

The ontology of language:

What is it to be a language?

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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.

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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

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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:
 - ▣▣▣▣▣.) Material description
 - ▣▣▣▣▣.) Formal description
 - ▣▣▣▣▣.) Efficient description
 - ▣▣▣▣▣.) End description

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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)

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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)

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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.

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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 for: 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?

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“What are you doing, daddy? How come?”

Zoe, aged 2.5 years
Repeated 20+ times per day...

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8 pre-requisites for language

- ▣▣▣) Classification ability
- ▣▣▣.) Causal inference
- ▣▣▣ii.) Representational independence
- ▣▣▣v.) Mnemonic capacity
- ▣▣▣v.) Second-order relations
- ▣▣▣ii.) Hyper-conditionability
- ▣▣▣ii.) Categorical discrimination of speech sounds
- ▣▣▣iii.) Intermodal association

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i.) Classification ability

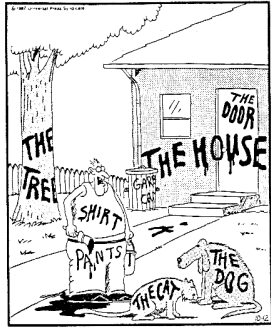
- An animal can only name things that can be distinguished
 - Language is thus predicated upon having a *rich perceptual ontology*: a need & ability to distinguish between many different perceived elements
 - Terry Deacon: ‘There are no simple languages’

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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

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Now- That should clear up a few things around here!

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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

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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

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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?

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v.) 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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Thompson, R. K. R., Oden, D. L. & Boysen, S. T. (1997). Language-naive chimpanzees (*Pan troglodytes*) judge relations between relations in a conceptual matching-to-sample task. *Journal of Experimental Psychology: Animal Behavior Processes*, 23, 31-43.

A very easy case:

The animal sees: A

And must choose between: A B C

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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

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Two very difficult cases:

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And must choose between: CC DE FF

Or

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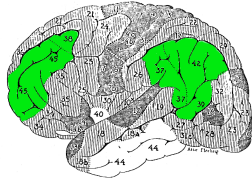
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vi.) Conditionability

- 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

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



Adapted from: J Eccles (1989)
Evolution Of The Brain

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vii.) Categorical discrimination of speech sounds

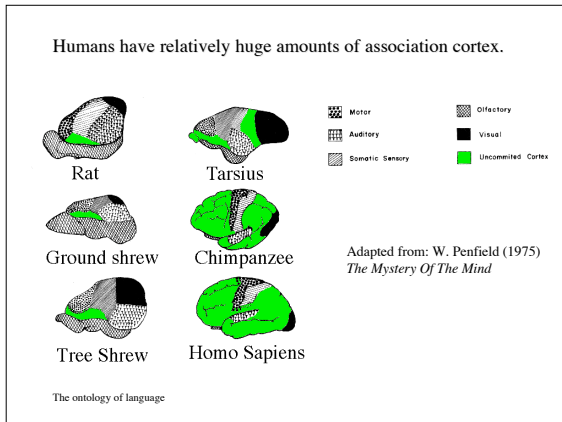
- Human beings render invisible the myriad differences in sounds of language
- We perceive phonemes as falling into one category or another even when are highly variable in their underlying waveform
- This ability is a *sine qua non* of verbal language, as we will see later

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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

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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.

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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.

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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

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- 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
 - i.) Continual selection: We must explain how adaptive pressures might have selected for continual refinement of the functionality; and
 - v.) Physiological substrate: We need to specify what pre-existing physiological structures (cognitive functions) could have been adapted to support that evolving adaptation.

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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

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