Phonology 4
rules & principles

Analysis of English Past tense morpheme

Hypothesis 1
English has 3 forms for the past tense morpheme

Hypothesis 2
English has only one past tense morpheme, the alternation in form can be accounted by a phonological rule.

Hypothesis 2a
Past tense morpheme: /-t/

Devoicing Rule:
C → [-voice] / [+voice]

Vowel Insertion Rule:
Ø → [ə] / C ___ C

Voicing Rule:
C → [+voice] / [-voice]

Vowel Deletion Rule:
[ə] → Ø / C ___ C

Hypothesis 2b
Past tense morpheme: /-d/

Devoicing Rule:
C → [-voice] / [+voice]

Vowel Insertion Rule:
Ø → [ə] / C ___ C

Voicing Rule:
C → [+voice] / [-voice]

Vowel Deletion Rule:
[ə] → Ø / C ___ C

Hypothesis 2c
Past tense morpheme: /-əd/

Devoicing Rule:
C → [-voice] / [+voice]

Vowel Insertion Rule:
Ø → [ə] / C ___ C

Voicing Rule:
C → [+voice] / [-voice]

Vowel Deletion Rule:
[ə] → Ø / C ___ C

Morpheme alternation (again)

(Regular) Past Tense Morpheme

beg/begged [brɛɡ] / [brɛɡd] / -d /
sob/sobbed [sʌb] / [sʌbd] / -d /
wreck/wrecked [rɛk] / [rɛkt] / -d /
stop/stopped [stɑp] / [stɑpt] / -t /
date / dated [deɪt] / [deɪt´d] / -d /
sand / sanded [sænd] / [sænd´d] / -d /

Necessary ingredients:

Devoicing Rule:
C → [-voice] / [-voice]

Voicing Rule:
C → [+voice] / [+voice]

Vowel Insertion Rule:
Ø → [ə] / C ___ C

Vowel Deletion Rule:
[ə] → Ø / C ___ C
Hypothesis 2b
Past tense morpheme: / -d /

Derivation:
\[ \text{[sab + d]} = \text{[sabd]} \]
Vowel Insertion → na
Devoicing Rule → na

Hypothesis 2c
Past tense morpheme: / -ad /

Derivation:
\[ \text{[sab + ad]} = \text{[sabad]} \]
Vowel Insertion → na
Devoicing Rule → na

How do we choose among these hypotheses?

• Criteria:
  – **Descriptive adequacy** — it must account for all the examined data
  – **Generality** — it should extend beyond the examined data
  – **Parsimony / Elegance** — it should do it with the fewest number of rules / principles / constraints

• As far as the criterion of Descriptive adequacy is concerned all 3 hypotheses qualify. Hence, we need to look further.

• For the 3 hypotheses we have postulated for the English past tense morpheme, we need to look at all the ingredients of the 3 hypotheses and judge them according to other criteria.

  Hypothesis 2a:
  \[ \text{[-t]} \]
  Rules:
  - Vowel Insertion
  - Voicing
  - Devoicing

  Hypothesis 2b:
  \[ \text{[-d]} \]
  Rules:
  - Vowel Insertion
  - Voicing
  - Devoicing

  Hypothesis 2c:
  \[ \text{[-əd]} \]
  Rules:
  - Vowel Deletion
  - Voicing
  - Devoicing

Voicing Rule

<table>
<thead>
<tr>
<th>Voicing Rule:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( C \rightarrow [+\text{voice}] / C \rightarrow [-\text{voice}] )</td>
</tr>
</tbody>
</table>

A voiced obstruent is devoiced when preceded by a voiceless obstruent.

Is this rule true in English in general? or Is this a rule that only applies to this suffix?

There are problems with this rule. According to this rule, we get the following result under Hypothesis 2a.

‘lean’ “learned” \([\text{lin} + \text{t} = \text{lint}]\)

because \([\text{n}]\) is not an obstruent it does not trigger voicing and we end up with the wrong surface form.
Devoicing Rule

Devoicing Rule:
\[ C \rightarrow \text{[voice]} / C \text{[+voice]} \]
\[ C \rightarrow \text{[voice]} / C \text{[voice]} \]
\[ C \rightarrow \text{[voice]} / C \text{[voice]} \]

A voiceless obstruent is voiced when preceded by a voiced obstruent.

Is this rule true in English in general? or Is this a rule that only applies to this suffix?

There are exceptions to this rule. For example: “anecdote” [anəˈkɪdə] – the [d] is not devoiced to [t] after a [k]. However, it is true for all English consonant sequences at the end of a word that two obstruents must match in voicing.

Voice Agreement Principle

Voice Agreement Principle:
In English, obstruents may not differ with respect to feature [voice] at the end of a word.

Devoicing Rule:
\[ C \rightarrow \text{[voice]} / C \text{[+voice]} \]
\[ C \rightarrow \text{[voice]} / C \text{[voice]} \]
\[ C \rightarrow \text{[voice]} / C \text{[voice]} \]

This principle predicts the existence of words like: kelp, vault, mint, dent, etc. and also the unacceptability of words like “[kɛlp],” “[vɔlət],” and others.

On the basis of the criterion of generality, we chose the devoicing rule over the voicing rule. This then, effectively eliminates Hypothesis 2a.

We are left with Hypotheses 2b and 2c

Hypothesis 2b:
/-d/
Rules:
• Vowel Insertion
• Devoicing

Hypothesis 2c:
/-əd/
Rules:
• Vowel deletion
• Devoicing

We know that the Devoicing rule has withstand the test of generality, so now we need to test the other two rules

Vowel Deletion Rule:
\[ \text{Ø} \rightarrow \text{[ə]} / C \text{[a place]} \]
\[ \text{Ø} \rightarrow \text{[ə]} / C \text{[β manner]} \]

Vowel deletion rule predicts that these words should surface without the schwa:
"[tIk,"] [pIk,"] [bEn"]

So, the vowel deletion rule is not general enough, it makes the wrong predictions regarding other English words. If we wanted to keep this rule, we would have to modify the rule to only apply to the past tense morpheme /-əd/.

[ə] deletion

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And the winner is:

Hypothesis 2b:
/-d/
Rules:
• Vowel Insertion
• Devoicing

Hypothesis 2c:
/-əd/
Rules:
• Vowel deletion
• Devoicing

So, the underlying form of the English tense morpheme is /-d/.

In order to generate the surface forms of the past tense verbs, the grammar also includes the rule of vowel insertion and the rule of devoicing.
### Principles vs. Rules

<table>
<thead>
<tr>
<th>ADJ</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>wide</td>
<td>width</td>
</tr>
<tr>
<td>broad</td>
<td>breadth</td>
</tr>
<tr>
<td>string</td>
<td>depth</td>
</tr>
<tr>
<td>deep</td>
<td>strength</td>
</tr>
</tbody>
</table>

-th \([T]\) = nominalizing suffix

**Violation of the Not-too-similar Principle**

This satisfies the condition for the Vowel Insertion Rule, so why don’t we have “smootheth”?

Phonological rules can be viewed as ways in which languages solve problems that arise when underlying forms violate some of the more general principles. However, languages have options in choosing which rule they will use to solve the violation with (a phonological rule, a different suffix, or a different word altogether).

<table>
<thead>
<tr>
<th>smooth *</th>
<th>smoothness</th>
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</thead>
<tbody>
<tr>
<td>shy</td>
<td>shyness</td>
</tr>
<tr>
<td>sweet</td>
<td>sweetness</td>
</tr>
</tbody>
</table>

### Linking Rules and Principles

One way to link phonological rules with the Principles they were motivated by is to prescribe the rule as a solution to a violation of the general principle.

**Revised Vowel Insertion Rule:**

a. Find every underlying string that violates the Not-Too-Similar Principle
b. In every such string insert a schwa, so that the result satisfies the principle

**Revised Devoicing Rule:**

a. Find every underlying string that violates the Voice Agreement Principle
b. In every such string change the voicing value of the affixal consonant, so that the result satisfies the principle