Further evidence for categories/constituents: structural ambiguity

► (headline) ‘Teacher strikes idle kids’

```
V
 N  V-aN
 A-aN  N  V-aN-bN  N
Teacher  strikes  idle  kids
```

```
V
 N  V-aN
 Teacher  V-aN-bN  N
          strikes  A-aN  N
               idle  kids
```
Syntactic Ambiguity

Further evidence for categories/constituents: structural ambiguity

► (headline) ‘British left waffles on Falklands’

These are examples of *category* ambiguity (word can be N or V-aN-bN).

We can also have *scope* ambiguity with same categories (more common)…

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William Schuler  
Language and the Mind, Lecture 16
Example of scope ambiguity:

- (headline) ‘Two sisters reunited after 18 years in checkout line’
Example of scope ambiguity:

- (headline) ‘Two sisters reunited after 18 years in checkout line’

[Diagram showing the syntactic tree of the sentence]
Example of scope ambiguity:

▶ (Traxler) ‘Dr. Phil discusses sex with Rush Limbaugh’
Example of scope ambiguity:

- (Headline) ‘Holiday stamps depict Virgin Mary and child on hobbyhorse’

This kind of ambiguity is hard to avoid — would need ‘audible brackets.’
Local Ambiguity

Ambiguity not always *global* (stays to end), can also be *local* (incremental).

- ‘*While Susan was dressing the baby ... ’* (prior to end of sentence)
Local Ambiguity

Ambiguity not always *global* (stays to end), can also be *local* (incremental).

- ‘While Susan was dressing the baby played ... (on the floor)’

![Tree diagram](diagram.png)

‘The baby’ has to be reanalyzed as the subject of the main clause.
Local ambiguity can sometimes bring parsing to a halt!

- (Bever ’70) ‘The horse raced past the barn fell.’ (trouble at end)

```
   V
  / \   ...
 N   V-aN
  /  \
 the horse V-aN R-aN
   |    raced     past the barn
```

...fell?!
Local ambiguity can sometimes bring parsing to a halt!

▶ (Bever ’70) ‘The horse raced past the barn fell.’

‘Raced …’ must be reanalyzed as a passive (reduced relative) modifier.

Trouble is, readers often don’t see this reanalysis. Perhaps it comes too late.
Garden Path Model

Why does this happen?

Lyn Frasier ('79): Garden Path model — serial processor with reanalysis

▶ maintain single partial parse, reanalyze when obs. words not predicted
▶ examine multiple options at each word, but then commit to best
▶ reanalysis increases reading time, can cause failure to comprehend
Garden Path model also ignores lexical preferences for subcategories.

Phases of Garden Path parser:

1. lexical processor $\rightarrow$ lexical categories (but $V$ always $V-aN-bN$)
2. syntactic parser $\rightarrow$ syntactic structure
3. thematic (dependency) interpreter $\rightarrow$ sentence meaning

This is justified by results of self-paced reading experiments (Mitchell ’87):

- **stimuli**: sentences presented block by block, with trans./intrans. verbs:
  1. ‘After the audience had applauded the actors … (sat down for a drink).’
  2. ‘After the audience had departed the actors … (sat down for a drink).’
- **measure**: self-paced reading time for each segment
- **results**: intransitive sentences (b) are slower, despite lack of ambiguity

Martell, Frazier conclude processor ignores subcategory preferences of verbs.
Garden Path model makes parse decisions using *heuristics* (rules of thumb):

- **late closure**: prefer to keep constituents open, attach low
- **minimal attachment**: prefer to build simpler structure w. fewer nodes (but you have to providently define verb phrases to have fewer nodes)
- **main assertion**: prefer to modify the main assertion
Problems with Garden Path Model

Paul Gorell ’91:
Mitchell’s sentences had suggestive segmentations, lacked punctuation.

John Trueswell & al ’93: eye-tracking experiments favor interactive model
  ▶ **stimuli**: sentences read with eye-tracking headset
    (a) ‘The student forgot the solution was in the book.’ (prefer nom. comp.)
    (b) ‘The student hoped the solution was in the book.’ (prefer sent. comp.)
  ▶ **measure**: eye-tracking fixation positions and durations
  ▶ **results**: large delay at ‘in’ for verbs preferring nominal (a)

These results favor a **constraint-based** model:
  ▶ readers constrain structural decisions with subcategories, other factors
  ▶ when high probability analyses fail to predict data, reallocate probability
  ▶ reallocation causes delays, very large reallocations may cause failure
For next time...

Read:

▶ Traxler ch 4, pp. 167–181