Regular and Irregular Verbs: Part 2
Informatics 1 CG: Lecture 4

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Reading:

*Steven Pinker’s, Words and Rules, Chapters 3 and 7*
Recap: Words and Rules

- Theory of words and rules.
- Does it explain regular and irregular verbs?
- How can it be changed/refined to account for the fact that irregular verbs are also semi-systematic?
- What does evidence from language development tell us about regular and irregular verbs?
- What are possible theories/models of the linguistic data?
- Are they cognitively plausible?
Irregular verbs seem to display some patterns!

- Suppletion (e.g., go → went) is exception rather than rule.
- These patterns are the fossils of rules that lived in the minds of Old English speakers.
- But, evidence suggests that these patterns are represented, in some way, in the minds of modern-day English speakers.
Irregular Verb Patterns

**Stem-past similarity**
Stems and their past tense alternants show non-random levels of sound similarity (e.g., *drink-drank* share [dr_nk]).

**Change-change similarity**
A few kinds of stem-past alternations are seen over and over again in the irregular verbs; e.g., the [i]-[a] alternation accounts for a large proportion of verbs (e.g., *drink, sing, begin*).

**Stem-stem similarity**
The stems in certain classes of strong\(^1\) verbs show non-random levels of sound similarity ([i]-[a] verbs tend to end with either -nk, -ng, or -n (e.g., *drink, sink, shrink, sing, spring, begin*).

Why is the human mind so impressed by sound similarity?

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\(^1\)Verbs in which a vowel inside the verb is changed to indicate different tenses.
The Sound Pattern of English (SPE)

- Theory of English sound system (Chomsky and Halle, 1968).
- Provides explanations for a range of phonological phenomena:
  - Why are bicket, dax and fep possible English words, but ftip, ptut and nganga aren’t?
  - Why does the stressed vowel shorten when the -ity nominalizing suffix is added to the adjective divine?
  - Why is Canada stressed on the first syllable, but Canadian on the second?
- Phenomena captured by just a few dozen phonological rules.
- Manages to account for the vast majority of English irregular verb inflections by adding just three additional rules!
SPE Rules for Irregular Verbs

Stem-past similarity, change-change similarity
If a verb has the sound *consonant-consonant-i-ng* change *i* to *u* (e.g., *cling-clung*).

- SPE rules essentially replace consonants and vowels.
- Several simple rules can account for one complex change.
- A few rules are shared by many verbs.
- Chomsky and Hale reject the words-and-rules dichotomy.

SPE is undeniably brilliant but is it true?
Problems with the SPE Theory of Irregular Verbs

**Q₁:** How could a child possibly learn these rules?

**Q₂:** Why would a child even bother to learn these rules?

**Q₃:** Is it not simpler to just memorize the past forms by rote?

- English speakers can produce irregular forms much more quickly than the regular forms; if they applied rules, it would take them longer (retrieval is faster than computation).
- SPE is not meant to be a theory of how children learn words or how adults represent words in their minds.
- Importantly, SPE fails to explain *stem-stem* similarity (*grow*-grew, *blow*-blew but *glow*-glowed, *show*-showed).

But how do children actually learn the past tense?
### Stages of Language Acquisition

<table>
<thead>
<tr>
<th>Age</th>
<th>Description</th>
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<tbody>
<tr>
<td>18 months</td>
<td>Children start to produce two-word microsentences. See baby!, More cereal! Allgone sticky! (i.e., my hands are clean) Circle toast (i.e. I want a bagel)</td>
</tr>
<tr>
<td>2 years</td>
<td>Children produce longer, more complicated sentences. They start to use grammatical morphemes: inflectional suffixes (e.g., -ed, -s, -ing) auxiliary verbs (e.g., have, be, do, will)</td>
</tr>
<tr>
<td>3 years</td>
<td>Children start to make errors, by attaching -ed to irregular verb stems and pass the wug-test. (e.g., sing-ed, bleed-ed; bing-binged).</td>
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</tbody>
</table>
Children don’t just overgeneralize from regular past tense forms!

- they overuse the plural suffix -s (*mans, foots, tooths, mouses*)
- they overuse the third person singular suffix -s (*haves, do’s, be’s*)
- they overuse the comparative -er and superlative suffixes -est (*specialer, powerfullest, gooder*)
- they overuse the ordinal suffix -th on numerals (*oneth, twoth*)
- Children find regularity in the oddest places.

Parent: No booze in the house!
Child: What’s a “boo”? 

Child: ”It did! It snew!”
[After being told it was going to snow.]
Children’s performance gets better as they get older. With inflectional morphology they get worse before getting better. This is what child psychologists call U-shaped development.

**Stage 1** children produce both regular and irregular past tense forms with very few errors.

**Stage 2** after a certain amount of time, the error rate appears to increase significantly; children add regular past tense suffix *-ed* to irregular verb stems even with verbs whose past tense forms they had previously mastered.

**Stage 3** the error rate slowly decreases, as the child gets older, until almost no errors are made.
U-Shaped Learning

- U-shaped learning in early childhood cognitive development.
- Child uses *spoke*, then *spaked*, and later again *spoke*.
The sudden deterioration in performance appears to be evidence for mental reorganization.

The child has inferred a new generalization involving previously unrelated concepts.

The rule which says "add -ed to form the past tense".
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Why is it that only children generate overregularization errors like *bleded* and *singed*?
The sudden deterioration in performance appears to be evidence for mental reorganization. The child has inferred a new generalization involving previously unrelated concepts. The rule which says “add -ed to form the past tense”.

Why is it that only children generate overregularization errors like *bleeded* and *singed*?

**Guess 1**
Adults communicate their thoughts more clearly than children by slowly learning to do that.
The sudden deterioration in performance appears to be evidence for mental reorganization. The child has inferred a new generalization involving previously unrelated concepts. The rule which says “add \(-ed\) to form the past tense”.

Why is it that only children generate overregularization errors like \textit{bleeded} and \textit{singed}?

**Guess 1**
Adults communicate their thoughts more clearly than children by slowly learning to do that.

**Guess 2**
Adults don’t say \textit{bleeded} and \textit{singed} because they don’t hear other adults saying these words.
The sudden deterioration in performance appears to be evidence for **mental reorganization**.

The child has inferred a new generalization involving previously unrelated concepts.

The rule which says “add *-ed* to form the past tense”.

**Why is it that only children generate overregularization errors like *bleded* and *singed*?**

**Guess 1**
Adults communicate their thoughts more clearly than children by slowly learning to do that.

**Guess 2**
Adults don’t say *bleded* and *singed* because they don’t hear other adults saying these words.

**Guess 3**
Adults have learned the **blocking principle**: *sang* blocks the past-tense rule from applying to *sing*. 
Q₁: How could a child learn the blocking principle from scratch?

A₁: They would need to learn explicitly that overregularized forms like *bleeded* and *singed* are ungrammatical, i.e., they need to have negative evidence to solve the problem.

Q₂: What would this negative feedback be?

A₂: An explicit correction, an indirect signal of disapproval (a frown, a puzzled look, a slap) or a failure to achieve some non-linguistic goal.

Q₃: Is there evidence that negative feedback has any effect on children’s language acquisition?

A₃: The answer is no!
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Q$_2$: What would this negative feedback be?
Learning how to Block

**Q₁**: How could a child learn the blocking principle from scratch?

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**Q₂**: What would this negative feedback be?

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Q₃: Is there evidence that negative feedback has any effect on children’s language acquisition?
A₃: The answer is no!
“Mommy Dolly hitted me,”
“Dolly HIT me.”
“You too?! Boy, she’s in trouble!”
The child could not talk but understood complex sentences.  
Gave dog a bone when it spoke correctly and a rock otherwise.  
Bones: heated, baked, showed, sewed. Rocks: eated, taked, knowed.  
Child recognized that forms were ungrammatical without making an error and noting parents’ response.
### Hypothesis

Blocking principle is part of **innate linguistic knowledge**; children don’t **learn** it from evidence that *singed* is not in English. They **deduce** that *singed* is not in English from the blocking principle.
Blocking as Innate Knowledge

**Hypothesis**

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**Why do adults use blocking more effectively than children?**
### Hypothesis

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**Why do adults use blocking more effectively than children?**

- Because they have more experience than children. They have heard irregular past tense verb forms being used more often.
- And memory retrieval improves through repetition.
- Adults retrieve the irregular verb forms from memory more quickly, and hence blocking is more likely to happen.
- Children are “little adults with bad memories”.

What is the past-tense form of the verb *shend*?

[*shend* means to shame]
What is the past-tense form of the verb *shend*?

*shend* means to shame

- *shended*
- *shent*
What is the past-tense form of the verb *shend*?

[*shend* means to shame]

- If you have answered *shended*, you have overgeneralized.
- The error is to be expected! Irregular forms are not predictable. The only way you could have produced *shent* is if you had previously heard and remembered it.
- Many verbs will be like *shent* for the child; she hasn’t heard them enough times to recall them on demand!
Theories of Regular and Irregular Verbs

<table>
<thead>
<tr>
<th>Hypothesis A</th>
<th>Regular past tense forms are formed by a rule. Irregular past tense forms are stored and retrieved as words.</th>
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<tbody>
<tr>
<td>Hypothesis B</td>
<td>Irregular past tense forms are also generated by rules. SPE captures irregular verbs with just three rules!</td>
</tr>
<tr>
<td>Hypothesis C</td>
<td>Regular past tense forms are formed by a rule which is blocked for irregular verbs. Blocking principle is innate.</td>
</tr>
<tr>
<td>Hypothesis D</td>
<td>There are no rules, only a general associative mechanism for recognizing patterns; reason by analogy.</td>
</tr>
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Can the study of regular and irregular English verbs shed light on how language works?

- Irregular verbs display some patterns, which sheds doubt on the words and rules theory.
- SPE proposes rules for irregular verbs too, but they are too rigid; there’s always exceptions, rule membership fuzzy.
- Perhaps words and rules theory can be salvaged, through innate blocking principle.
- Or, there are no rules at, all we need is a mechanism for recognizing patterns.

**Next lecture:** connectionism and neural networks.