

Language Evolution

Gricean intentions meet Lewisian conventions

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“... it does not appear altogether incredible, that some unusually wise ape-like animal should have thought of imitating the growl of a beast of prey, so as to indicate to his fellow monkeys the nature of the expected danger. And this would have been a first step in the formation of language”.

Charles Darwin (1871, p. 45)

How might symbolic language have evolved?

- Project: cognitive costs & benefits of language
- Method: thought experiment
- Task:
 - ...as *coherent* a story as possible,
 - *compatible* with the empirical evidence,
 - as little *explanatory gaps as possible*,
 - invokes *scientifically acceptable mechanisms*,
 - does *not posit* capacities that could not ...

Outline

- natural signs, animal signals, symbols
- features that symbols have and signals lack
- paleo-fiction
- Paul Grice's model of communication
- David Lewis' account of conventions
- summary

Natural signs

“...events and conditions that derive their indicative powers, not (as in the case of symbols), from us, from our *use* of them to indicate, but from the way they are objectively related to the conditions they signify”.
(Dretske 1988, 54)

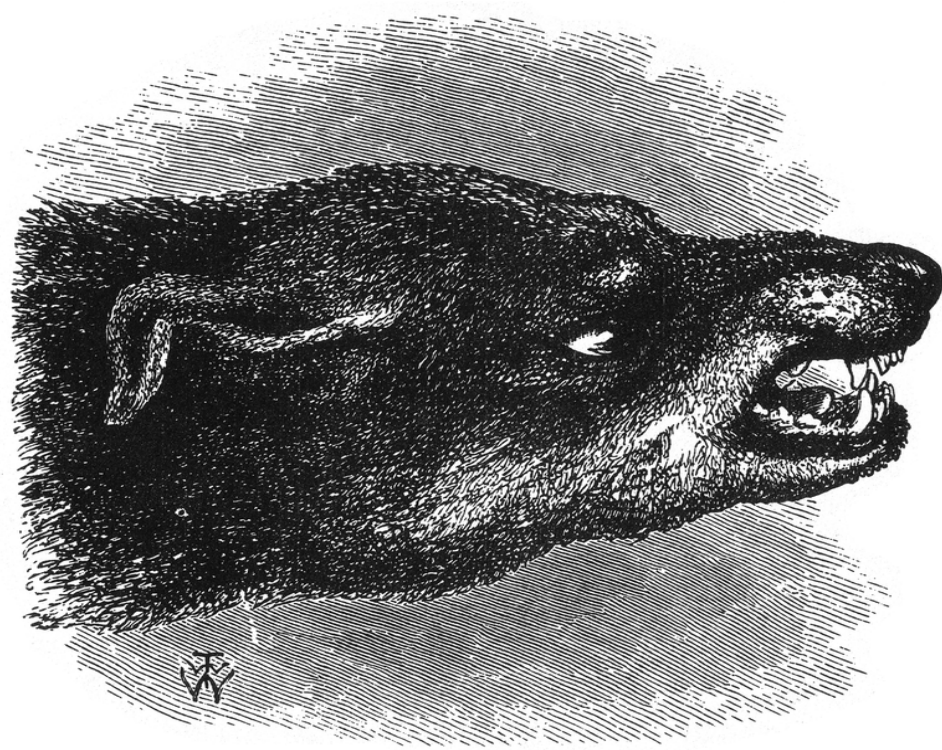
A natural sign reliably indicates a particular state of the world as it reliably correlates with that state.

... who comes to learn about the reliable correlation, thereby learns to ‘understand’ or ‘interpret’ them *as* signs.

Signals

A *signal* has been defined as “any act or structure which alters the behavior of other organisms, which evolved because of that effect, and which is effective because the receiver’s response has also evolved”.
(Maynard Smith and Harper 2003, 3)

Signs turn into signals...



Social calls

“...ontogenetically ritualized intention-movement gestures” (Tomasello 2008, 23).

“...signals are basically abbreviations of full-fledged social actions, and they are almost always dyadic in the sense that the communicator is attempting to influence the behavior of the recipient directly ...” (ibid.).

“...rest on the natural tendency of recipients to anticipate the next step in an action sequence...” (ibid.)

Alarm calls

Vervet monkeys give alarm calls in response to leopards, eagles and snakes that differ acoustically ... (cf. Cheney/Seyfarth 1990).

“... vocal production is highly constrained” (Seyfarth/Cheney 2012, 60).

...audience effects (Clay/Zuberbühler 2012; 2014).

...orang-utans even modify their signals if they haven't been fully understood (Zuberbühler 2012, 72-3).

Campbell monkeys modify alarm calls ... (Collier et al. 2014; cf. Engesser et al. 2016).

Distinguishing features

- **Compositionality**
 - ... some evidence that signals can be combined and morphologically (as well as phonetically) modified. Whether these complex signals exhibit genuine compositionally is less clear...
 - Symbols can be – subject to certain qualifications – compositionally combined.

Distinguishing features

■ Flexibility

- a) being able to abstain from producing the signal in the *presence* of a trigger
- b) being able to *voluntarily* produce the signal in the *absence* of a trigger
- Symbols are at our disposal.
- ...allows us to go *offline* and to exert cognitive control.

Distinguishing features

- **Context/function-(in)dependence**
 - Signals usually have one urgent function, e.g., to help escape predators. They are bound to a particular context of use and meaningful in that context only.
 - Symbols can be meaningfully used in different kinds of contexts and for different kinds of purposes.

Distinguishing features

- **Guiding behavior vs. influencing minds**
 - Signals evolve as means of influencing behavior. They are ‘correctly interpreted’ by being appropriately reacted to...
 - Symbols are a means of influencing minds. Their interpretation does usually not require a particular behavioral reaction on the part of the addressee.
 - ...and mind-reading has become a popular pastime ever since.

Paleo-fiction

“... if humans got language, they can only have got it because they had some pressing need for it“ (Bickerton 2009, 25).

“We need numbers, as many as we can get. And we need them now” (ibid., 158).

Recruitment may be the key to language evolution. (cf. ibid., 132).

Only by *recruiting* as many group members as possible do we have a chance of fighting back competitors...

Recruitment

- (i) We might point in the direction where the mammoth is to be found. Given that apes don't point much, it is not clear whether pointing gestures where at our ancestors' disposal.
- (ii) We might produce a natural sign that is somehow 'naturally' related to mammoths (tooth) ... That presupposes a certain understanding of proxy relations, something our closest relatives are not very good at either.
- (iii) We might produce an iconic sign that somehow resembles what it denotes (Bickerton 2009, 159-60).
...presupposes mimetic skills (Donald 1998, 49).

Pushmi-Pullyu representations

They are descriptive and directive at the same time, “used to co-ordinate behavior among conspecifics. Danger signals, for example, tell in one undifferentiated breath when there is danger nearby and when to run or take cover”. (Millikan 2006, 119)

Communicative attempts

At first, I just might have the intention (1) to urge you to join me...

Sharing information becomes a means to an end that we both benefit from.

We both begin to *intentionally* inform others – to form *communicative intentions*.

... you have to understand that my action is an *attempt at communicating* in the first place, that it is an attempt at ‘signalling signalhood’ (Scott Phillips et al. 2009).

Grice' analysis of meaning_{nn}

“U meant something by uttering x” is true iff, for some audience A, U uttered x intending:

- A to produce a particular response *r*
- A to think (recognize) that U intends (1)
- A to fulfill (1) on the basis of his fulfillment of (2). (Grice 1989, 92)

The speaker intends to produce a response in the audience due to the recognition of his intentions.

The problem of honest communication

“If information has any value, it is in the interest of no one to give it for free. And if information has no value, why are there ears ready to listen to it?”
(Desalles 2014, 284).

“...it arose in the context of mutualistic collaborative activities...” (Tomasello 2008, 170)
...exerts a selection pressure favoring language-apt creatures.

Iconicity

You not only need to understand *that* I am trying to communicate but also *what* I am trying to communicate.

What better could I do than try to imitate the noises and movements made by the mammoth – maybe with an accompanying pointing gesture

... “to see my gesture as communicative and as relevant to our current activity” (Tomasello 2008, 203).

Coordination problems

Suppose that we want to meet at a restaurant. Neither of us cares whether we meet at Charlie's Pub or to Stefano's Trattoria—as long as we manage to meet. We have a coordination problem in David Lewis' sense as the situation meets the following two criteria:

- (i) our relevant interests coincide; and
- (ii) there is more than one equilibrium (Lewis 1969)

Payoff matrix

me/you	Trattoria	Pub
Trattoria	5, 5	0,0
Pub	0,0	5,5

“An assignment of strategies to players is a Nash equilibrium iff no agent can improve his payoff by deviating unilaterally from it. An equilibrium is *strict* iff each agent *decreases* his payoff by deviating unilaterally from it” (Rescorla 2017, 10).

Signaling problems

The speaker observes a state of the world and sends a signal; this is the speaker's contingency plan (strategy). The addressee observes the signal and then acts upon it; this is the addressee's contingency plan (strategy).

“... signals are not endowed with any intrinsic meaning. If they are to acquire meaning, the players must somehow find their way to information transmission. ... [W]hen transmission is perfect, so that the act always matches the state and the payoff is optimal, Lewis calls the equilibrium a *signaling system*” (Skyrms 2010, 7).

Contingency plans

- Fc_1 : If you observe a dead mammoth, send signal S1.
If you observe a lion, send signal S2
- Fc_2 : If you observe a dead mammoth, send signal S2.
If you observe a lion, send signal S1.
- Fa_1 : If you observe signal S1, leave the cave and meet the speaker outside.
If you observe signal S2, hide in the cave.
- Fa_2 : If you observe signal S2, leave the cave and meet the speaker outside.
If you observe signal S1, hide in the cave.

Payoff matrix

C/A	Fa ₁	Fa ₂
Fc ₁	5, 5	0,-10
Fc ₂	-10,0	5,5

„... as any convention whereby members of a population P who are involved (...) in a certain signaling problem S do their part of a certain signaling system $\langle Fc, Fa \rangle$ by acting according to their respective contingency plans. If such a convention exists, we also call $\langle Fc, Fa \rangle$ a *conventional signaling system*“ (Lewis 1969, 135).

How signals acquire meaning...

...a signal acquires meaning by repeatedly and successfully contributing to solving a coordination problem

...as that will “help to resolve ambiguity” (Lewis 1969, 40).

These early signals are ambiguous between signals-that and signals-to (ibid., 144).

If the sign comes to be used iff a dead mammoth is present, and listeners will begin to act as though that is the information conveyed ...

... Slowly, the sign will acquire a more context/function-independent meaning.

The problem of equilibrium selection

- explicit agreement
- precedent
- chance
- salience (Lewis 1969, 35)

But suppose I had used an iconic sign...

...mightn't I thereby have dramatically increased the chances of your coming to understand...?

...symmetry-breaking.

The storyline

- At some time in history our ancestors began to use signs to **recruit** conspecifics and to **inform** them ...
- That required a certain level of **cooperation**...
- ...thereby solved **coordination problems**.
- These signs were **iconic** at first so as to help with the problem of **equilibrium selection**...
- Yet then our ancestors began to use them more **flexibly**...
- And this is where all the **trouble** began...

Thank you

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