

# E105 Slides

## Spring 2000

E105

## Born to Be a Genius: Theories of Language Acquisition

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## Agenda-Day 1, Week 1

- † Course Introduction
  - † Course requirements, Faculty and sections
  - † All course information is on the E105 Web Page
    - <http://www.indiana.edu/langacq/E105>
- † Purpose of the course
  - † Survey of issues to be covered
- † Discussion Questions
  - † Survey of opinions about language

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### Faculty

- † Phil Connell, Professor in Departments of Speech and Hearing Sciences and Linguistics
- † Steven Franks, Professor in Departments of Linguistics, SPHS, Slavic Languages and Literatures
- † Sean McLennan, Associate Instructor, Graduate Student in Linguistics and Cognitive Sciences
- † Andrea Sept, Associate Instructor, Graduate Student in SPHS

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### Course Organization

- † Lectures: Mon & Wed 12:20-1:10 WH101
- † Section/Laboratories: Thursday and Friday

	Day	Place	Time
† Section 1:	Th	SPHS SG C018	04:40P-05:30P
† Section 2:	F	SPHS SG C018	09:05A-09:55A
† Section 3:	F	SPHS SG C018	10:10A-11:00A
† Section 4:	F	SPHS SG C018	11:15A-12:05P

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### Course Text and Requirements

Text: *The Language Instinct* by Steven Pinker and other readings assigned on the web.

Papers: 2 -- 4 pages addressing questions about language acquisition, due on 2/26 & 4/9

Tests: 2 -- Midterm and Final, 50-70 and 100 -140 multiple choice questions, respectively

Quizzes: 8 -- On Quizsite, 5-10 multiple choice questions on the readings and lectures

Friques: 12 -- Student questions on some interesting aspect of the material covered during the week

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### Websites used by the course

- † E105 Webpage-Syllabus, sample paper topics, slide information, & much, much more.  
<http://www.indiana.edu/~langacq/E105>
- † SSF Summit: site for submission of Friques and other kinds of interactions      <http://ssf.indiana.edu/pconnell/>
- † QuizSite- Online quizzes  
<http://www.best.indiana.edu>
- † Post-em: Updated grade status  
<http://www.best.indiana.edu>

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### Purposes of the course

- † To examine and evaluate theories about the design and structure of the language module within human mind
- † To examine and evaluate theories about the origin of this module
- † To use the principles of scientific reasoning to address intriguing questions about the origin, nature, acquisition, and impairment of language capacity of humans
- † To illustrate all this using examples of unusual cases of language learning and use. Highlights -->

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### Apes Learning Language



Koko and Penny Patterson



Nim Chimpsky and Herb Terrace



Kanzi on a computer



Washoe and Deborah Fouts

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### Language of William's Syndrome Children

- Genetic disorder affecting the structure of the brain
- IQ between 50 and 70, designated as Mentally Retarded
- Limited spatial skills and motor control;
  - Can't tie their shoes or cut with a knife.
  - Can't learn arithmetic
  - Can't learn directions to locations or use maps
- But can talk and understand language with little apparent problem



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### The Language of Autistic Children

- † Sing-song or monotoned (mechanical) speech
- † Rapidly spoken phrases
- † Echolalic
- † Goal directed, never interested in other's thoughts
- † Repetitious for no apparent reason

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### Language of Aphasics

- † Fluent sounding but mostly meaningless
  - † I impose a lot, while on the other hand, you know what I mean, I have to run around, look it over, trebbin all that sort of stuff.
- † Or struggle to say words, saying mostly single nouns
  - † Yes...ah...Monday...ah...hospital...Wednes day...

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### Language of Children with Specific Language Impairment

- † Six year-olds using language structures that are common in children of two and three years of age.
  - † Her got loose
  - † My got big
  - † Them hurt me
  - † Yeah, her two years old

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### Language of children with no language input

- † Deaf children who are exposed only to an oral language
- † Children who are isolated from their parents and other language users
  - † Intentionally by outside forces
  - † Intentionally by the parents themselves
  - † Unintentionally, by a parent who doesn't know a language

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### Benefits of Studying Language

- † It provides an opportunity to discover important clues about how the human mind works
- † It provides hints about how innate capacities interact with cultural influences to develop unique human intelligence.
- † It demonstrates how our theories about the natural world can conceal the truth about our own genius.
- † Gaining some understanding of the origin and design of language can be one of the most important academic experiences of your life

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### Preliminary Questions

- Is everything that preschool children know about language taught to them by their parents (and others in their homes)?
- Given that foreign languages in the U.S. are taught to high school and college-aged students, is this the best age for learning a second language?
- Is language ability among students at all levels of education on the decline in the U.S.?
- Are dialects simply the degraded and uneducated forms of real languages?
- Do children wait until they enter school before they learn about the grammar of their language?

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### Discussion Questions - 2

- Is thinking actually a process of using language silently inside the mind?
- Does the diversity of languages in the world mean that there were multiple sites from which these languages originated?
- Did the language ability of Homo Sapiens develop by a evolutionary process different from other human capacities; for example, upright walking?
- Does language separate humans from other animals in a dramatic and unique way, like no other capacity separates one species from another?
- Are humans the only species capable of acquiring and using a language?

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### Discussion Question Answers

1. Yes:  
No:
2. Yes:  
No:
3. Yes:  
No:
4. Yes:  
No:
5. Yes:  
No:

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### Discussion Question Answers

6. Yes:  
No:
7. Yes:  
No:
8. Yes:  
No:
9. Yes:  
No:
10. Yes:  
No:

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### Agenda: Day 2, Week 1

- † What does language do and how does it work?
- † Where did language come from?
- † How does the mind work
- † Evidence for a modular theory
  - † The universality of language
  - † Universality and innateness
  - † Interesting natural experiments that demonstrate genius of children

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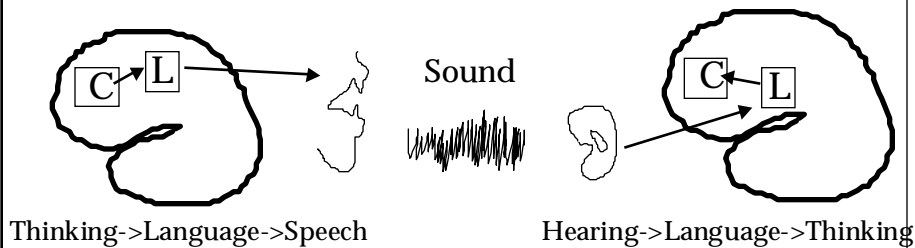
### What does language do?

**Transfers thoughts from one brain to another**  
Oral-Aural Language

Output System

Acoustic Energy

Input System



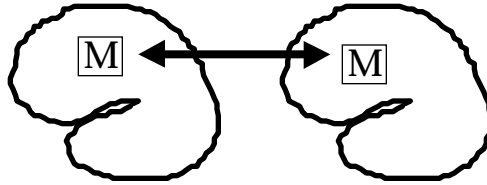
**C** Conceptual Processor  
**L** Language Processor

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## What could replace language

Mental Telepathy



Or  
Mindmelding

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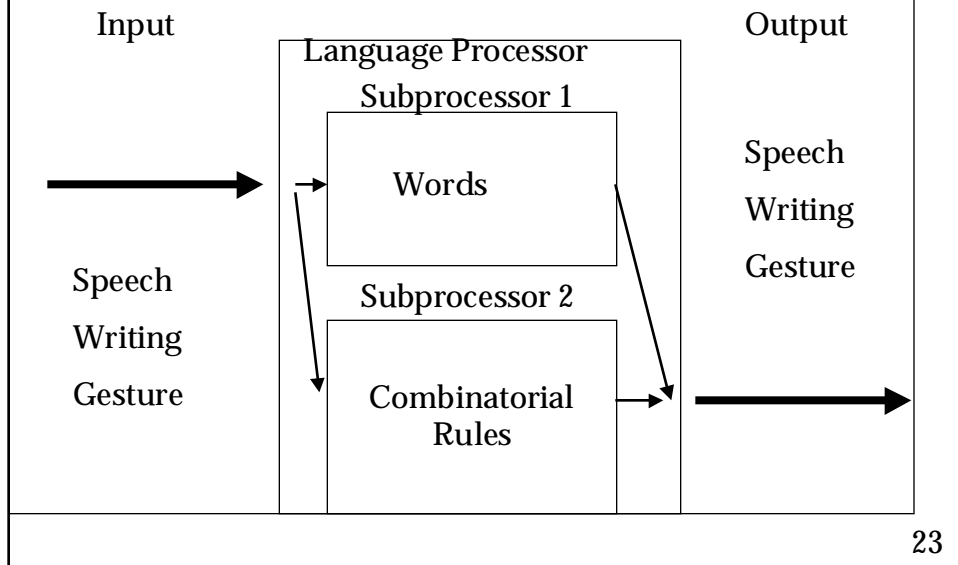


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### How does language work? A simple model



### Where did language come from?

This question has two meanings

Individual interpretation:

How and when did a child come to acquire the ability to process language?

Species interpretation:

How and when did Homo Sapiens come to acquire the ability to process language?

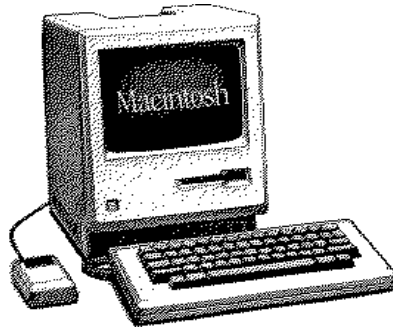
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### Taking the perspective of a computational theory of the mind

#### Hardware: Brain



#### Software: Mind

**Two kinds of programs:**

**Operating Systems**

Mac OS (Finder)

Windows 95, 98, NT

**Specialized Programs**

Microsoft Word

Microsoft PowerPoint

A program is what a computer does.

The mind is what the brain does.

Language is what the language processor part of the brain does.

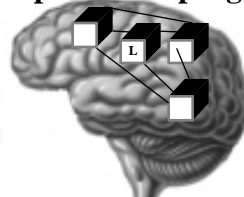
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### Two Computational Views on How the Mind Works:

**A single processor view: a powerful operating system that learns from the environment**



**A modular view: a weaker operating system controlling a network of specialized programs**



These views are analogous to the two opposing historical theories about how the body works

Prescientific theory of undifferentiated protoplasm

Modules: kidneys, heart, skin, lungs, pancreas, liver,

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### Where does language come from?

Human DNA  
construct a  
language module  
containing language  
information (universals)



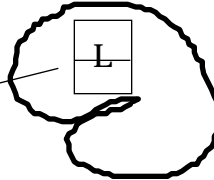
**Beginning**



Scans the  
environment  
shortly after birth to  
obtain important  
data

**End**

Constructs a  
fully operational  
language processor  
by 28 months



The Modular Theory of Language Acquisition

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### Where does language come from?

Human DNA  
construct a  
conceptual processor  
with no specialized  
language components

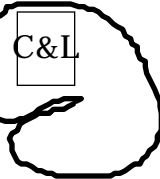


**Beginning**

Receives  
language lessons  
from parents in in-  
creasing levels of  
detail and complexity

**End**

Creates a succession of  
language processors  
that better approximate  
the adult system by trial  
and error problem solving finishing by 5 or 6 years



A Single Processor Theory of Acquisition

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### Theories, uncertainty, and science

Science is a system of logic designed to provide answers to important questions about the natural world.

Science uses a standardized method for gathering, sifting, evaluating, and drawing conclusions from facts.

The initial answers provided by science are largely uncertain.

The goal of science is to reduce and then eliminate uncertainty, to find the answer having the least uncertainty.

Hypotheses are initial uncertain answers to narrow scientific questions

Theories are sets of hypotheses providing less uncertain answers to broad scientific questions

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### Focus on the scientific method

How did humans obtain the unique ability of language?

- A. Evolution: Testable by the scientific method
- B. Divine Intervention: faith
- C. Combination of A and B

In spite of the fact that few of the important facts are known, and the fact that theories about language are necessarily speculative and uncertain, because this is a course in science, we must take a scientific approach to answering questions about the natural world in this class, thus we will evaluate A.

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### Language and cognition from the two perspectives

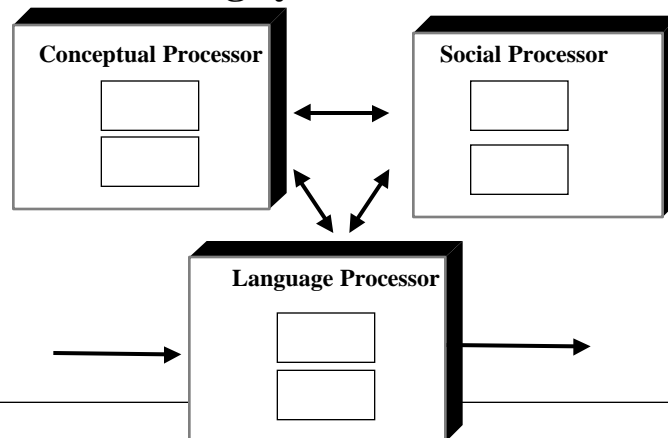
**Single processor model: cognition and language are not independent in development nor operation**

**Modular model: cognition and language are independent but interacting systems**

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### Modular theory view of the relation between language and cognition

**Cognition and language are independent but interacting systems**



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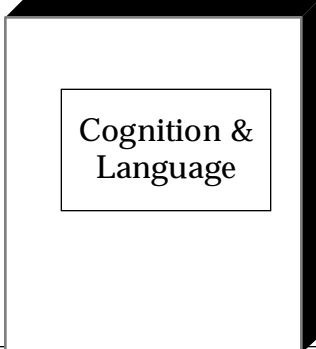
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### Single processor view

**Cognition and language are not independent but are highly dependent during development and normal operation**

General Intelligence



Cognition &  
Language

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### Possible other processors



Intuitive  
Mechanics

Intuitive  
Biology

Intuitive  
Psychology

Number

Maps

Food

Justice

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### Evidence supporting the modular theory for language

- † All human cultures have a grammatically complex language, regardless of the level of their technology
- † All human languages are equally complex grammatically
- † All human languages are composed of the same components

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### All human cultures have a grammatically complex language

- † 1. Kivunjo (Bantu) spoken by hunter-gatherer tribes in Africa has a complex verb system
  - † 7 prefixes, 7 suffixes
  - † two moods
  - † 14 tenses
  - † 16 genders
- † 2. Compared to natural languages, unnatural languages, such as computer "languages," are simple, linear, and not elegant

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### Universality and Innateness

- † Certain traits are universal but are not innate
  - † Eating with hands rather than feet is a universal trait of humans
  - † The reason for this is that hands are closer to the mouth than feet and they are more facile manipulators of objects.
  - † Children slowly change from being fed by others to being self feed. They apparently learn to feed themselves with their hands

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### Universality + Early Acquisition = Innateness

- † However, early acquisition together with universality always reflects innateness
  - † Language is acquired early
  - † Language is universal
  - † Therefore, language is innate
  - † If eating with the hands were acquired early, it would suggest that humans have an innate hand-eating program.

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