The ontology of language:

What is it to be a language?

What is ontology?

- Ontology (from Greek word, meaning “to be”): The science or study of being; that department of metaphysics which relates to the being or essence of things, or to being in the abstract.

Overview

- What is being?: 4 aspects of ontology, after Aristotle
- What is language?
  - David Premack’s 8 pre-requisites for language
  - Some other characteristics of human spoken language
- 4 evolutionary constraints on language

What is being?

- Aristotle identified four kinds of causal explanation (often re-invented by others since)
- They define 4 (simultaneously applicable) ways of describing what any object is:
  1. Material description
  2. Formal description
  3. Efficient description
  4. End description

Material description

- A material description of X tells us what X is made of
  - In language, material descriptions will focus on:
    - the structural components of language
      - Phonemes (elementary sounds); morphemes (elementary sound/letter combinations); words (morpheme combinations); phrases (word combinations); sentences (phrase combinations) and texts or discourses (sentence combinations)
    - the biological means of producing those components
      - Motor ‘gestures’ (minimal motor features)

Formal description

- A formal description of X is the form or structure of what X is trying to be
  - In language, formal descriptions have tried to capture algorithmic rules by which elements (phonemes, words, morphemes, phrases, stress patterns) can combine with each other
  - Noam Chomsky famously emphasized this aspect of language by emphasizing linguistic competence (what one was capable of) over ability (what one actually did)
Efficient description
• An efficient description of X is a description of the way X is actually made, in terms of the tools used and the way it was put together by its maker.
  – In language, efficient descriptions will focus on (social, developmental, neurobiological, and genetic/evolutionary) historical forces that shape the way any particular language came to be.

End description
• An end description of X is a description in terms of the purpose of X; what it is intended to do.
  – In language, end descriptions focus on what language can do: what it means to communicate.
  – It may also focus on less obvious purposes: some have postulated that language plays a role on cognitive enhancement (allowing us to think in ways we could not otherwise think); in social cohesion; in the nature of human consciousness.
  • Might communication be (more or less) epiphenomenal: a secondary purpose that was made possible by the primary need for a system of structured cognition or social cohesion?

8 pre-requisites for language

i.) Classification ability
• An animal can only name things that can be distinguished
  – Language is thus predicated upon having a rich perceptual ontology: a need & ability to distinguish between many different perceived elements
  – Terry Deacon: ‘There are no simple languages’

ii.) Causal Inference
• Language is only a useful tool insofar as it departs from the directly-perceptible present
  – Naming the obvious is useless: We will return to this issue when we discuss the ‘noun bias’ in language development
Now: That should clear up a few things around here!

**ii.) Causal Inference (cont.)**
- A language user must be able to use language to make inferences: ‘If you touch that you’ll get burned
- Many statements are implicitly inferential: “I’m hungry.”; “My back is killing me.”; “I like lemonade.”
- Pragmatics guarantees that utterly useless statements are almost impossible to make in ordinary discourse (Try it and see?)
- Grice: Everything is inferred to be relevant
- The main way we have of knowing if we ourselves have been understood is by inferring from what we intended to the recipient’s action

**iii.) Representational independence**
- Linguistic representation must be independent of object represented
- Language must be built on knowledge of an object manipulated independently of that object
  - We will see that the history of writing systems reveals this process of increasing symbol/symbolized independence happening in historical time

**iv.) Mnemonic capacity**
- Language makes astonishing claims on memory.
  - A human adult may know several hundred thousand words: How can such an astonishing mnemonic feat be pulled off?

**iv.) Second-order relations**
- Even very simple sentences contain complex (second-order) information about relations between things
  - i.e. the relationship between words is a relationship between the relationships between the words and the referents
- Many (including me) believe that second-order relations are a pre-requisite for language-like symbols
- Non-human primates are notably bad at tasks requiring these kinds of relationships

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A very easy case:

The animal sees: **A**

And must choose between: **A B C**
The ontology of language

Two very difficult cases:
The animal sees: AB
And must choose between: CC DE FF

Or

The animal sees: AA
And must choose between: BC DE FF

vi.) Conditionability

- Language requires not just high conditionability (ability to learn) but also voluntary control of the nervous system (especially vocal activity)
  - Hyper-plasticity is vital for language
  - Many animals (i.e. ungulates) require highly functional nervous systems when born
  - Humans have extremely immature (unmyelinated) nervous systems at birth

Humans are developmentally retarded (especially in their prefrontal cortex and inferior parietal cortex)

vii.) Categorical discrimination of speech sounds

- Human beings render invisible the myriad differences in sounds of language
- We perceive phonemes as falling into one category or another even when are highly variable in their underlying waveform
- This ability is a *sine qua non* of verbal language, as we will see later

viii.) Intermodal association:

- Speech requires many cross-modal associations (associations between sensory modalities)
- Human beings are much better-equipped for making these kind of associations than other animals
Humans have relatively huge amounts of association cortex.

Adapted from: W. Penfield (1975) The Mystery Of The Mind

Some other characteristics of human language

• i.) Arbitrariness (true symbolization): The speech signal itself bears no relation to the object or event to which it refers
  • Iconic reference: Reference by resemblance
    • Widely used in the animal kingdom
  • Indexical reference: Reference by contiguity in space/time
    • Normal associative learning
  • Symbolic reference: Reference without resemblance, correlation, or contiguity
    • This enables: ii.) Displacement = Speech signals can refer to entities removed in space and time.

Some other characteristics of human language

• iii.) Specialization: The only function of the acoustic waveform is to convey meaning.
• iv.) Interchangeability: Users can (easily and almost automatically) produce any signal they can comprehend.
• v.) Total feedback: Signals produced by an individual can be reflected upon.

Some other characteristics of human language

• vi.) Discreteness: Speech is composed of a small set of acoustically distinct elements or units.
• vii.) Duality of pattern: The sound elements have no intrinsic meaning but combine to form structures that do have meaning.
• viii.) Productivity: An infinite number of meaningful utterances are possible
• ix.) Traditional transmission: Language structure and usage is passed on from one generation to another

An evolutionary perspective places constraints on what language must be

• Incremental pathway: There must be a series of ‘baby steps’ from no-language to some-language to full-language
• Adaptive utility: We need a description of how such functionality might have been adaptive when it first arose
• Continual selection: We must explain how adaptive pressures might have selected for continual refinement of the functionality; and
• Physiological substrate: We need to specify what pre-existing physiological structures (cognitive functions) could have been adapted to support that evolving adaptation.

Conclusion

• Language depends on many non-linguistic cognitive, sensory, and motor functions, as well as many highly-specialized language-specific functions
• Language is therefore not a monolithic entity, but is composed of a network of interacting sub-functions
• We should expect functional decomposition in scientific study and following brain damage to reflect this complexity