

24.904

Language Acquisition

Class 1: Foundations

Warm-up

- Athulya
 - linguist
 - research focus: syntactic, semantic and pragmatic development in young children
 - where this research happens: The Language Acquisition Lab at MIT Linguistics
- Who are you?
 - Course? Background in linguistics?
 - What do you want to get out of this course?

Requirements

- Attendance and participation (10%)
- Problem sets (40%)
- Mid-term; open notes, take-home (25%)
- Final paper (25%)

Attendance + Participation

- **You are expected to attend all lectures.**
- But it's still a pandemic, life is unpredictable, and I am not here to police yours, so...
 - ▶ 1 no-questions-asked absence
 - ▶ any more than that is 'questions-asked' and requires a 24hr notice, but if there is a need, just let us know.

Problem sets

- You will have one most weeks (8 psets)
- ternary grading scheme: ✓ ✓- ✓+

Readings

- No official textbook, but we'll make some use of the following:
 - Guasti, M. (2017). *The Growth of Grammar*, 2nd edition.
 - PDFs of relevant chapters will be posted on Canvas.
- Otherwise, readings will be research papers and summary articles posted on the course site.

Final paper

- As the final written component of the course, you will write up a “what’s next” paper
- Pick a topic — ideally related to something we’ve covered in class — and summarize the state-of-the-art and discuss what needs to be done to advance our understanding on that issue.

Goals of the course

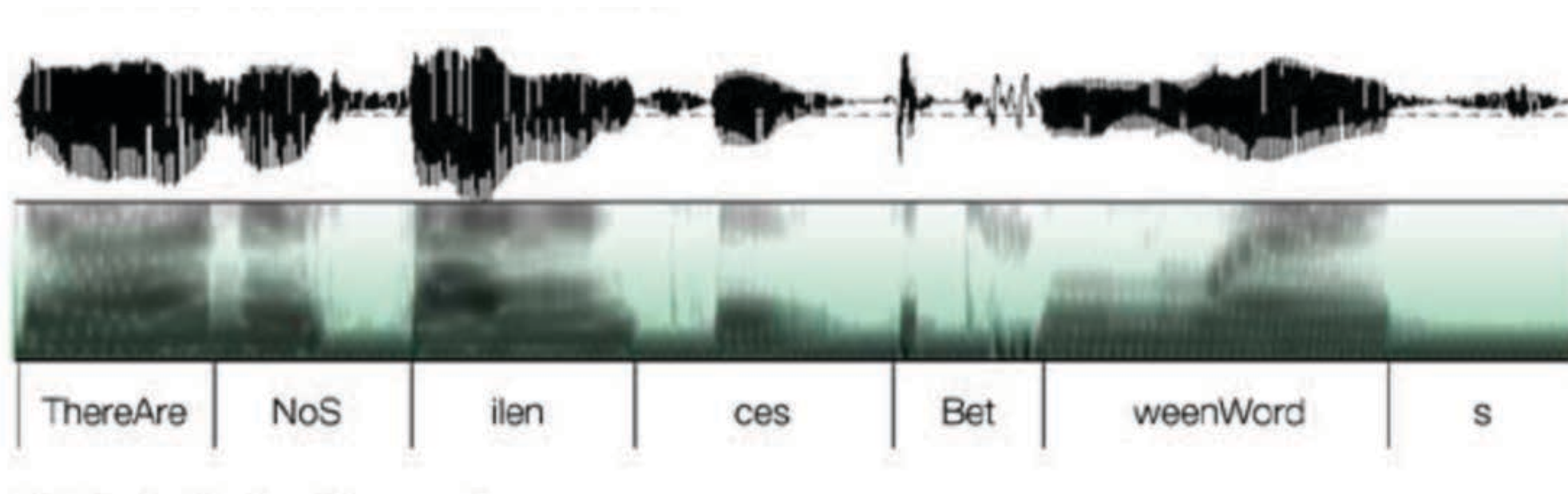
- Gain exposure to the foundational work in first language acquisition
- Become acquainted with a number of techniques used to study infant and child cognitive development
- Become familiar with critically evaluating data collected by researchers using these methodologies

Tell me

- What do you know about your native language (L1)?
- When did you come to know it?
- How did you figure it out?

What do we know when we know a language?

- You know what chunks in a speech event corresponds to words in your language (speech segmentation)



Box 3 image from Patricia K. Kuhl, "Early language acquisition: cracking the speech code," *Nat Rev Neurosci* 5, 831–843 (2004). <https://doi.org/10.1038/nrn1533>. © Springer Nature Limited. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <https://ocw.mit.edu/help/faq-fair-use/>.

- You know the rules for combining sounds in your language

e.g. in English: /kɪti/ → [ˈkɪ.ri] (*[kɪ.ˈti])

- You know what grammatical category a word belongs in

e.g. **NOUN:**

What a pretty _____!

kitty

dress

dream

**pur*

**happy*

**walked*

- You know the different rules and structures associated with different speech acts in the language

Declaratives: Psycho likes fish.

Questions: What does Psycho like?

*Psycho likes what?

- You know how rules of your grammar constrain interpretation of sentences

(1) Psycho₁ wants you to like her_{1,2}.

(2) Psycho₁ likes her*_{1,2}.

- You know the conversational rules that tell you when a (grammatical) structure is appropriate

(1) Who does Psycho like? 

Psycho likes only me.

(2) Who likes me? 

Psycho likes only me.

How do we know all this?

- Children master all of these (and more) without explicit instruction
- Not clear explicit instruction is all that effective in the first place

Child: Want other one spoon, Daddy.

Father: You mean, you want the other spoon.

Child: Yes, I want other one spoon, please Daddy. **Father:** Can you say "the other spoon"?

Child: Other...one...spoon.

Father: Say "other".

Child: Other.

Father: "Spoon."

Child: Spoon.

Father: "Other spoon."

Child: Other...spoon. **Now give me other one spoon?**

(Braine 1971)

How do we know all this?

- Could children be imitating the language around them?

How do we know all this?

- Could children be imitating the language around them?
- Probably not
 - ▶ Most sentences are novel — you understand and produce them on the fly, and may never have heard them before.
 - ▶ Children are actually *bad* at imitating things they don't already know!
 - Imitation studies

How do we know all this?

We know all of this because as a child, we were able to **extract patterns** and **make generalizations** from input data mostly just by hearing examples of what's allowed in our community language

Why this is very hard

- An incredibly complex system
- How does one even break in to it?

Why this is very hard

- An incredibly complex system
- How does one even break in to it?
 - 2 sentences
 - declarative, then question
 - 8 words
 - 5 sounds not found in English

Why this is very hard

- Even once you break into the system, there are often many ways to generalize beyond the available data, and most of them aren't right!

Even the “straightforward” cases



Look at that **bird!**

Bird
???

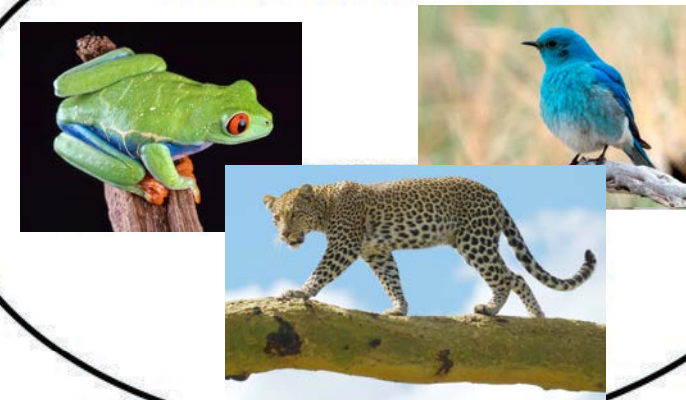
H1: +blue bird



H2: +blue



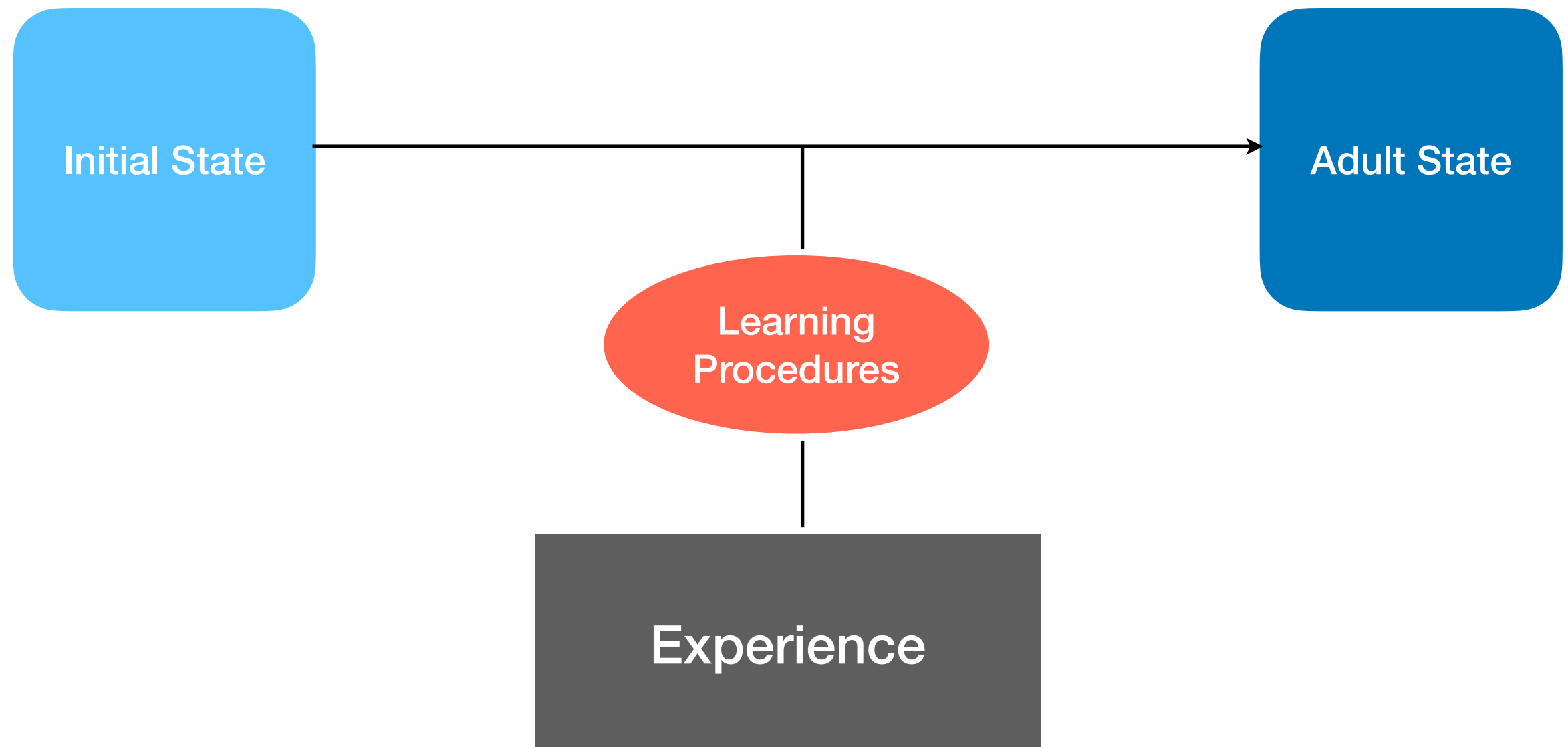
H3: +on-branch



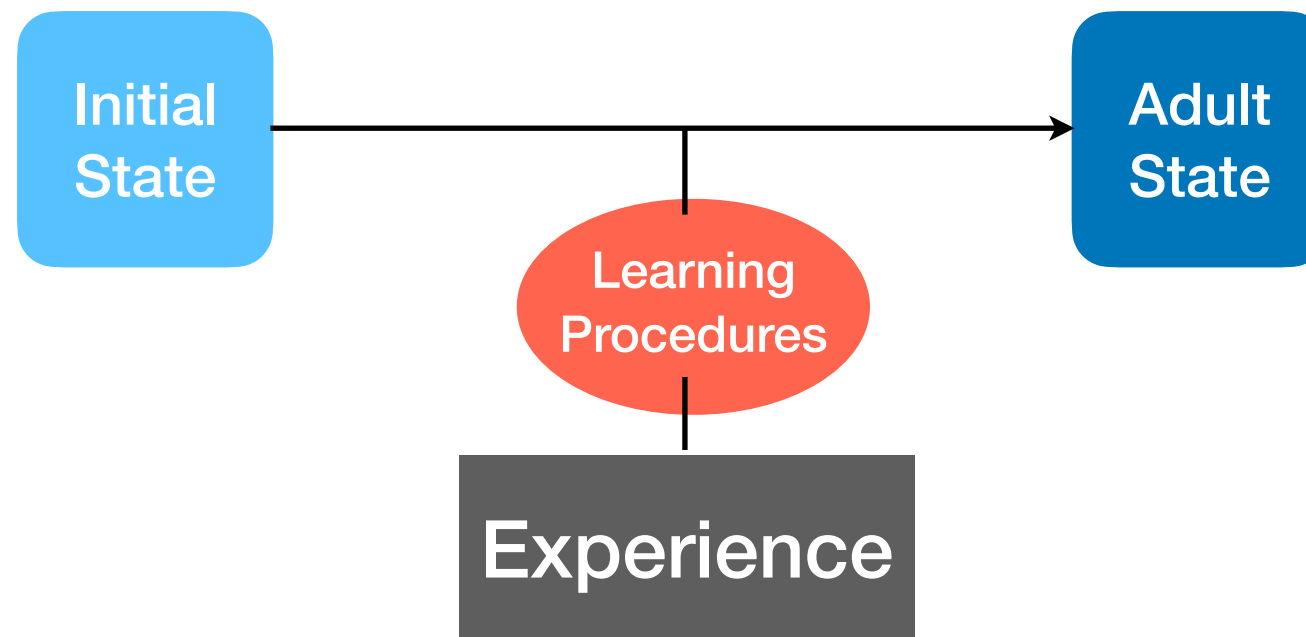
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- Language acquisition = solving a series of such induction problems
 - speech categorization
 - phonological rules
 - syntactic categorization
 - syntactic rules
 - semantics
- Somehow, by the age of 6 or so, children have made all the right generalizations about their native language

First language acquisition



Defining our problem space



- A characterization of the adult state (What is the target of acquisition?)
- A characterization of the learner's experience (How does the learner characterize the available data?)
- Specification of the initial state + learning procedures that:
 - i. ensures learnability of any human language
 - ii. allows learners to project from finite experience to a system with infinite expressive power

Topics we will (try to) cover

- Nature of the human language faculty
- Learning the lexicon
- Syntactic structure
- Semantic composition
- Language use

How do we study child language?

- Child minds are minds in development
 - ▶ can't always extrapolate backwards from adult state
- Children cannot always tell us what they know
 - ▶ externalized language contingent on extraneous factors, e.g. motor development

Naturalistic studies

- Diary or Parental Report
 - Offline measure. Parents or other caregivers record or report their child's receptive or productive vocabulary, grammatical milestones, or rates of language usage (esp. for bilingual children), a.o.
- Corpus-Based (CHILDES: <https://chilDES.talkbank.org/>)
 - Children are recorded in naturalistic settings to collect bodies of data "from the wild".
 - Transcribed in a uniform fashion, making it easy to measure/mine data for particular properties to gather information and test hypotheses

Naturalistic studies

- **The good:**
 - The child producing a particular structure is a compelling argument for them knowing that structure
 - Allows us to systematically study child language as it naturally occurs, with frequency, usage and contextual factors all as richly present as in the actual learning context
- **The less good:**
 - lots of information that we cannot extract from naturalistic production
 - ▶ what they think is ungrammatical
 - ▶ the meaning they assigned (extremely difficult to extract from a corpus)
 - ▶ infrequent sentences

Experimental studies

- Behavioral or neuroimaging
 - tasks designed to collect specific types of data to test specific hypotheses
 - either exploiting behaviors extant in the subject or measuring e.g. activation in neuroimaging
- Different tasks for different age groups

Passive looking and listening

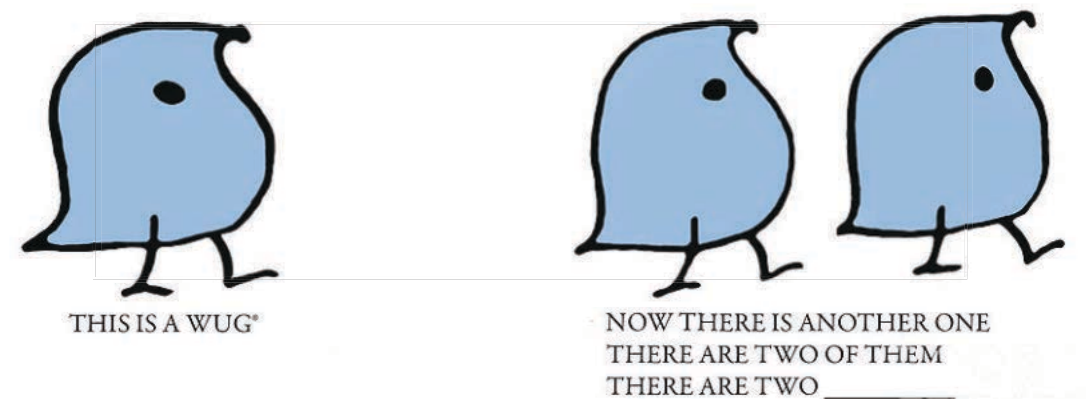


visual fixation procedure
head-turn preference
preferential looking

- Ideal for infants and young toddlers
- All capitalize on interest: e.g. infants may listen longer to ungrammatical sentences, infants may prefer to look at the image that matches a sentence they heard

Nonce word tasks

- use fake words – which the child could not have memorized from the input – to probe...
 - the process of word learning
 - the process of rule formation



(Berko-Gleason 1958)

Act-out Task

- Experimenter presents a sentence and child is instructed to act out the sentence (often with the toys and props in the work space)
 - (1) After you touch your nose, touch your ears
 - (2) Before you touch your nose, touch your ears

Elicited imitation

- Ask children to repeat back sentences presented to them. Do they change their input in some way?
- Premise: children cannot repeat what they cannot mentally represent or comprehend
 - Repeat what the experimenter says:
The boy with the the dog with the hat got an ice cream.
 - Repeat after the experimenter but correct any errors:
The boy is eat an ice cream cone >> “...eating...”
 - Repeat after the experimenter and reproduce errors:
The boy is eat an ice cream cone >> “...eat...”

Truth-Value Judgment Task

- Investigates which meanings children can and cannot assign to sentences.
- E.g. Are sentences that are ambiguous for adults also ambiguous for children?

(1) Every horse didn't jump over the fence.

a. It's not the case that every horse jumped over the fence

(true if some horses jumped some horses didn't jump)

b. Every horse failed to jump over the fence

(false if some horses jumped)



For next class

- Required: Dyer & Dickerson 1996
- Recommended: Guasti, Ch. 1
- Extra: Chomsky 1975, “On cognitive capacity”

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<https://ocw.mit.edu>

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