

# Psych229: Language Acquisition

## Lecture 13 Words & Morphology

### Pinker 1995: Past Tense Rule

"My teacher holded the baby rabbits and we patted them"  
Overregularization error

English past tense: happen between end of first year and end of second year  
Means children have acquired "past tense rule" ~+ed

clawed /d/      folded /ed/

Extracting the -ed rule (Yang, 2002)

### Pinker 1995: Past Tense Rule

U-shaped development

went, came, saw, walked -->      went, came, saw, walked  
goed, comed, seed, walked -->

One idea: Children simply haven't heard irregular counterparts enough to retrieve them reliably, so the -ed rule kicks in

Marcus & Pinker (supporting this idea): children make more errors on words parents don't use as frequently

Also, kids are aware that the overregularized forms are wrong

### Pinker 1995: Past Tense Rule

Where the connectionists come in

Rumelhart & McClelland (1986) Parallel Distributed Processing (PDP) pattern associators (root form with past tense)

Learn by analogy

PDP model of past tense:

input = very frequent irregular verbs, followed by surge of less frequent regular verbs as kids acquire more words

result: U-shaped learning

Pinker: Is it really true the proportion of irregular to regular verbs changes?

The answer: **No** (between 2 and 5 years old, 30% of tokens are regular verbs)

If looking at types, change in proportion of regular to irregular happens a year too early to be responsible for U-shaped learning (oops)

### Pinker 1995: Past Tense Rule

Also, if learning proceeds by analogy (pattern association), similar patterns should reinforce each other....and reinforce overregularization errors

holded ~ folded ~ scolded ~ ...      drank ~ blinked

Pinker: No correlation between overregularization frequency & number of neighbors

However...what about the irregulars? Would analogy work there?

Irregulars fall into families, after all.

Pinker: Relation between overregularization and # of rhyming neighbors

The more rhyming irregular neighbors, the less overregularization

drank ~ sank ~ shrank      kept ~ slept ~ wept ~ crept

The verdict: Pattern associators really good for the irregulars

### Yang 2002: Irregular Classes & The Free-rider Effect

- same frequency (≈20), different performance
  - hurt, cut: 80%
  - draw, blow, grow, fly: 35%
- lower frequency, higher performance
  - hurt, cut (≈20): 80%, caught (36); 96%
  - know (58), throw (31): 49%
- higher frequency, lower performance (Abe)
  - hurt (25), cut (21): 66%
  - go-went (557): 64%, come-came (262): 26%

## Pinker & Ullman 2002: Past Tense Debate

### The Great Past Tense Debate

Why the fuss over the past tense? Good testbed containing both rule-like regularization and exception-like irregularization.

Pinker & Ullman: Rules or Words ("Words-And-Rules Theory")

(Rules) Regulars: generated by rule-like process of +ed (symbolic manipulation)

~GRAMMAR

(Words) Irregulars: stored separately in associative memory and retrieved

~LEXICON

Want to emphasize necessity of rules (grammar-like portion)

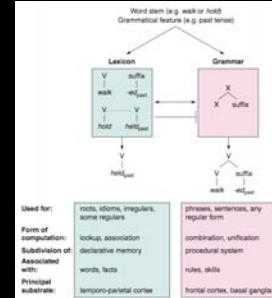
Grammar = system of productive, combinatorial operations that assemble smaller pieces (e.g. morphemes & simple words) into larger pieces (complex words, phrases, sentences)

## Pinker & Ullman 2002: Past Tense Debate

Blocking Principle for irregulars: try to retrieve irregular form from associative memory, but if it fails use regular rule

This is different from older generative phonology theories (Chomsky & Halle) that suppose there are rules for everything, in order to account for patterns of regularity in irregulars (*ring-rang, sing-sang, etc.*)

This is the approach taken by Yang (2002), though.



## Pinker & Ullman 2002: Past Tense Debate

Pinker & Ullman on pattern associators

No lexical entries, no combinatorial "apparatus" - just sound pattern associations, transforming one sound form to another

Acquire families of sound patterns much more easily (e.g. patterns in irregular rules)

...but also produce odd output for novel forms (*mail-membled*), which is not what people do with novel forms.

Models that don't do this have a built-in dedicated component for the +ed connection (built-in rule)

Default rule doesn't have to do with frequency of form either

- children regularize before onslaught of regular verbs

- German default plural 's' is only used in 7% of cases (default because used for unusual nouns, default error in childhood, etc.)

## Pinker & Ullman 2002: Past Tense Debate

Default rule doesn't have to do just with sound pattern either...

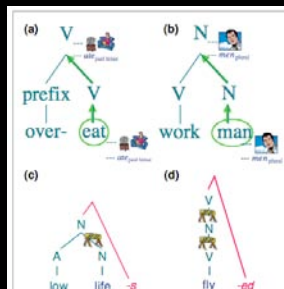
Some irregulars are regularized when used in certain contexts

"Orcs ringed the city", "I steeled myself for battle"



## Pinker & Ullman 2002: Past Tense Debate

Example: exocentric (ex: low-lives - not a kind of life) vs. endocentric (ex: workmen - is a kind of man)



## Pinker & Ullman 2002: Past Tense Debate

What if pattern associators had a semantic component so they could tell if a meaning was altered?

Problem: exocentric isn't the same as semantically different - it's a particular kind of semantically different.

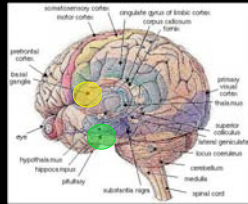
If pattern associator has component that notices exocentric for noun-like verbs "ring" (to ring, a ring), this is like implementing morphological knowledge already. Also requires lots of training of exocentric verbs with regular past tense, which is data children don't normally get.

## Pinker & Ullman 2002: Past Tense Debate

Pinker & Ullman on Words-And-Rules neural basis

Declarative/Procedural Hypothesis:

lexical/irregular/hippocampus & medial lobe structures = **declarative**  
 grammatical/regular/basal ganglia & frontal cortex = **procedural**



## Pinker & Ullman 2002: Past Tense Debate

Pinker & Ullman: Predictions of Words-And-Rules

1) Separable memory

Irregulars - psychological, linguistic, neuropsychological traces of lexical memory

Regulars - psychological, linguistic, neuropsychological traces of grammatical processing

2) "Elsewhere" rule for +ed

When memory fails for irregulars, use +ed rule for past tense.

## Pinker & Ullman 2002: Past Tense Debate

Results for brain-lesioned patients: predicted double dissociation

agrammatism



anomia

Agrammatism: more trouble inflecting regular than irregular

Anomia: more trouble irregular & overregularized

