Knowledge of language

Three Fundamental Arguments

Plasticity in vision and language

I-language
More Introduction: Jackendoff's Fundamental Arguments

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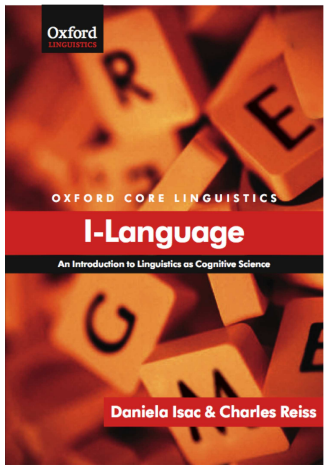

Outline

Knowledge of language

Three Fundamental Arguments

Plasticity in vision and language

1. Knowledge of language

2. Three Fundamental Arguments

3. Plasticity in vision and language

Knowledge of language

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What can language tell us about human nature?

What do we mean by *human nature*?

- Individuals?
- Groups?
- Species

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- Effects of having language?

⇝ Prerequisites for having language.

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"The beginning of science is the recognition that the simplest phenomena of ordinary life raise quite serious problems: Why are they as they are, instead of some different way?" [Noam Chomsky, Language and Problems of Knowledge:43].

Intelligence cannot be a function of brain size alone:

- Different tools perform different jobs—a bigger tool can't necessarily do what a smaller one can.
- Small brained animals seem to be capable of tasks that we are not capable of: navigation, web building, species appropriate social interaction.
- What would happen with a brain that was human in structure, but not in size?

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Seckel's syndrome / 'Bird-headed' dwarfism

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- Genetic disorder
- Microcephaly (small head and brain)
- Supposedly delayed, but normal pattern, language development

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Reserving the term *language*:

- This is not a question of right or wrong, but a request to the reader to agree to use the term in a certain way.
- Dolphin communication, dance, music do not have the same capacity for explicitness and abstractness that human language have—we can talk not only about the here and now, but about what is long gone, what is to come, and even what can never be.

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Expressive variety / Creativity of language

- Not restricted to the 'here and now': *Yesterday Bill asked if Mary would arrive tomorrow.*
- Counterfactuals: *John would not be happy if Bill were absent.*
- Displaced reference: *The woman I met yesterday had just arrived from Paris.*
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Our knowledge of language is:

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Rules in phonology: Pintupi (Australian) stress

(á is a primary stressed vowel; à is a secondarily stressed vowel.)

páɳa	'earth'
tʲúɽaya	'many'
málawàna	'through from behind'
púliŋkàlatʲu	'we (sat) on the hill'
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- Unconscious
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Internalism:

The Pintupi stress rule is a property of certain minds The nature of language tells us that our minds contain knowledge of an abstract system of rules that allows us to *generate*, that is, produce and understand, language. This type of system is called a *grammar*.

Another lesson from Pintupi

Generativity—unbounded set of forms of unbounded length

Linguistic generativity/productivity

- Use of number:
  I ate one slice of pizza. $\rightarrow$ *I ate n slices of pizza.*
- Negation:
  The students are rich. $\rightarrow$ *The students are not rich.*
- Predication:
  An x is a y. An x is not a y.
- Coordination:
  If X and Y are sentences, then so are *X and Y* and *X or Y*.
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Linguistic generativity: Recursive embedding

You are brilliant.

→ *I know you are brilliant.*

→ *You think I know you are brilliant.*

→ *My teacher's sister's best friend's brother-in-law's dog's veterinarian's aromatherapist suspects you think I know you are brilliant.*

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Linguistic generativity: Recursive embedding

S within S . . .

- *She suspects you think I know you are brilliant.*
- [S [S [S [S]]]]

Linguistic generativity: Recursive embedding

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Joining two NPs to make an NP

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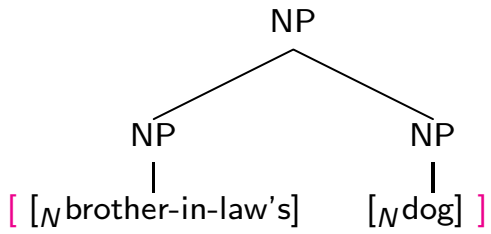
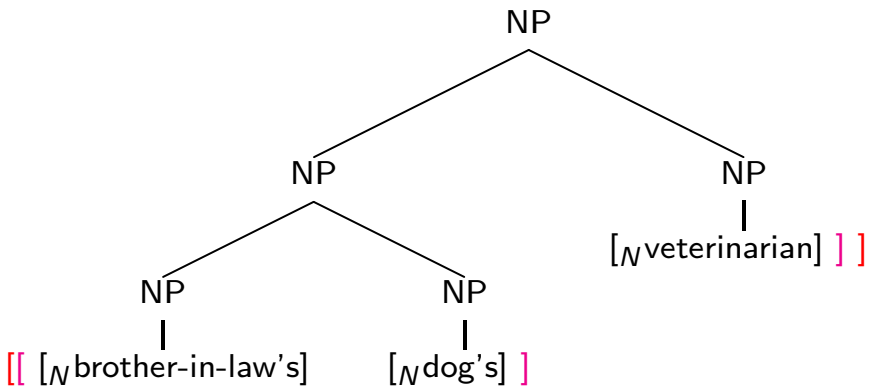


Joining that NP with another



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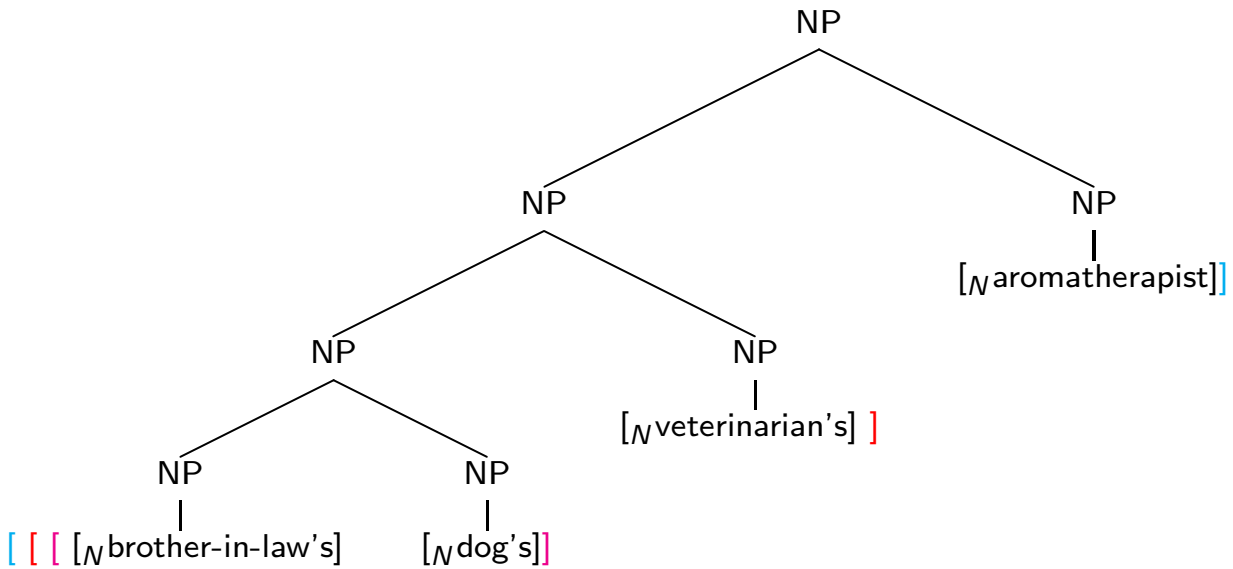

Three fundamental arguments

Three fundamental arguments concerning the mind (Jackendoff 1994)

- Internalism:
  The argument for **Mental Grammar**: the nature of language tells us that our minds contain knowledge of an abstract system of rules that allows us to *generate*, that is, produce and understand, language. This type of system is called a *grammar*. The mind is a computational system—whatever that means.

Three fundamental arguments

- Nativism:
  The argument for **Innate Knowledge**: Some aspects of our Mental grammar are not learned, but are rather innate (we are born with them). This innate knowledge is sometimes called *Universal Grammar*.

Nature and nurture

Environment and general smarts:

- Baby Z and Oonagh share the same food
- Baby Z and Oonagh go out on the mountain every day
- Oonagh has been hearing us talk for almost 9 years vs. 2 1/2 yrs. for Z
- Oonagh knows how to hunt a groundhog
- Oonagh has better hearing
- Oonagh understands about 5 words
- Z understands hundreds of words
- Z appears to have acquired rules, etc. in three languages

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Three fundamental arguments

- Constructivism:
  The argument for the **Construction of Experience**: our experience of the world is (partially?) dependent upon what our minds bring to perception; we do not experience the physical world directly (as we will soon see).

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Internalism, Nativism, Constructivism

It turns out that cognitive scientists find these three fundamental arguments to be relevant not only to language, but to other aspects of intelligence in humans and other animals, such as vision, hearing, smelling *etc.*. We can briefly illustrate all three of these initially implausible claims (in reverse order).

Three fundamental arguments

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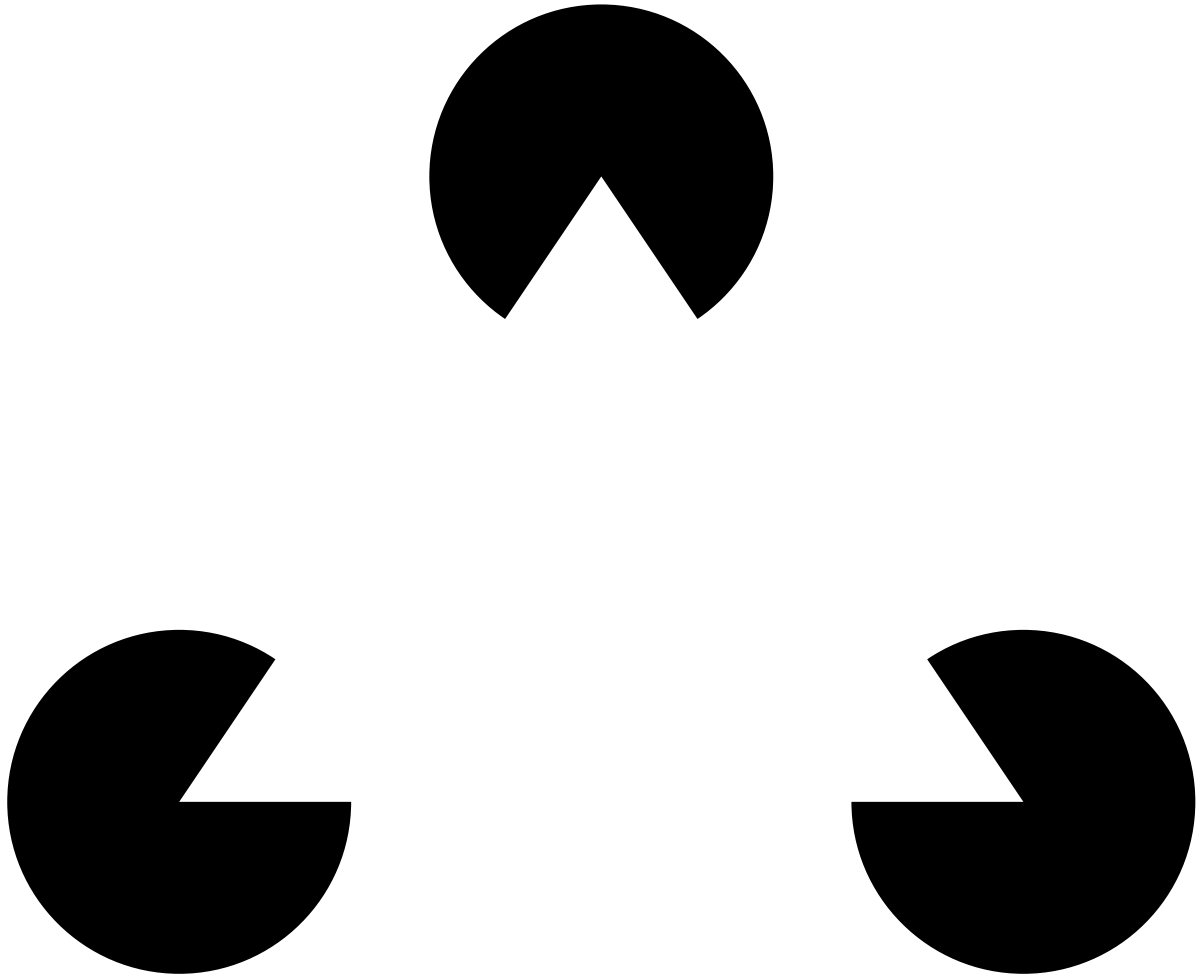

Figure: Triangle constructed by visual system.

Constructivism

A photometer (a device that measures light), would not detect any edges of the triangle that you perceive in Figure 1. Your mind **constructs** the percept, the experience of seeing the triangle, on the basis of a pattern of light that contains *no physically definable triangle*.

Nativism

I assume that nobody taught you to see a triangle in this figure–you see it because that is how we (humans) all process certain kinds of visual information. Since nobody taught it to us, it must be part of our biological endowment, and thus **innate**, or at least derivable via interaction with our environment from some innate properties that we share.

Nativism

Not all animals would perceive a triangle here, but some non-humans do, so this property may be innate in more than one species. More specific examples of innate visual knowledge are given in one of the readings (Hoffman 1998).

Internalism

Obviously, you do not see a triangle when presented with only this exact visual stimulus. If you hold the paper closer or further from your face, if you see it on the page or projected on a screen, you still construct the triangle. You obviously cannot store an unbounded number of 'triangle representations' in your limited brain, so there must be a procedure that your visual system uses to construct the triangle you see for an unbounded number of physical stimuli. That procedure, or set of rules, can be referred to as part of your **mental grammar** of vision.

http://www.cut-the-knot.org/Curriculum/Geometry/EdgeIllusion.shtml

Is the word *triangle* important?

How important is the word *triangle* to our perception?

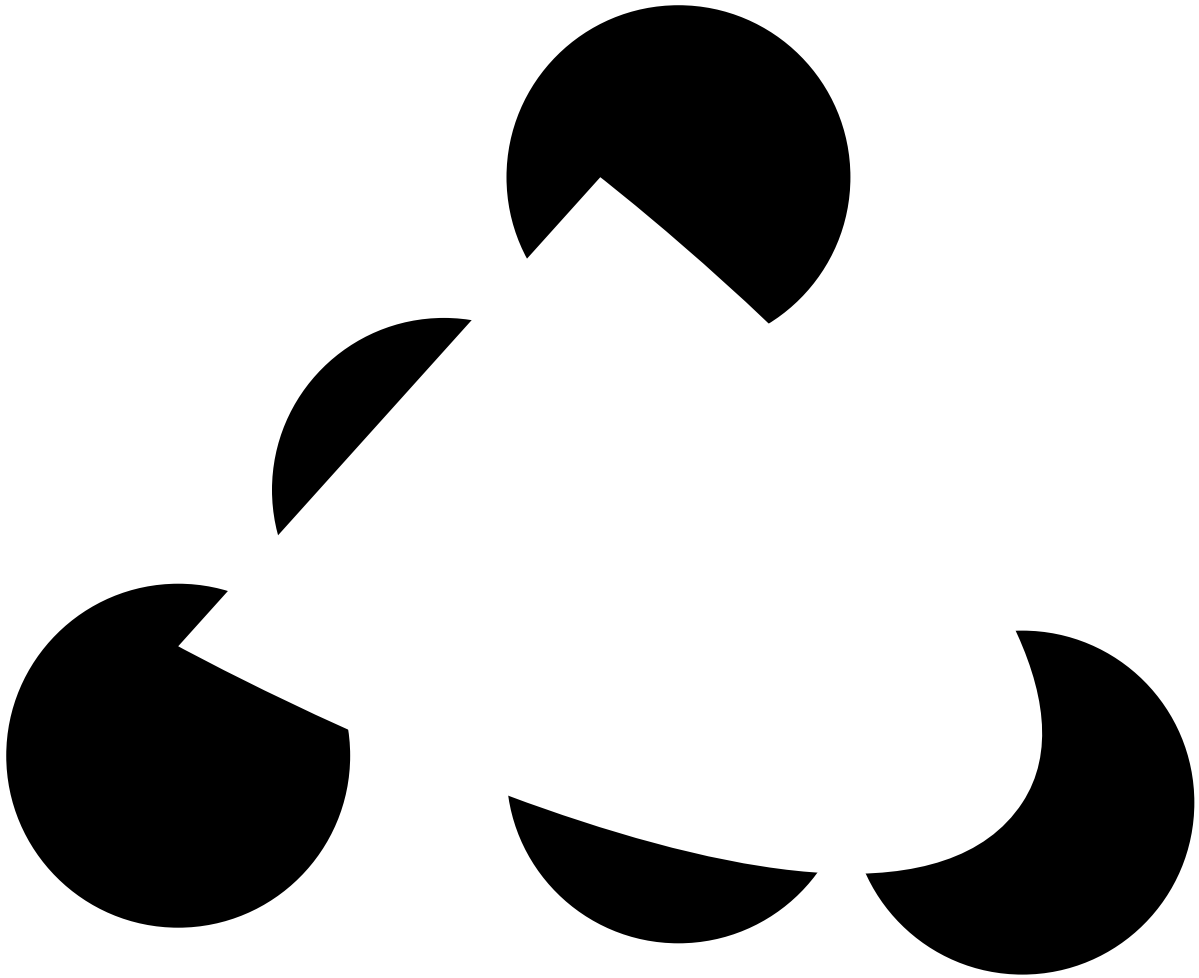

Figure: Unnamed form constructed by visual system.

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Case in Dyirbal

English	Dyirbal	gloss
she *saw him*	ɲuma yabuŋgu buran	'mother saw father'
she *returned*	yabu banaganʸu	'mother returned'
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Back to the three fundamental arguments

- Internalism:
  The object of study of linguistics and cognitive science in general is what is in the mind (**mental grammars**), and not what is 'out in the world' (grammar books, conventions). This leads us to the surprising conclusion that as far as linguists are concerned English, French Cree don't exist! Recall the term I-language from last class.

Back to the three fundamental arguments

- Nativism:
  If something is **innate** it means that it is part of your biological, genetic endowment. It may require interaction with the environment to appear, but it is somehow encoded in the genes. Is this mystical? There is *some* initial state that the child is in before learning takes place. Let's figure out what it is.

Back to the three fundamental arguments

- Constructivism;
  We will find that we construct our view of the world in just about every domain we can think of —language, vision, hearing, touch.