Do animals have language?

Communication in the animal kingdom

Language vs communication

- Language is not identical with communication
- There are many other communicative tools such as
  - Turn-taking
  - Intonation
  - Gesture (body language)
  - Eye gaze control
  - Touch
  - Displays: external objects, including jewelry, tattoos, clothing, cars

Language vs communication

- We have also discussed other communicative tools such as
  - ability to understand and use appropriateness rules, including the Gricean maxims (i.e. of how conversation works)
  - understanding of 'speech acts'- what speech can and is used for; the difference between a command, a request, a promise, a reminder, a joke, irony, sarcasm, a metaphor, a curse, and how these can be conveyed indirectly
  - comprehension of reference- that communication refers to things

What is communication?

- There are many definitions of communication
  - Many of them are problematical because they use terms which are as complex and difficult to define as 'communication'-
  - i.e. 'the transmission of symbols', where the problem of how to define a symbol looms

E.O Wilson's definition

- In his book 'Sociobiology' (1975) E.O. Wilson wrote:
  "Communication occurs when the action or cue given by one organism is perceived by and thus alters the probability pattern of behavior in another organism in a fashion adaptive to either one or both of the participants." (p. 111)
- There is thus the idea of causal influence as the result on one organism's behavior on another organism
- This definition is tied into a mathematical definition of information (Shannon and Weaver, 1949) as a reduction in uncertainty

M. Hauser's definition

- In his recent book on communication, Marc Hauser suggested that we should draw distinction between two different forms of communication: cues versus signals
  - **A cue** is a regularity that is permanently 'on'
    - e.g. a rock in our path cues us, as does the sun when it rises in the east
  - **A signal** is more plastic, and can be turned on and off in response to ecologically-relevant cues in the environment
    - e.g. a warning cry issued in response to the appearance of a dangerous predator

Innate versus cultural cues

- In the biological world, Hauser's interest was in underscoring that cues typically correspond to phenotype- the way our genes our expressed, in our appearance and behavior
- For example markings which allow a male to recognize a suitable mate of the same species by markings on the female is using cues and so is an animal that warns off predators by its colouring
- Signals may be innate or cultural

How common is communication?

- **All** animals have a biologically-based semantics of signals: they need to, in order to be able to identify the relevant aspects of the four f's of biological semantics: fleeing, fighting, feeding, and fornication.
  - In mammals these are largely subcortical
  - In humans we can still see this in the strange hold these have over us- people's cortically-mediated rationality disappears in many situations in which one of the four f's places an overwhelming demand on us

Selecting signals

- In all animals there must be a system for deciding between signals relevant to more than one f's when they overlap
  - Usually it is just interrupt-driven: whatever happens latest has priority- you can stop cats from having sex by throwing a boot at them
  - More rarely is there an opportunity to play one against the other
  - When there is, calculations comes into play
  - To decide between multiple f's we need a calculator which can weight each one and 'turn off' the automaticity
  - We need some tissue which can suppress the automatic fear response in order to allow access to hunger or sex, or which can differentially weight the possible signals

What about human communication?

- We do have many cues
  - E.g we have many sexually-relevant cues: secondary sexual characteristics that are visible all the time, and ostentatious unnecessary displays of wealth like gold chains and Porsches
- We can issue signals without language
  - This is what allows aphasics and pre-linguistic infants to communicate
  - A small infant in pain can issue a cry of distress that is immediately and unequivocally different from a less-urgent cry of hunger or tiredness

From animals to humans

- There is (debatably) no characteristic of human language that is not seen in some analogous form in other animals
- What differentiates humans from animals is mainly the flexibility, the complexity, and the large number of characteristics that are brought to bear on communication by humans
- However, two characteristics that seems key: predication and recursion

Predication

- What is the main difference between the signal system that we have called language and the other signal systems we use?
  - **Predication: The ability of a signal to 'take an argument'**
  - We use many signals which modify signals, or (what amounts to the same thing) language users can use signalled information to select between different signal interpretation systems
- Animals have very little predication
  - We've seen one example: Bateson's play
  - The most unequivocal source comes from an unexpected source: Anyone know where?

Recursion

- Recall that a key aspect of syntax was recursion: the ability of a function to work on its own output, or the definition of a function in terms of itself
- Recursion allowed us functions (= rules) like:
  - S → Either S or S
  - S → If S then S
- This kind of self-referentiality- in which an object (here, a sentence) is defined in terms of itself- is *recursion*
- Recursion allows for very tightly defined functions, which simplify complex calculations by defining them in terms of simpler cases.
- There is no good animal analogue of recursion: all animal communication streams can be defined without it

Birds as a model

- Some believe that birds are a better model of human language than apes:
  - Both have *learned* different dialects in different populations
    - Some primates have different dialects, but under genetic control
  - Both learn structure, not just meaning, of call
  - Both learn from adults
  - Both have critical period
  - Both have built-in biases to guide the learning process

Why birds?

- Marler (1987) suggests that birds have relatively complex communication because they have migratory patterns and needed to be able to adapt and identify themselves in different areas
  - Primates are more sedentary than bjrds, so there has been little selection for malleable vocal learning
  - This suggests the possibility that language may be related to migration patterns: that language became likely when we started moving out of the jungles into the savannas (forcing more complex/subtle/rich representations)

Studying animal semantics

- Most animal semantic studies use the playback method: play back a sound and see if it has the desired effect
- Quine's 'gavagai' problem- we can't tell what the animal really thinks it means
  - i.e. California ground squirrels use aerial/terrestial signal for distant/urgent terrestial predators
  - i.e. macques use the same 'pleasure calls' for ripe figs and sunny after a rainy period or rain after a sunny period

Was the 'water bird' real?

HaloMyBaby: Is Koko aware that she's chatting with thousands of people now?

LiveKOKO: Good here.

DrPPatrsn: Koko is aware.

Was the 'water bird' real?

Question: Do you like to chat with other people?

[…]

LiveKOKO: fine nipple

DrPPatrsn: Nipple rhymes with people, she doesn't sign people per se, she was trying to do a "sounds like..."

Conclusion

- All animals communicate, some in complex ways
- Only by using the most stripped-down definition of language can we say that any non-human animal has or can learn language
- No non-human animal can come close to a 2.5-year old human on any measure one cares to define: vocabulary size, range of expression, mean utterance length, range of syntactic mastery, range of predication, ability to use logical markers etc.