we can see Jakobson’s missing features of communication (contact and context) at work in language in ways that are unnecessary in non-language communication.

These two process models, mapping the four referents, show that language and non-language communication are very different semiotic processes, but they do not give any indication as to how one model could metamorphose into the other. They emphasise the differences between the two methods of communication without emphasising their useful similarities. Yet there are common elements between the two models that indicate a commonality: the external referent, the sender meaning and referent, and the receiver meaning and referent, are all common in both models. We can therefore, returning to the original standard semiotics model (figure 1), identify the differences as occurring only in the message; but what would those differences be?

3. Language within Nonlanguage

Language is essentially a segmented communication process, even though certain vital parts of language communication are unsegmented. These include the all-important indicators of agreement: *yes* and *no*, and there are many other important utterances that are expressible in single signs, and which therefore appear to be outside of the segmentation process. Wray shows that this holistic feature of language is pervasive, and underlies many of our utterances today.¹²

However, 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 receiving the act (being seen). This structure expresses a primitive state which is recognisable in all human languages.

¹² Alison Wray, *Dual Processing in Protolanguage: performance without competence*. In *The Transition to Language*, pp113-137

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 human language. We can express this in the standard semiotic model as follows:

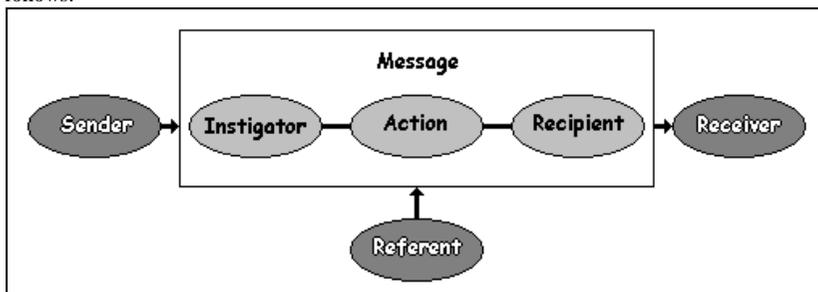


Figure 4 - The communication process model incorporating language components

There are two ways figure 4 can be compared to figure 1. The first is the discontinuous approach, identifying the segmented message components as present only in human language and therefore the product of a qualitative differentiation between non-language 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 nature of the instigator, action and recipient in a non-language message.

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 metamessages “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 metamessage, 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.¹⁵ 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 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

¹⁵ Dorothy L Cheney & Robert M Seyfarth, *How Monkeys See the World*, pp144-146

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 non-language 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 non-language 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 non-language communication, as is shown by the following variation of figure 1:

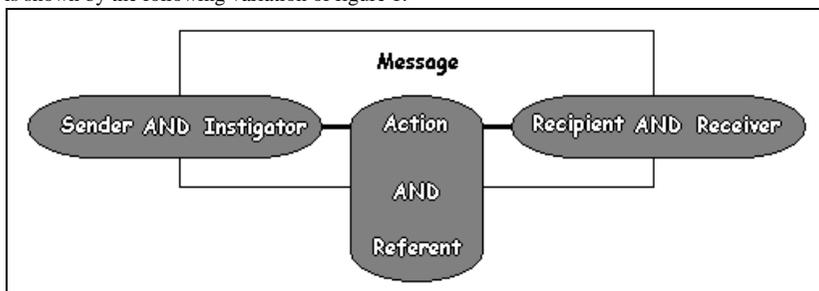


Figure 5 - The communication process model with language components co-identified

However, this leads on to the question: how did figure 5 become 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.

4. 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.¹⁴

However, selfishness is different to sense of self, which in turn is different to self awareness. Selfishness is a default state which 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, so it is trivial; 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.

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 any situation 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. However, in order to 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.

However, as soon as there is a sense of self then it is 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.

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 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 this escalation 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*,¹⁵ Pinker labels it *sentience*, giving it as one of the three definers of consciousness (the other two being *self-knowledge* and *access to information*),¹⁶ and Bruner calls it *the transactional self*.¹⁷ In this paper 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?

¹⁴ Richard Dawkins, *The Selfish Gene*, ch5

¹⁵ Michael Tomasello & Josep Call, *Primate Cognition*, pp337-338

¹⁶ Steven Pinker, *How the Mind Works*, pp134-136

¹⁷ Jerome Bruner, *Actual Minds, Possible Worlds*, ch4

This important and difficult question will be put to one side at present, but it will be addressed later in this paper.

The four stages of self-identification can be represented by a series of questions that are only poseable and answerable 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 must have intentionality, and I must have it, too; and if there is intentionality then there must be a “me” and a “you” to have it. It is comprehending this intentionality that poses such a problem for autistics.¹⁸

Self awareness is essentially a process that enables, and is used for, social judgement: it defines the things we can do with language, but it does not explain why we do them. 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.

The dual self image, the self-who-does and the self-who-knows, is prevalent throughout language. It is epitomised in modern English by reflexive forms, such as *I hate me* and *I hate myself*. A recent study by me indicates that these specific two forms do appear to have different roles in the identification of the nature of self.¹⁹

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.²⁰ 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

¹⁸ Simon Baron-Cohen, *The Essential Difference: men, women and the extreme male brain*, ch10

¹⁹ Martin Edwardes, I like Both Myself and Me. In *CamLing 2005: Proceedings of the University of Cambridge first postgraduate conference in language research*, pp233-239

²⁰ Kenan Malik, *Man, Beast and Zombie: what science can and cannot tell us about human nature*, p220

both of our minds, and this recursion is within the rules that enable language – as the Hauser, Chomsky and Fitch model predicts.²¹

The second question (or series of questions) that self awareness makes possible is speculation on the intentionalities of others to each other, with no direct reference to the self's own intentionality. The intentionality of other individuals is modelled as a relationship between them, not to identify strategies which are directly useful to me but to identify, simply, what is going on. It is the question that enables and informs the insatiable and disinterested curiosity of humans²².

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

- **Reflexion:** *what could I do if I were me?* The self-who-does can be manipulated by the self-who-knows.
- **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.
- **Anticipation:** *what should I do, knowing what you can do?* There is recursion between intentionalities.

The rather arbitrary four stages in theory of mind given above take us from a barely aware reactive state to the ability to anticipate the thoughts of others. 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.²³

Children are able to utilize a theory of mind because they are born with a theory of theory. They seem to understand implicitly the process of thesis-antithesis-synthesis which is the heart of human scientific method. They apprehend the world, make models of it, check those models against new realities as they arise and modify their models appropriately. Gopnik, Meltzoff and Kuhl call this “the scientist as child”, comparing the childhood modelling, which builds adult competence, with the human adult ability to continue modelling into adult life. Humans continue to play in the “mental gymnasium” throughout their lives.²⁴

The issue of self raises the issue of temporality: humans have an image of themselves as continuous with their past selves and future selves, but are also able to see the past and future selves as if they were other people. Obviously, according to the model, this is something that non-linguistic animals cannot do. They can have a sense of the continuity of the self, inasmuch

²¹ 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

²² Ian Stewart & Jack Cohen, *Figments of Reality: the evolution of the curious mind*, pp163-164

²³ Paul Bloom, *How Children Learn the Meanings of Words*, ch3

²⁴ Alison Gopnik, Andrew Meltzoff & Patricia Kuhl, *How Babies Think*, pp155-162

as survival is its own testament to continuity; but it is a trivial sense which only serves to inform the current self. The trick of seeing time as episodic through the eyes of past and future selves requires a mechanism for identifying those past and future selves. The model predicts that non-humans can see time as passing before the self, but they cannot see the self as passing through time.

5. From Nonlanguage to Language

Returning to figure 5, 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 action but the purpose of the tool is related to the outcome.

However, tool use is not communication and, if we use a modular model of the mind (epitomised by Fodor,²⁵ and Cosmides & Tooby²⁶), 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.²⁷ 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 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 in its existing role and has no spare capacity to take on a new role in a new module.

This is why Mithen had to abandon the modular approach to the mind in his explanation of the genesis of culture: according to Mithen, the *Homo sapiens* mind became a demodularised, despecialised, cognitively fluid device²⁸. However, 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 non-human communication and human language: segmented mental articulation used in problem-solving is exapted for use in physical articulation, and also allows segmented linguistic articulation –phonological, semantic and syntactic²⁹. 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 paper will tend towards the latter reasoning: modules are a useful explanation but not necessarily a model of reality.

It seems likely that many examples of non-communicative referent/action dislocation exist in nature, but the question remains, does it occur in communication? To show dislocation in

²⁵ Jerry A Fodor, Four Accounts of Mental Structure. In *The Modularity of Mind*, pp2-38

²⁶ Leda Cosmides & John Tooby, Cognitive Adaptations for Social Exchange. In *The Adapted Mind: evolutionary psychology and the generation of culture*, pp163-228

²⁷ Steven Pinker & Paul Bloom, Natural Language and Natural Selection. In *The Adapted Mind: evolutionary psychology and the generation of culture*, ch12

²⁸ Steven Mithen, *The Prehistory of the Mind: a search for the origins of art, religion and science*, ch9

²⁹ William Calvin and Derek Bickerton, *Lingua ex Machina: reconciling Darwin and Chomsky with the human brain*, ch11

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 gesture). But the elements would have to be individually identified with different meanings; they would have to be of two classes which are mutually exclusive; and there would have to be some, albeit very limited, replaceability of elements. In other words, there would have to be an identifiable referent/action syntax. The diana monkey “probably” boom preceding a warning signal is an example of a segmented signal that meets these requirements,³⁰ but it is not the only example. Chimpanzee begging behaviour, for instance, 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.³¹

A good example of referent/action dislocation is deliberate deception. A deceptive signal involves a dislocation of the referent and 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.³²

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 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:

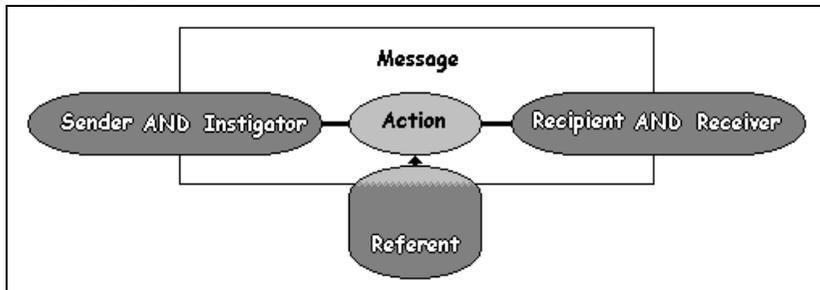


Figure 6 - The communication process model with dislocated referent and action

³⁰ James Randerson, Call of the Wild? In *New Scientist*, 30 March 2002, p10

³¹ Frans de Waal, *Good Natured: the origins of right and wrong in humans and other animals*, ch4

³² Michael Tomasello & Josep Call, *Primate Cognition*, ch8.1

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 separation. 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 syntax consisting of paired, mutually exclusive, classes: they tend to use fixed word order. When Kanzi started signing he was likely to sign *peanut hide* as *hide peanut*, but after a month he used the verb-object order almost exclusively.³⁵ Sarah displayed a similar understanding of word order when she was able to correctly answer questions like “is red on green?”³⁴ The Premacks do not take this as an indicator that Sarah has mastered 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 grammar at work in the comprehension of the constructs.

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.³⁵ 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.³⁶ We could propose that there are two parts to the two-word stage, involving the two types of syntax, but this poses its own problems: why are the two syntaxes necessary, where do they come from, and are they interrelated?

It is clear that referent/action syntax does not need to be symbolic. The referents can be purely indexical, with a one-to-many relationship between the sign and the thing referenced. The action can be iconic, represented by a single sign and only that sign. However, while iconic actions form a stable element, referents are easy to change to a symbolic form. A single referent sign can represent both the plural (a class of things) as well as a single, specific thing itself. An eagle warning can be intensified in the presence of more than one eagle, and the bee waggle dance becomes more insistent when signalling a larger food source³⁷. 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. On the other hand, if a sign represents a single action and only that action then 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)³⁸.

³⁵ Sue Savage-Rumbaugh & Roger Lewin, *Kanzi: the ape at the brink of the human mind*, pp160-161

³⁴ David Premack & Ann James Premack, *The Mind of an Ape*, pp114-119

³⁵ Kathy Hirsh-Pasek & Roberta Michnick Golinkoff, *The Origins of Grammar*, ch7

³⁶ Michael Tomasello, *Constructing a Language: a usage-based theory of language acquisition*, pp98-100

³⁷ James L. Gould & Carol Grant Gould, *The Honey Bee*, ch5

³⁸ Roger Fouts with Stephen Tugel Mills, *Next of Kin: my conversations with chimpanzees*, pp156-159

In contrast to this, we know that Instigator/Action/Recipient (IAR) syntax in human language is almost exclusively symbolic in all components. There has to be a mechanism which converts the one form of syntax into the other; or at least a mechanism which allows the referent/action (R/A) syntax to be represented in IAR syntax. The mechanism proposed here is the separation of the recipient of an action from that action, and its interchangeability with the referent in messages composed of two signs (R/R syntax). When expressed in language this transformation appears easy. Let us take, as an example, the vervet leopard warning:

	(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>		
Full IAR syntax	Instigator ₁ <i>(you)</i>	Recipient ₁ / Instigator ₂ <i>tree</i>	Action ₁ <i>climb</i>	Recipient ₂ <i>leopard</i>	Action ₂ <i>because-of</i>

Figure 7 - Transformations from a nonlanguage call to the language equivalent

In the 'Vervetese' line (which represents general communication) a single unsegmented call gives the whole message, while in the R/A syntax line the call has been dislocated so that action and referent are represented by separate signs.

The R/R syntax line hides 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 message 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 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 could you do if you were me?*

The Base IAR syntax line takes the theory of mind to the next level: *what would I do if I were you?* The sender is able to place others into the role of the instigator of the action. Further transformations are then needed to make the receiver explicit as recipient, and to demerge the main and subordinate actions to give Full IAR syntax. This level of syntax is represented by modern human language: the segmented message used in figure 7 can be reordered into the English imperative form *climb a tree because of the leopard*, or the instruction *you must climb a tree because of the leopard*.

Of the intermediate syntaxes, it is possible to see value in segmenting a call into referent/action. For instance, it becomes possible to associate the same action with different referents. However, this is an unlikely 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. 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 referent as recipient (R/R syntax), we still have only two segmented components in the message; so the action and referent must again be co-identified. The referent of the action is now identifiable within the action, it 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*. This gives us a process model as below:

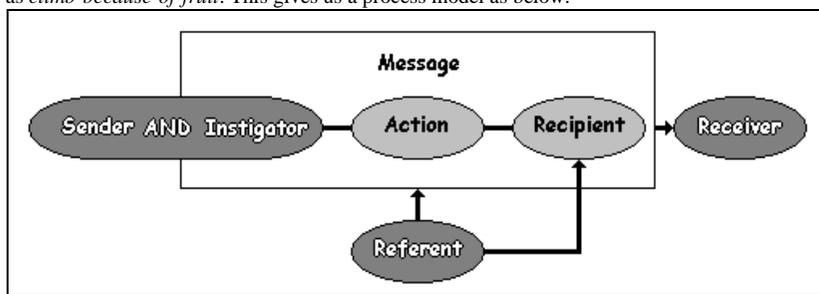


Figure 8 - The communication process model with dislocated recipient and receiver

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”: *Mary gave-a-book-to John*. *John* 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 John*, a construct which (like the model) has two components, the referent/action and the recipient.

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: 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 circumstance where this syntax has a purpose, although its purpose is not communicational: that circumstance is social grooming.

Example constructs for R/R syntax in grooming 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 message 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 state. Effectively, the meanings in the minds of the sender and receiver are different; but it is this difference of meanings which provides the mental constructs needed to establish an environment where social calculus can operate.

Grooming 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; and 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*.³⁹ However, it is important to note that the signals exchanged in grooming are unsegmented constructs. It is only within the minds of the grooming partners that segmented R/R syntax occurs; it does not occur between them.

6. Social Calculus and Syntax

For receiver/recipient dislocation (R/R syntax), we need to look at social animals and the social calculus that gives structure to their view of their society. However, social calculus 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

³⁹ JL Austin, *How to Do Things with Words*, Lecture V

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.⁴⁰

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 not within a communication environment.

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 (ticks are full of protein, much of it not their own). 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

⁴⁰ William H Calvin and Derek Bickerton, *Lingua ex Machina: reconciling Darwin and Chomsky with the human brain*, p129

what would I do if I were you? 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:

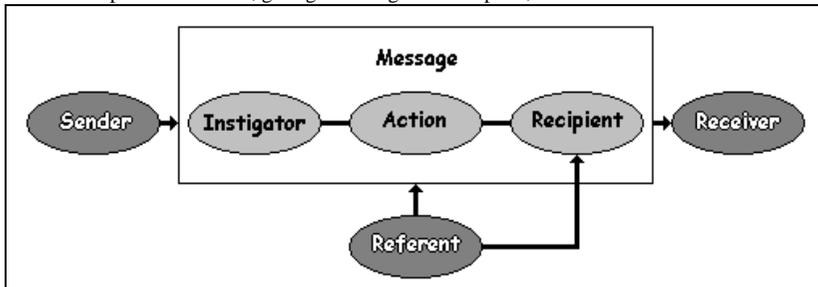


Figure 9 - The communication process model with sender and receiver dislocations

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 “boxes” in the matrix, the twenty-first member requires an extra twenty one “boxes”, 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 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 in modelling society 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 4 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 co-operative mechanism to separate the self into the self-who-knows and the 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.⁴¹ Here, the action is supplemented by a rehearsal stage and a review stage: the self-who-knows is able to practice 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.⁴² Leaving aside the considerable problems of co-operation and truth-values in gossip messages,⁴³ in order to convey meaning about others as instigators in a message 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 indicate 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.⁴⁴ 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.⁴⁵ 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 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 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 an item in the main triad, by a secondary action

⁴¹ Merlin Donald, *A Mind So Rare: the evolution of human consciousness*, p142

⁴² Robin Dunbar, *Grooming, Gossip and the Evolution of Language*, p5

⁴³ Camilla Power, Old Wives' Tales: the gossip hypothesis and the reliability of cheap signals. In *Approaches to the Evolution of Language*

⁴⁴ 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

⁴⁵ Ib Ulbaek, The Origin of Language and Cognition. In *Approaches to the Evolution of Language*, pp30-43

(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 four into three-plus-three-equals-five, 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"**]
becomes

STAGE 4: [**Sender="I"**] + **Instigator** + Referent/action + Recipient + [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 pre-existent social calculus, which 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. The most likely order of transitions and stages is, therefore, as given above.

7. Conclusion

The theory proposed in this paper 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. As Aitchison argues, the continuity-discontinuity dichotomy is more ideological than real.⁴⁶

⁴⁶ Jean Aitchison, On Discontinuing the Continuity-Discontinuity Debate. In *Approaches to the Evolution of Language*

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.

One model of social revolution not only allows both social stratification and separation of self-who-does from self-who-knows, it demands them. The female solidarity model espoused by Knight, Power and Watts⁴⁷ posits a cultural revolution in which women undertake two very different roles at different parts of a monthly cycle: during waning moon the women are wives and partners to men, during waxing moon they are monstrous in order to drive the men out to hunt. The women have to maintain two very different self-who-does personae, while the self-who-knows maintains the who, what and when of those personae. In addition, the women have to maintain a hierarchical and dichotomous model of their society: men and women are separated not just by sex but by group gender roles; men are further subdivided into family and mates; and women are subdivided into infertile and currently fertile, at least inasmuch as this difference has to be suppressed before the males. The collective aspects of the female solidarity are more significant than the individual aspects: hierarchy is everything.

The ritual would have to recognise the motivation of others, because the women are enacting the question *what would I do if I were you?* They try to change the model of what “you” (the men and animals) would do, by being them and changing their minds for them: the men must hunt, the animals must be caught. It is wish-magic or art-magic in action. However, self awareness is also evident in a different feature of the ritual: in order for the women to co-operate in the solidarity ritual they must put aside their selfness to present the solidarity – a single entity – to the men. But you can only put aside what you have: if selfness is being temporarily given up then there must be an awareness that the self exists. The women cannot give up their *sense of self*, any more than other animals can do so – the women remain individuals regardless of ritual; but they can give up their *sense of self as other* – the self-who-does and the self-who-knows can be treated separately.

If females wished to communicate with each other about aspects of this social model – and the collective nature of the model means that they would⁴⁸ – then they would have to use a communicative device that incorporated the same syntax as the social model. It would have to be hierarchical in terminology, and able to express statements about who did what to whom: it would require full IAR syntax. The female solidarity model also overcomes that other major problem of language communication: how to justify a system that is both volitional and truthful. The system has to be volitional, because every part of the segmented message can be replaced by a myriad of other parts; choice is intrinsic to the nature of segmented communication. And the system has to be truthful, because what is being expressed is part of a shared fantasy: agreement with externally verifiable reality is less important than agreement with the internally agreed “solidarity-reality”. Truth is, at every point in language, negotiable; but this does not mean that it has no value: agreement, co-operation and solidarity become their own, verifiable truth. Accuracy in the message itself becomes secondary to reliability as a member of the social group: the value of the message becomes subordinate to the value of the metamesages.⁴⁹

⁴⁷ Chris Knight, Camilla Power & Ian Watts, (1995). The human symbolic revolution: a Darwinian account. In *The Cambridge Archeological Journal*, 5(1), 75-114

⁴⁸ Chris Knight, Language and Revolutionary Consciousness. In *The Transition to Language*

⁴⁹ Deborah Tannen, *You Just Don't Understand: women and men in conversation*, pp.31-33

With segmented, digital communication the metamessage can contain information very different to that of the message. It is, therefore, not necessary for our every utterance to be verifiably truthful, we can often give more information, deliberately or accidentally, by lying. As a society, we create agreed fantasies like fiction, ceremonial, money, and even past and future. As Douglas Adams said: “time is an illusion; lunchtime doubly so”.⁵⁰ But it is those fantasies and illusions that form the largest part of our cultural environment, and we spend inordinate effort in enforcing these collective fantasies on recalcitrant realists.

From the viewpoint of the model set out above, language is a cultural solution to a cultural problem: how can individuals within the female solidarity model communicate about the model? The building blocks of the solidarity very likely had genetic causes, and those genetic causes are likely to be the causes of the theory of mind and social calculus that enable language. However, the need for language, and therefore language itself, arises not from genetic inevitabilities but from the culturally determined female solidarity.

References

- Adams, Douglas.** 1979. *The Hitchhikers Guide to the Galaxy*. London, UK: Tor Books.
- Aitchison, Jean.** 1998. *The Articulate Mammal: an introduction to psycholinguistics*. London, UK: Routledge.
- Aitchison, Jean.** 1998. On Discontinuing the Continuity-Discontinuity Debate. In *Approaches to the Evolution of Language* (eds: James R Hurford, Michael Studdert-Kennedy, Chris Knight). Cambridge, UK: Cambridge University Press.
- Austin, J L.** 1962. *How to Do Things with Words*. Oxford, UK: Oxford University Press.
- Barkow, Jerome H.** 1992. Beneath New Culture is Old Psychology: gossip and social stratification. In *The Adapted Mind: evolutionary psychology and the generation of culture* (eds: Jerome H Barkow, Leda Cosmides, John Tooby). Oxford, UK: Oxford University Press.
- Baron-Cohen, Simon.** 2003. *The Essential Difference: men, women and the extreme male brain*. London, UK: Penguin.
- Bickerton, Derek.** 1990. *Language and Species*. Chicago, USA: University of Chicago Press.
- Bloom, Paul.** 2002. *How Children Learn the Meanings of Words*. Cambridge, USA: MIT Press.
- Bruner, Jerome.** 1986. *Actual Minds, Possible Worlds*. Cambridge, USA: Harvard University Press.
- Calvin, William and Derek Bickerton.** 2000. *Lingua ex Machina: reconciling Darwin and Chomsky with the human brain*. Cambridge, USA: MIT Press.
- Cheney, Dorothy L & Robert M Seyfarth.** 1990. *How Monkeys See the World*. Chicago, USA: University of Chicago Press.
- Chomsky, Noam.** 1988. *Language and the problems of knowledge: the Managua lectures*. Cambridge, USA: MIT Press.
- Cosmides, Leda & John Tooby.** 1992. Cognitive Adaptations for Social Exchange. In *The Adapted Mind: evolutionary psychology and the generation of culture* (eds: Jerome H Barkow, Leda Cosmides, John Tooby). Oxford, UK: Oxford University Press.
- Crystal, David** (ed). 1997. *The Cambridge Encyclopedia of Language*, 2nd edition. Cambridge, UK: Cambridge University Press.
- Dawkins, Richard.** 1989. *The Selfish Gene*, 2nd edition. Oxford, UK: Oxford University Press.

⁵⁰ Douglas Adams, *The Hitchhikers Guide to the Galaxy*

- Donald, Merlin.** 2001. *A Mind So Rare: the evolution of human consciousness*. London, UK: WW Norton & co.
- Dunbar, Robin.** 1996. *Grooming, Gossip and the Evolution of Language*. London, UK: Faber & Faber Ltd.
- Eco, Umberto.** 1976. *A Theory of Semiotics*. Basingstoke, UK: Macmillan Press Ltd.
- Edwardes, Martin.** 2003. I like Both Myself and Me. In *CamLing 2003: Proceedings of the University of Cambridge first postgraduate conference in language research* (eds: Damien Hall, Theodore Markopoulos, Angeliki Salamoura, Sophia Skoufaki). Cambridge, UK: Cambridge Institute of Language Research.
- Fodor, Jerry A.** 1983. Four Accounts of Mental Structure. In *The Modularity of Mind*. Cambridge, USA: MIT Press.
- Fouts, Roger with Stephen Tukul Mills.** 1997. *Next of Kin: my conversations with chimpanzees*. New York, USA: Avon Books inc.
- Gopnik, Alison, Andrew Meltzoff & Patricia Kuhl.** 1999. *How Babies Think*. London, UK: Weidenfeld & Nicolson.
- Gould, James L & Carol Grant Gould.** 1988. *The Honey Bee*. New York, USA: Scientific American Library.
- Hauser, Marc D, Noam Chomsky & W. Tecumseh Fitch.** 2002. The Faculty of Language: what is it, who has it, and how did it evolve? In *Science*, vol 298, pp1569-1579.
- Hirsh-Pasek, Kathy & Roberta Michnick Golinkoff.** 1996. *The Origins of Grammar: evidence from early language comprehension*. Cambridge, USA: MIT Press.
- Jakobson, Roman.** 1987. *Language in Literature*. Cambridge, USA: Harvard University Press.
- Knight, Chris, Camilla Power & Ian Watts.** 1995. The Human Symbolic Revolution: a Darwinian account. In *The Cambridge Archaeological Journal*, 5(1), 75-114.
- Knight, Chris.** 1998. Ritual/Speech Coevolution: a solution to the problem of deception. In *Approaches to the Evolution of Language* (eds: James R Hurford, Michael Studdert-Kennedy, Chris Knight). Cambridge, UK: Cambridge University Press.
- Knight, Chris.** 1999. Sex and Language as Pretend Play. In *The Evolution of Culture* (eds: Robin Dunbar, Chris Knight, Camilla Power). Edinburgh, UK: Edinburgh University Press.
- Knight, Chris.** 2002. Language and Revolutionary Consciousness. In *The Transition to Language* (ed: Alison Wray). Oxford, UK: Oxford University Press.
- Malik, Kenan.** 2000. *Man, Beast and Zombie: what science can and cannot tell us about human nature*. London, UK: Phoenix.
- Mithen, Steven.** 1996. *The Prehistory of the Mind: a search for the origins of art, religion and science*. London, UK: Phoenix.
- Pinker, Steven & Paul Bloom.** 1992. Natural Language and Natural Selection. In *The Adapted Mind: evolutionary psychology and the generation of culture* (eds: Jerome H Barkow, Leda Cosmides, John Tooby). Oxford, UK: Oxford University Press.
- Pinker, Steven.** 1994. *The Language Instinct*. London, UK: Penguin.
- Pinker, Steven.** 1997. *How the Mind Works*. London, UK: Penguin.
- Power, Camilla.** 1998. Old Wives' Tales: the gossip hypothesis and the reliability of cheap signals. In *Approaches to the Evolution of Language* (eds: James R Hurford, Michael Studdert-Kennedy, Chris Knight). Cambridge, UK: Cambridge University Press.
- Premack, David & Ann James Premack.** 1983. *The Mind of an Ape*. London, UK: WW Norton & co Ltd.
- Randerson, James.** 2002. Call of the Wild? In *New Scientist*, 30 March 2002.
- Savage-Rumbaugh, Sue & Roger Lewin.** 1994. *Kanzi: the ape at the brink of the human mind*. New York, USA: John Wiley & sons inc.
- Stewart, Ian & Jack Cohen.** 1997. *Figments of Reality: the evolution of the curious mind*. Cambridge, UK: Cambridge University Press.

- Tannen, Deborah.** 1990. *You Just Don't Understand: women and men in conversation.* London, UK: Virago Press.
- Tomasello, Michael & Josep Call.** 1997. *Primate Cognition.* Oxford, UK: Oxford University Press.
- Tomasello, Michael.** 2003. *Constructing a Language: a usage-based theory of language acquisition.* Cambridge, USA: Harvard University Press.
- Ulbaek, Ib.** 1998. The Origin of Language and Cognition. In *Approaches to the Evolution of Language* (eds: James R Hurford, Michael Studdert-Kennedy, Chris Knight). Cambridge, UK: Cambridge University Press.
- de Waal, Frans.** 1996. *Good Natured: the origins of right and wrong in humans and other animals.* Cambridge, USA: Harvard University Press.
- Wray, Alison.** 2002. Dual Processing in Protolanguage: performance without competence, In *The Transition to Language* (ed: Alison Wray). Oxford, UK: Oxford University Press.
- Zahavi, Amotz & Avishag.** 1997. *The Handicap Principle: a missing piece of Darwin's puzzle.* Oxford, UK: Oxford University Press.