

# Regular and Irregular Verbs: Part 2

Informatics 1 CG: Lecture 4

Mirella Lapata

School of Informatics  
University of Edinburgh  
mlap@inf.ed.ac.uk

January 19, 2016

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 Inflection is Semi-systematic

blow-blew, grow-grew, know-knew, . . .

bind-bound, find-found, grind-ground, . . .

drink-drank, shrink-shrank, sink-sank, . . .

bear-bore, wear-wore, swear-swore, . . .

- Irregular verbs seems 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.

## 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<sup>1</sup> 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?

---

<sup>1</sup>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 *blicket*, *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!**

## 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

**Q<sub>1</sub>:** How could a child possibly **learn** these rules?

**Q<sub>2</sub>:** Why would a child even **bother** to learn these rules?

**Q<sub>3</sub>:** 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

**18 months** 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)

**2 years** 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*)

**3years** 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*).

# Overzealous Grammarians

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 sing suffix *-s* (*haves, do's, be's*)
- they overuse the comparative *-er* and superlative suffixes *-est* (*specialer, powerfulest, 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.]

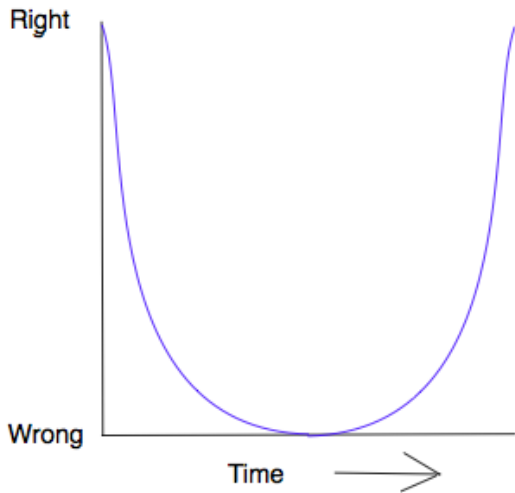
Children's performance gets better as they get older. With inflectional morphology they get worse before getting better. This is what child psychologists call **U-shaped development**.

**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 *speaked*, and later again *spoke*.

# Children versus Adults

- 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”.

# Children versus Adults

- 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*?

# Children versus Adults

- 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.

# Children versus Adults

- 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.

## Guess 2

Adults don't say *bleeded* and *singed* because they don't hear other adults saying these words.



# Children versus Adults

- 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.

## Guess 2

Adults don't say *bleeded* 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*.

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**A<sub>1</sub>:** 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.

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**A<sub>1</sub>:** 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.

**Q<sub>2</sub>:** What would this negative feedback be?

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**A<sub>1</sub>:** 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.

**Q<sub>2</sub>:** What would this negative feedback be?

**A<sub>2</sub>:** An explicit correction, an indirect signal of disapproval (a frown, a puzzled look, a slap) or a failure to achieve some non-linguistic goal.

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**A<sub>1</sub>:** 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.

**Q<sub>2</sub>:** What would this negative feedback be?

**A<sub>2</sub>:** An explicit correction, an indirect signal of disapproval (a frown, a puzzled look, a slap) or a failure to achieve some non-linguistic goal.

**Q<sub>3</sub>:** Is there evidence that negative feedback has any effect on children's language acquisition?

**Q<sub>1</sub>:** How could a child learn the blocking principle from scratch?

**A<sub>1</sub>:** They would need to learn **explicitly** that overregularized forms like *bleded* and *singed* are **ungrammatical**, i.e., they need to have **negative evidence** to solve the problem.

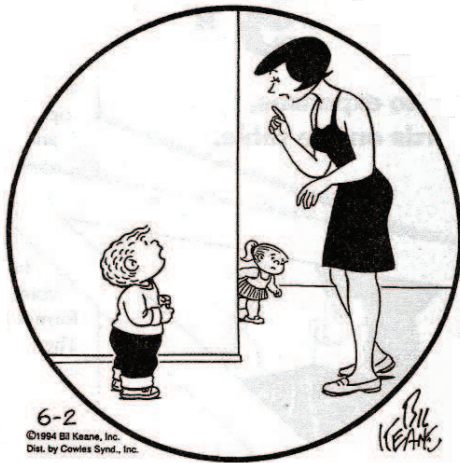
**Q<sub>2</sub>:** What would this negative feedback be?

**A<sub>2</sub>:** An explicit correction, an indirect signal of disapproval (a frown, a puzzled look, a slap) or a failure to achieve some non-linguistic goal.

**Q<sub>3</sub>:** Is there evidence that negative feedback has any effect on children's language acquisition?

**A<sub>3</sub>:** The answer is no!

# Negative Feedback



“Mommy Dolly hit 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.

# Blocking as Innate Knowledge

## 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

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.

Why do adults use blocking more effectively than children?

## 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.

## 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]

# A Little Experiment

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

[*shend* means to shame]

*shended*

*shent*

# A Little Experiment

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

[*shend* means to shame]

*shended*

*shent*

- 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

## Hypothesis A

Regular past tense forms are formed by a rule. Irregular past tense forms are stored and retrieved as words.

## Hypothesis B

Irregular past tense forms are also generated by rules. SPE captures irregular verbs with just three rules!

## Hypothesis C

Regular past tense forms are formed by a rule which is blocked for irregular verbs. Blocking principle is innate.

## Hypothesis D

There are no rules, only a general associative mechanism for recognizing patterns; reason by analogy.



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.