# The Evolution of Language and Human Rationality

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Language evolved not just by natural selection, but partly by sexual selection for the display of superior intelligence. This accounts for the uniqueness of human language: other species have not faced the same sexual selection pressures. If language is to be used to display intelligence and compete for mates, then it needs to be accompanied by other mental facilities: a fast Theory of Mind (to converse) and social emotions (to seek high status within a group, to find a mate). So language underlies a less rational side of human nature – our irrational emotions, and the harm we may do to ourselves and others.

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## 1. Introduction

The human mind is a prodigious pattern-matching engine. Throughout our lives, we learn thousands of patterns, and we rapidly retrieve them to match them to whatever we are experiencing. We think of language as part of this pattern-matching ability – matching the sounds of words, to understand what we hear. Language is seen as a benign, neutral medium for creating and expressing ideas – a wholly beneficial adaptation of the human mind. This narrow view of language is shown in figure (1a).

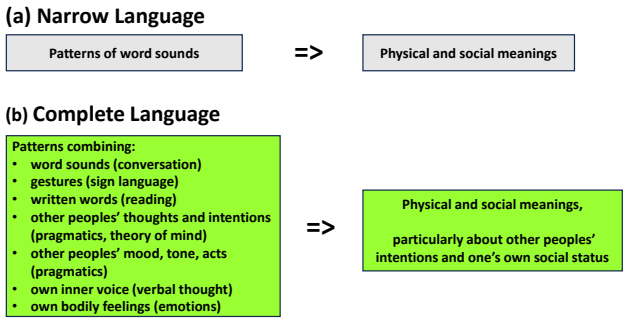


*Figure 1: a narrow view of language, and a more complete view of language*

This narrow view of language has arisen from the academic study of syntax and semantics – which are intellectually purer aspects of language. Looking at the many uses of language suggests a more complete view. Language is more pervasive, and language pattern matching is more wide-ranging, encompassing all the patterns of figure 1(b). Language is not just the benign, neutral medium we have taken it for; its influence is more profound, and not always beneficial. I suggest that the reasons for this lie in the evolutionary origins of language – which involve sexual selection. Understanding these origins can help us understand the role language plays in our lives, and how it is linked to a darker, less rational side of our nature[1].

## 1. Language Evolution and Sexual Selection

There are many theories about how human language evolved, described in previous proceedings of this conference, and in (Christiansen & Kirby, eds, 2003). These have two difficulties (Szamado & Szathmary 2006):

A. They do not account for the uniqueness of human language. If mankind has expressive language and high intelligence, why has no other species evolved a similar capability?
B. In most accounts, the fitness benefits brought by language in a natural habitat are not sufficient to offset the large metabolic costs of our expanded brains.

An account of language evolution through both sexual selection and natural selection can address these problems.

Sexual selection (Lande 1981; Maynard Smith 1982) is very widespread. It creates much of the diversity and vivid profusion of nature, such as birds' plumage or flowering plants. (Worden 2022) has proposed a hybrid account of the evolution of language, in which both natural selection and sexual selection have played a part. In this account, superior intelligence became a sexually attractive trait in *Homo Sapiens*, needed by both sexes to attract a mate (Miller 2002); and complex language evolved as the primary way to display intelligence. This hybrid account does not conflict with accounts of language evolution by natural selection. For a full account, see (Worden 2022). In short, both of the difficulties (A) and (B) are addressed by sexual selection:

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- (A) Sexual selection leads to species-unique traits, because it acts in a unique way within each species;

[1] Due to limitations of space, some key concepts in this paper are only briefly described. By the time of the conference, a fuller version of the paper will be posted on arXiv, and on ResearchGate

- (B) Sexual selection is a process of runaway positive feedback, leading to exaggerated traits and handicaps, such as the peacock's tail, or the metabolically expensive human brain

If language evolved for the display of intelligence, to be sexually attractive and to gain high social status (in order to get a mate), some key properties of language follow:

a) It must be accompanied by high general intelligence, in order to be impressive (our enlarged brains)
b) Intelligence is displayed through conversation; the skills of conversation are a key part of language (pragmatics)
c) To impress, our speech must be fast and expressive (prodigious)
d) To impress another person in conversation, you need to know what they think, know and do not know (the Theory of Mind, or ToM)
e) You need to read their intentions though their gestures, tone of voice, and facial expressions – as well as their words.
f) To gain high status (in other peoples' eyes), requires inferring what they think about us
g) Our concept of ourselves is defined by what we think other people think about us (self-esteem)
h) To make our conversations more impressive, we rehearse them internally (verbal thought)
i) We monitor our changing self-esteem through our bodily feelings (emotions)

This helps to understand all the pattern-matching we use in language - the complete language of figure 1(b), not just the narrow language of figure 1(a). It shows that language is deeply linked to our self-esteem and emotions.

## 2. The Patterns of Complete Language

Research on language learning has focused on a narrow view of language - how we learn syntax and semantics, so we can understand the words we hear, and express what we mean. Syntax and semantics will not be discussed further, except to say that they use pattern-matching (technically, unification); the patterns are learnt from early childhood, and they are applied rapidly and pre-consciously. On hearing hear any utterance, we do a lot of pre-conscious pattern matching, before being consciously aware of its meaning.

I focus on the other pattern-matching in the complete language of figure 1(b). The first use of language is in conversation. To impress other people, we need to be fluent conversationalists – able to take our conversational turns within a fraction of a second (Levinson & Torreira 2015), to infer the relevance of what someone

has said (Sperber & Wilson 1986), and to infer our partner's conversational intent from what they say, and from the context. These pragmatic skills require mind-reading – a Theory of Mind (ToM), to infer what the other person in a conversation may be thinking (Sperber & Wilson 2002); so that a shared cooperative intent in the conversation is part of the common ground (Stalnacker 2002, Tomasello 2014). The ToM skill may be learnt as conversational patterns, similar to the pattern learning that we use to learn the meanings of words; and the ToM is applied in conversation by fast, pre-conscious pattern matching.

So we learn a Fast Theory of Mind – an ability to infer rapidly what a conversational partner is thinking, feeling and intending, from what they say and from the context. This includes what they are thinking about our selves. The human sense of self emerges largely as a sense of 'what I think the other person is thinking about me'. This becomes the self as measured against the social norms of the group – seeing oneself in the mirror of other peoples' assessments.

The need to impress others is linked to a need to obtain high social status within a group, in order to get a mate. Our self-perceived social status is a ToM assessment of 'what I think other people think of me'. In conversation, we track that assessment, and choose what we say to maximise it. Part of this is to feel unpleasant emotions – bodily feelings that are triggered when our self-esteem is threatened - and to use those emotional feelings to guide what we say, to bolster our self-esteem when necessary. This requires us to learn the patterns of our bodily feelings arising from emotions, and to use them to guide our conversation. This fast pre-conscious pattern matching may be like the pattern matching we use to learn words and the ToM. These learnt patterns of bodily feelings are all parts of language.

In summary, complete language (figure 1a) requires us to learn thousands of complex patterns, involving word sounds, the inferred mental states of others, and our own bodily feelings. These are shown in figure 2.

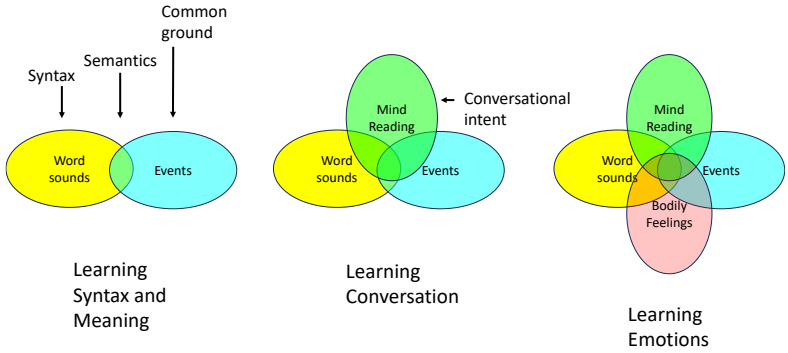


*Figure 2: Three components of language learning, which are needed to use language to display intelligence.*

As early as three years of age, a child learns many complex patterns, in all four quadrants of the picture (Bloom et al. 1993; Fletcher & McWhinney 1996). Human speech and thought works by fast, pre-conscious matching of these patterns. That makes the human mind a very complex dynamical system – and not always a rational one.

### 3. Consequences of Language for Human Nature and Rationality

To make our conversations fluent and impressive, we mentally rehearse them. This is the origin of verbal thought. As we think, we are consciously aware of the sounds of the words, and we remember them. Later recall enables us to construct extended chains of thought, and is the basis of our rationality (Pinker 2021).

When rehearsing conversations as verbal thoughts, we have in mind who the audience might be. As we think, the ToM patterns that we have learnt are matched, and we infer what the audience will think – their reactions to our words. In much verbal thought, there is a '**shadow audience'** in our minds, and we constantly infer what they will think about what we are thinking and might say. The shadow audience may be a specific person, but often it is a group, such as 'my parents' or 'the neighbours' or 'my peers at work'.

The influence of the shadow audience on our thought is pervasive:

1. The many ToM patterns which we learn in conversations match sense data (what the other person says, contextual cues). Those patterns work well enough to sustain a conversation (Levinson 1983). When the same ToM patterns are matched in our private thoughts, there is no feedback

from another person; so as a guide to what other people think, the patterns are less reliable.

2. Much of what we infer is about ourselves: 'what my shadow audience thinks of me'; if that is negative, lower self-esteem triggers negative emotions. These are consciously felt in the body, leading to further thoughts and emotions.

So while verbal thought enables us to construct and critique long chains of reasoning, supporting our rational thought (Mercier & Sperber 2017), it also triggers self-esteem reactions though ToM patterns. These patterns, in the absence of input from others, are unreliable and irrational. Our sense of self, being based on unreliable inferences about 'what other people will think of me' is a second-hand and impoverished sense of ourselves – like viewing ourselves in a cracked mirror.

ToM patterns triggered by bodily feelings can lead to cascades, in which we first feel some emotion as a bodily feeling; then, using ToM patterns, we unreliably infer what our shadow audience will think of us if we show that emotion. This triggers further emotions, and further words as we try to counter negative self-esteem. These cascades may be the cause of the volatile, unpredictable, and irrational nature of human emotions. They are driven by ToM 'shadow audience' patterns which are learnt from an early age, and may never be un-learnt.

The need to impress other people leads to group-think and tribalism. If some opinion is held within a group, and is affirmed in conversations, then we think we will achieve high status in the group by agreeing with it. We do this in our private thoughts, which are rehearsed conversations; self-esteem is enhanced by the inferred agreement of a shadow audience. It then matters more that some opinion should agree with a group opinion, than that it fits the facts and evidence. This is group-think. Acceptance in the group is enhanced by a negative view of other groups. This leads to tribalism and rejection of out-groups, reinforced by group-think. These are some of the irrational forces that may cause people to mistreat and harm other people – man's inhumanity to man. They start with language.

## 4. Conclusions

The human mind is partly rational, partly irrational. Our irrationality has caused immense harm over the ages, and continues to do so. With the growing power of technology, now more than ever we need to understand our own irrationality. This paper suggests that our rationality and irrationality both spring from the same origin – our use of language to display superior intelligence. The same fast pattern matching, which enables us to understand the words we hear, also drives our self-esteem and emotions, sometimes in harmful ways. It is a scientific priority to understand the origins of human irrationality. This paper is an attempt to do so.

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