Methods in Psycholinguistics LINGUIST 245B

Today

- **Part 1:** Why/how to do experiments
  Example: The Parsing Wars
- **Part 2:** Class logistics

Why experiments?

Behavioral experiments

- Goal:
  - measure behavior to draw inferences about **representations** and **processes** (computations)
- Components:
  - method for measuring an aspect of behavior
    - task
    - response
  - model/hypotheses about underlying processes
  - **linking hypothesis** (link between measured behavior and underlying process)

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Class theme: The Parsing Wars

Stage: the 80ies
Consensus: language processing is incremental.
No consensus: language processing is

modular & serial.
driven by language-specific heuristics.

Garden Path Model
(Frazier, Clifton)

distributed & parallel.
driven by integration of available information.

Constraint-Based Accounts
(Tanenhaus, MacDonald)

Behavioral measures

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The

horse

raced

past

the

barn

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Models/hypotheses?

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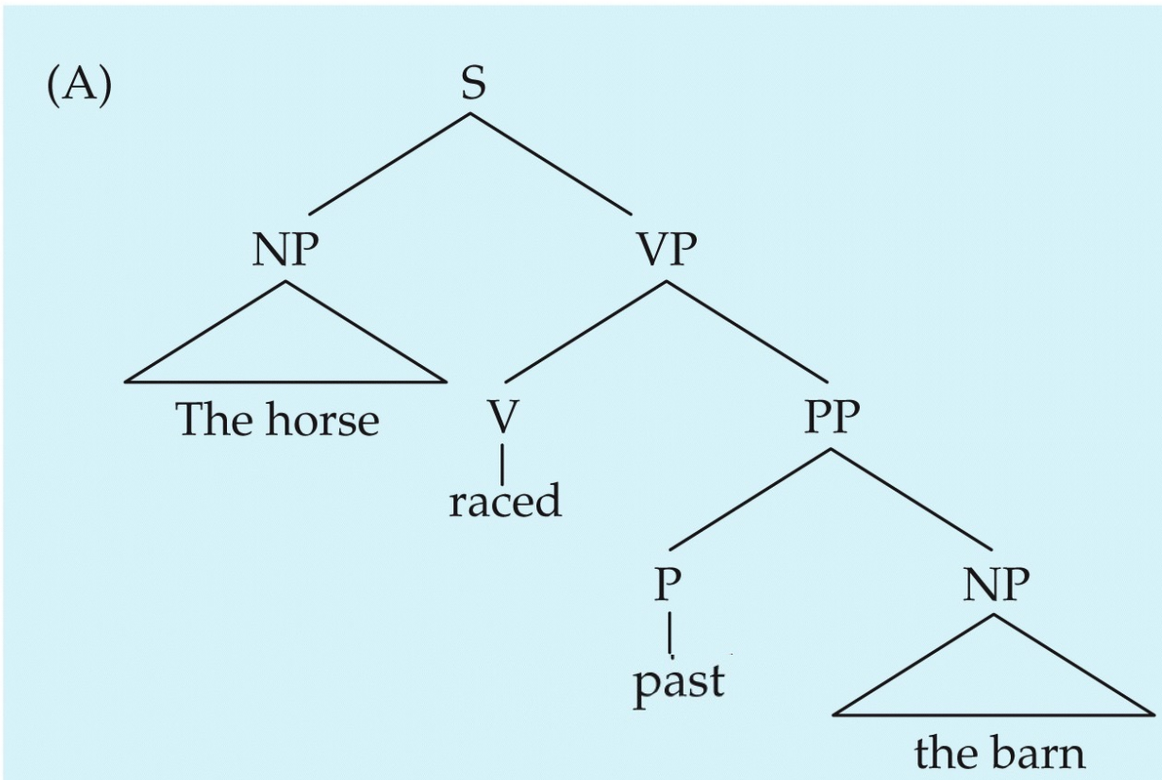
Application of syntactic heuristics followed by integration of contextual information

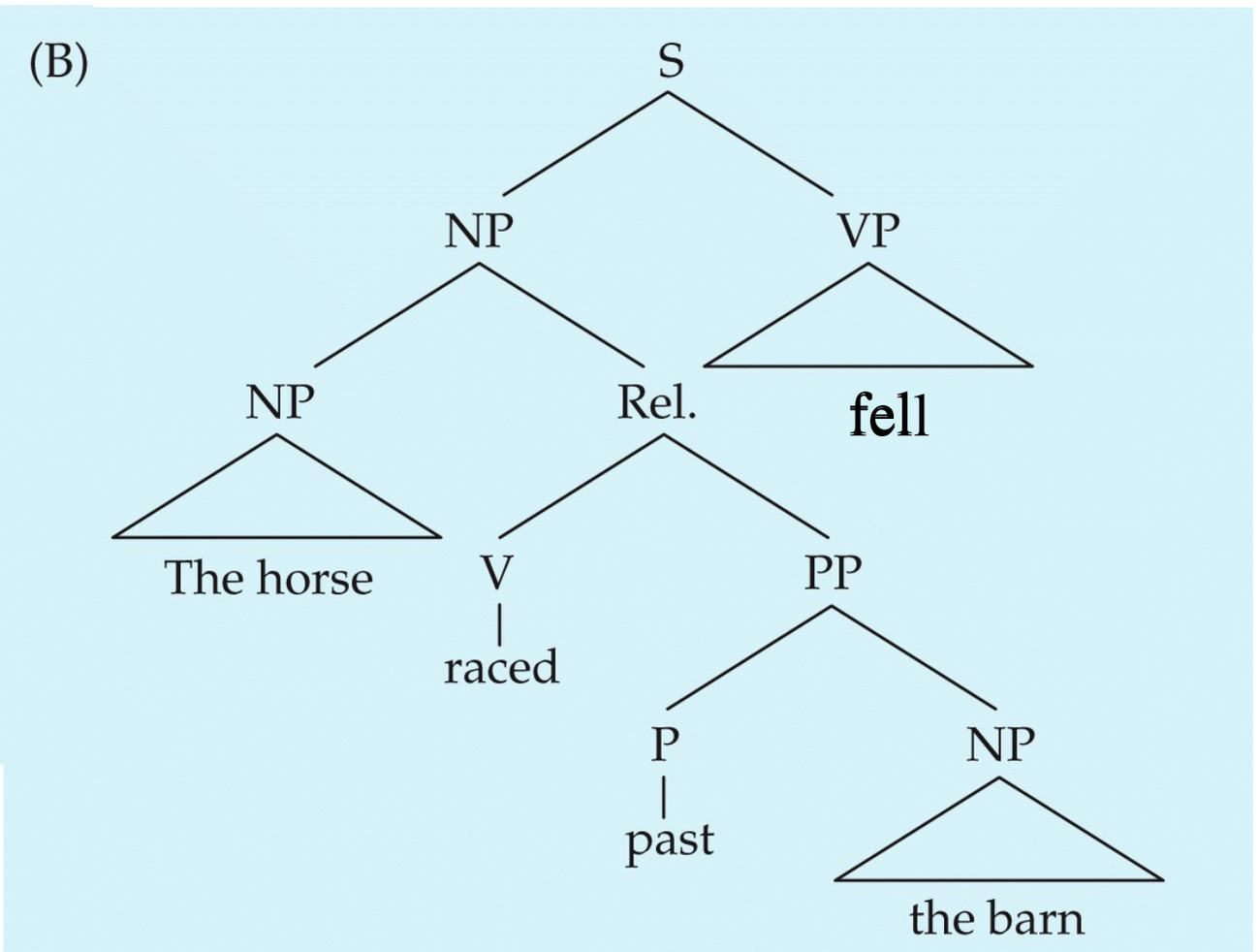
Interpretation of sentence against multiple available cues/constraints

Two potential parses before “fell”

main clause structure



reduced relative clause structure



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Examples of responses/tasks

- Choices
- Time measures (RT)
  - reading times
  - word recognition
    - lexical decision
    - naming
- Memory measures
  - recall
  - recognition
- Psychophysical measures
  - discrimination
  - identification
- Overt/natural behaviors
    - eye movements
    - mouse movements
    - errors
- Brain imaging
  - ERPs
  - fMRI

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Linking hypothesis?

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Linking hypothesis: reading time reflects processing effort.

Remainder of course

"…Twas in another lifetime, filled with blood and toil…"
— MK Tanenhaus, 2018

- review of the Parsing Wars (70ies - early 2000s)
  - methods
  - data
  - linking assumptions
- current consensus
- we never learn
  (experimental semantics/pragmatics today)

Some terminology

Rosenthal, R., & Rosnow, R. L. (2008). Essentials of behavioral research: Methods and data analysis (3rd ed.). McGraw-Hill.

- independent variable
  - what is manipulated
- dependent variable
  - what is measured
- hypothetical construct
  - what inferences are made about
- beware of conflating dependent variable and hypothetical construct

Experimental design

- goal: maximize probability of making valid inferences
  - maximize sensitivity (null effect problem)
  - minimize measurement error
    - avoid misattribution (confounds)
- choices about selecting/manipulating independent variables
  - between/within participants
  - randomize/counterbalance
- rules/heuristics/assumptions for drawing inferences from dependent measures (statistics)

Frequent problems

- null effects
- signature data pattern thinking
- lack of explicit linking assumptions
- “My experiment didn’t work”

Tanenhaus, M.K. (2004). On-line sentence processing: past, present and, future. In M. Carreiras and C. Clifton, Jr. (eds). On-line sentence processing: ERPS, eye movements and beyond. Psychology Press, pp. 371-392.

Class logistics

https://canvas.stanford.edu/courses/98965

By date	Task	Action
Apr 7	select an experiment to replicate/run	email me choice / schedule meeting
Apr 12	meet with me to discuss choice	
On Apr 18	give lightning project presentation	email me link to project repo
Apr 28	finish coding first draft of experiment (general infrastructure, data recording)	
May 5	finalize experiment (including all stimuli)	email me link to experiment
May 10	collect data	
May 19	visualize data	email me link to visualization R file
May 26	analyze data	email me link to analysis R file
On Jun 10	present project	
Jun 14	submit writeup (June 12 for graduating students)	email me pdf