The Basics of Morphological Analysis
Supplementary Readings

The following readings have been posted to the Moodle course site:

▶ Contemporary Linguistics: Chapter 4 (pp. 143-146)
▶ Contemporary Linguistics: Morphophonemics Appendix
▶ Language Files: Chapter 4.5 (pp. 172-175)

The following reading (on Moodle) is not essential, but you might find it helpful/interesting:

▶ Language Instinct; Chapter 5 (119-152)
Rules of ‘Pronunciation’

Fact From Four Weeks Ago:
The **phonology** of a language includes rules that affect the pronunciation of particular **phones**.

▶ **Example:**
/\p/, /\t/, /\k/ in English are aspirated when they are the first sound in an onset.

Fact We Will Now Learn:
The **morphology** of a language includes rules that affect the pronunciation of particular **morphemes**.

▶ **Example:**
The past tense suffix /-d/ in English is pronounced as [-t] when preceding a voiceless C.
The Past Tense Suffix /-d/ in English

Fact From Last Unit:
In English, there is a suffix /-d/ that has the following properties:

▶ We write it as “-ed” (even though that’s not how it’s pronounced)
▶ It attaches to (most) verbs.
▶ It is inflectional.
▶ It means ‘past tense’ (the action happened in the past)

“buzz” [bʌz]     “buzzed” [bʌzd]
“sigh” [saj]     “sighed” [sajd]
“grab” [ɡræb]    “grabbed” [ɡræbd]
“call” [kɔl]     “called” [kɔld]
“fan” [fæn]      “fanned” [fænd]
“save” [sejv]    “saved” [sejvd]
Other Past Tense Morphology in English

Fact From Last Unit:
In English, some verbs form past tense via ‘internal change’ (ablaut).

“see” [si]  “saw” [sɔ]
“know” [now]  “knew” [nu]
“think” [θiŋk]  “thought” [θɔt]
“write” [wɒjt]  “wrote” [wɔwt]
“sing” [siŋ]  “sang” [sæŋ]
“give” [ɡɪv]  “gave” [ɡɛv]

This Rule is Different:
▶ Only some verbs form past tense in this way.
▶ New verbs never form their past tense this way (only with “-ed”).
▶ So, there isn’t really a (general) rule of ‘ablaut’ for English past-tense.
▶ For some ‘irregular’ verbs, we just have to memorize what their past-tense form is.
Other Past Tense Morphology in English

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In English, some verbs form past tense via ‘internal change’ (ablaut).

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<th>Pronunciation</th>
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<td>[si]</td>
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<td>[nu]</td>
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<td>“thought”</td>
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</tr>
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<td>[rəut]</td>
</tr>
<tr>
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This Rule is Different:

▶ Only some verbs form past tense in this way.
▶ New verbs never form their past tense this way (only with “-ed”)

Fact From Last Unit:
In English, some verbs form past tense via ‘internal change’ (ablaut).

“see” [si]  “saw” [sɔ]
“know” [nəu]  “knew” [nu]
“think” [θiŋk]  “thought” [θɔt]
“write” [rəjt]  “wrote” [rəut]
“sing” [sɪŋ]  “sang” [sæŋ]
“give” [gɪv]  “gave” [ɡɛv]
The Basics of Morphological Analysis

Supplementary Readings

Introducing Morphophonemics

Past Tense Morphology in English

Towards Morphophonemics

The Existence of a Rule

Morphemes and Allomorphs

Morphophonemic Analysis

Morphophonemics and Phonotactics

Practice: The Prefix ‘-/in/’

More Practice: Swedish Definite Suffixes

The Logic of Morphological Analysis

Other Past Tense Morphology in English

Fact From Last Unit:
In English, some verbs form past tense via ‘internal change’ (ablaut).

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This Rule is Different:

- Only some verbs form past tense in this way.
- New verbs never form their past tense this way (only with “-ed”)
  - So, there isn’t really a (general) rule of ‘ablaut’ for English past-tense.
- For some ‘irregular’ verbs, we do just have to memorize what their past-tense form is.
Towards Morphophonemics

Puzzling Fact 1:
In English, there is a suffix [-t] that has all the key properties of /-d/:
► We write it as “-ed” (even though that’s not how it’s pronounced)
► It attaches to (most) verbs.
► It is inflectional.
► It means ‘past tense’ (the action happened in the past)

“bake” [bejk] “baked” [bejkt]
“stuff” [stəf] “stuffed” [stəft]
“jump” [dʒʌmp] “jumped” [dʒʌmpd]
“kiss” [kɪs] “kissed” [kɪst]
“wish” [wɪʃ] “wished” [wɪʃt]
“froth” [ˈfroʊθ] “frothed” [ˈfroʊθt]
Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-id] that has all the key properties of /-d/:

- We write it as “-ed” (even though that’s not how it’s pronounced)
- It attaches to (most) verbs.
- It is inflectional.
- It means ‘past tense’ (the action happened in the past)

"fold"  [fowld]  "folded"  [fowldid]
"bat"  [bæt]  "batted"  [bætid]
"lift"  [lift]  "lifted"  [liftid]
"seed"  [sid]  "seeded"  [sidi]
Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-id] that has all the key properties of /-d/:

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“fold” [fowld]       “folded” [fowldid]
“bat” [bæt]         “batted” [bætid]
“lift” [lɪft]       “lifted” [lɪfid]
“seed” [sid]        “seeded” [sidid]

Question:
▶ Are these past tense forms with ‘[-t]’ and ‘[-id]’ like the ones with ablaut?
▶ Are they ‘irregular’ forms that we just have to memorize?
Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-id] that has all the key properties of /-d/:  
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“lift”  [lɪft]  “lifted”  [lɪftid]
“seed”  [sid]  “seeded”  [sidid]

Answer:  No!
▶ English speakers know which suffix to use for words they’ve never heard before!
Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-ɪd] that has all the key properties of /-d/:

▶ We write it as “-ed” (even though that’s not how it’s pronounced)
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▶ It means ‘past tense’ (the action happened in the past)

“fold” [fɔːld] “folded” [fɔːldɪd]
“bat” [bæt] “batted” [bætɪd]
“lift” [lɪft] “lifted” [lɪftɪd]
“seed” [sɪd] “seeded” [sɪdɪd]

Answer:  No!

▶ English speakers know which suffix to use for words they’ve never heard before!

“to slub” [slʌb] “slubbed”
Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-\textit{id}] that has all the key properties of /-d/:  

- We write it as “-ed” (even though that’s not how it’s pronounced)
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- It is inflectional.
- It means ‘past tense’ (the action happened in the past)

“fold” [\textit{fowld}]  “fold\textit{ed}” [\textit{fowld}\textit{id}]
“bat” [\textit{bæt}]  “batt\textit{ed}” [\textit{bæt}\textit{id}]
“lift” [\textit{lift}]  “lift\textit{ed}” [\textit{lift}\textit{id}]
“seed” [\textit{sid}]  “seed\textit{ed}” [\textit{sid}\textit{id}]

Answer: No!

- English speakers know which suffix to use \textit{for words they’ve never heard before!}

“to slub” [\textit{slɛb}]  “slub\textit{bed}” [\textit{slɛbd}]
Towards Morphophonemics

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In English, there is a suffix [-id] that has all the key properties of /-d/:

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“fold” [fəʊld]  “folded” [fəʊldɪd]
“bat” [bæt]      “batted” [bætɪd]
“lift” [lɪft]    “lifted” [lɪftɪd]
“seed” [sɪd]    “seeded” [sɪdɪd]

Answer: No!

- English speakers know which suffix to use for words they’ve never heard before!

“to slub” [slʌb] “slubbed” [slʌbd]
“to sluk” [slʌk] “slukked”

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<th>[fɔwlɒd]</th>
<th>&quot;folded&quot;</th>
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<td>&quot;bat&quot;</td>
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<td>[baetɪd]</td>
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Answer: No!

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Towards Morphophonemics

Puzzling Fact 2:
In English, there is a suffix [-id] that has all the key properties of /-d/:

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“fold” [fowld] “folded” [fowldid]
“bat” [bæt] “batted” [bætid]
“lift” [lɪft] “lifted” [lɪftɪd]
“seed” [sid] “seeded” [sidɪd]

Conclusion:
Whether a past-tense verb ends in [-d], [-t], [-id] is determined by a **general rule**.
Morphemes and Allomorphs

Conclusion
There's a rule stating whether past-tense verbs end in [-d], [-t], [-id].
Morphemes and Allomorphs

Conclusion
There’s a rule stating whether past-tense verbs end in [-d], [-t], [-id].

Key Observations:
These three suffixes have many properties in common:

▶ They attach to (most) verbs (including newly created ones)
▶ They are inflectional
▶ They mean ‘past tense’
▶ We write them as “-ed”
▶ They are all really similar in form
  ▶ They all end in an oral alveolar stop.
Morphemes and Allomorphs

Conclusion

There’s a rule stating whether past-tense verbs end in [-d], [-t], [-id].

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Key Idea:

▶ At some level, [-d], [-t], [-id] are really the ‘same suffix’, /-d/
▶ There’s a rule stating when to pronounce /-d/ as [-d], [-t], [-id]
Morphemes and Allomorphs

Key Idea:

- At some level, [-d], [-t], [-ɪd] are really the ‘same suffix’, /-d/
- There’s a **rule** stating when to pronounce /-d/ as [-d], [-t], [-ɪd]
Morphemes and Allomorphs

Key Idea:

- At some level, [-d], [-t], [-ɪd] are really the ‘same suffix’, /-d/
- There’s a rule stating when to pronounce /-d/ as [-d], [-t], [-ɪd]

Important Consequence:
Because of these kinds of rules, we need to distinguish:

- **Morpheme**: the affix as it is stored in memory (/-'d/)
- **Allomorph**: the affix as it is actually pronounced ([-d], [-t], [-ɪd])

Vocabulary:

**Morphophonemics** = The (study of) rules affecting the pronunciation of specific morphemes
Morphophonemic Analysis

Question:
How do we figure out the rule stating whether past-tense /-d/ is pronounced as [-d], [-t], [-id]?

Answer:
As with phonological rules, we can break down the process into a series of manageable steps...
Step 1: Get the Environments

Determine the environments of the allomorphs
Step 1: Get the Environments

Determine the environments of the allomorphs

Since these are all suffixes, we will write up three lists:

- The phones that precede the allomorph [-d]
- The phones that precede the allomorph [-t]
- The phones that precede the allomorph [-id]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

\[
\begin{array}{lll}
[b\acute{a}z\acute{d}] & [b\acute{e}jkt] & [f\acute{o}w\acute{l}d\acute{i}d] \\
[sajd] & [st\acute{a}ft] & [b\acute{e}t\acute{i}d] \\
[græbd] & [f\acute{r}\acute{c}\theta t] & [l\acute{i}ft\acute{i}d] \\
[kald] & [d\acute{g}\acute{m}\acute{p}\acute{t}] & [s\acute{i}d\acute{i}d] \\
[f\acute{æn}\acute{d}] & [kist] & \\
[sejvd] & [wi\breve{f}t] & \\
\end{array}
\]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[b\øzd]  [bejkt]  [fow\l\ød]
[sajd]  [st\øft]  [bæt\ød]
[græb\ød]  [fr\øt]  [lift\ød]
[kald]  [d\ømpt]  [sid\ød]
[fænd]  [kist]
[sejvd]  [wi\øt]

▶ The phones that precede the allomorph [-d]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[b] [j] [k] [t] [l] [d]

[a] [j] [b] [l] [n] [v]

[g] [r] [æ] [b] [d]

[k] [æ] [l] [d]

[f] [æ] [n] [d]

[se] [j] [v] [d]

[bejkt] [fowldid] [baetid]

[staf] [frct] [lftid]

[gmpt] [sidid]

[kist]

[wift]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bəz]d  [be]jkt  [fɔw]ldi[d]
[saj]d  [stɔ]ft  [bæt]id
[ɡræb]d  [fɔrθ]t  [lɪft]id
[kɔld]  [dʒʌmpt]  [sɪd]id
[fænd]  [kɪst]
[sejv]d  [wɪ]ft

▶ The phones that precede the allomorph [-d] [z] [aj]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bæzd]     [bejkt]     [fowldıd]
[sajd]     [stəft]     [bætıd]
[græbd]     [frəθt]     [lifıd]
[kalıd]     [dʒəmt]     [sidiıd]
[fænd]     [kist]     
[sejvıd]     [wiʃt]

▶ The phones that precede the allomorph [-d]
   [z] [aj] [b]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bæzd]  [bejkt]  [fowld]  
[sajd]  [st\ft]  [bætid]  
[græbd]  [f\ct]  [lifd]  
[kald]  [d\mpt]  [sidid]  
[fænd]  [kist]  
[sejvd]  [wi\t]  

▶ The phones that precede the allomorph [-d]  
[z] [aj] [b] [I]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

- [bæzd] [bejk\t] [fowl\d\d]
- [sajd] [st\df\t] [bæt\d]
- [græbd] [frc\theta\t] [lift\d]
- [kald] [d\jm\mpt] [sid\d]
- [fænd] [kist]
- [sejvd] [w\j\t]

- The phones that precede the allomorph [-d]
  - [z] [aj] [b] [l] [n]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bænd] [bejkkt] [fowldid]
[sajd] [stəft] [bætid]
[græbd] [fræθt] [lɪftid]
[kald] [dʒʌmpt] [sidid]
[fænd] [kist]
[sejvd] [wɪfɪt]

▶ The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

- [bəzɑd]  [bejkt]  [fəwldɪd]
- [sajd]  [stəft]  [bætɪd]
- [græbd]  [fərθt]  [lɪftɪd]
- [kɔld]  [dʒəmpt]  [sɪdɪd]
- [fænd]  [kɪst]
- [sejvɔd]  [wɪʃt]

- The phones that precede the allomorph [-d]  
  [z] [aj] [b] [l] [n] [v]
- The phones that precede the allomorph [-t]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bəz̪d̪]  [be deut̪]  [fowldi d̪]
[sajd̪]  [stəft̪]  [buat̪d̪]
[ɡræbd̪]  [frəθt̪]  [luft̪d̪]
[kald̪]  [ŋʌmp̪θt̪]  [sid̪d̪]
[fænd̪]  [kist̪]
[sejv d̪]  [wiʃt̪]

▶ The phones that precede the allomorph [-d]
   [z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
   [k]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bæzd] [bejkt] [fowldid]
[sajd] [stəft] [bætɪd]
[ɡræbd] [fɜʊt] [lɪftɪd]
[kæld] [dʒʌmpɪt] [sidɪd]
[fænd] [kɪst]
[sejvd] [wɪʃt]

▶ The phones that precede the allomorph [-d]
[z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
[k] [f]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

- [bæzd]  [bejkt]  [fowldid]
- [sajd]  [stʌft]  [bætid]
- [græbd]  [frɔt]  [liftd]
- [kɔld]  [ŋʌmpt]  [sidid]
- [faend]  [kist]
- [sejvd]  [wɪʃt]

- The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]

- The phones that precede the allomorph [-t]
  [k] [f] [θ]

Supplementary Readings
Introducing Morphophonemics
Morphophonemic Analysis
Step 1: Determine the Environments
Step 2: Look for Similarities
Step 3: Identify the Morpheme
Step 4: Write the Rules

Morphophonemics and Phonotactics
Practice: The Prefix ‘-in’

More Practice: Swedish Definite Suffixes

The Logic of Morphological Analysis
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[ba zd] [be jk t] [fowl d-id]
[saj d] [st af t] [ba en d]
[gr æ bd] [fr c ð t] [lif t-id]
[kal d] [dg æ mpt] [sid-id]
[fæ nd] [kist] [sid-id]
[se jv d] [wi j t]

▶ The phones that precede the allomorph [-d]
   [z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
   [k] [f] [θ] [p]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bəz̪d̪]  [bejkt]  [fɔwld̪id̪]
[sajd̪]  [stʌft]  [bætid̪]
[ɡræbd̪]  [frɛθt]  [lɪftid̪]
[kɔld̪]  [dʒʌmpt]  [sid̪id̪]
[fænd̪]  [kist]  
[sejvð]  [wɪʃt]

▶ The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bæzd] [bejk[t] [fowlid]d]
[sajd] [stʌft] [bætid]
[ɡræbd] [fɹθt] [lɪftd]
[kɔld] [dʒʌmp] [si]d]
[fænd] [kɪst]
[sejv]d] [wi[t]

▶ The phones that precede the allomorph [-d]
   [z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
   [k] [f] [θ] [p] [s] [ʃ]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

- [bækzd]  [bejk[t]  [fowlid]d
- [sajd]  [stf]t  [bætid]
- [græbd]  [frçt]  [lifid]
- [kald]  [dɔmpt]  [sid]d
- [fænd]  [kist]
- [sejvd]  [wift]

▶ The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]

▶ The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ]

▶ The phones that precede the allomorph [-id]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

- [bæzd] [bejk:t] [fowlidid]
- [sajd] [stæft] [bætid]
- [græbd] [fræθt] [lifid]
- [kald] [dʒɛmpt] [sidid]
- [fænd] [kist]
- [sejvd] [wift]

- The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]
- The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ]
- The phones that precede the allomorph [-id]
  [d]
Step 1: Get the Environments

Illustrative Past-Tense Forms:

[bazd]  [bejkt]  [fowldid]
[sajd]  [stft]  [baetid]
[græbd]  [frcθt]  [lftid]
[kald]  [χmppt]  [sidid]
[fænd]  [kist]
[sejvd]  [wit]  

» The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]

» The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ]

» The phones that precede the allomorph [-id]
  [d] [t]
Step 2: Look for Similarities

For each environment, look for similarities between the sounds.
Step 2: Look for Similarities

Step 2:
For each environment, look for similarities between the sounds.

- We want to write up three lists:
  - Similarities between the phones that precede the allomorph [-d]
  - Similarities between the phones that precede the allomorph [-t]
  - Similarities between the phones that precede the allomorph [-id]
Step 2: Look for Similarities

For each environment, look for similarities between the sounds.

We want to write up three lists:

- Similarities between the phones that precede the allomorph [-d]
- Similarities between the phones that precede the allomorph [-t]
- Similarities between the phones that precede the allomorph [-id]

Note:
For the purposes of this unit, consonants share nothing in common with vowels.
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

| [bəzd] | [bejk t] | [fowld i d] |
| [sajd] | [stəft] | [bæt i d] |
| [ɡræbd] | [fəcθ t] | [lɪft i d] |
| [kald] | [dʒæmpt] | [sid i d] |
| [fænd] | [kɪst] |               |
| [sejv d] | [wiʃ t] |               |
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

[bəzd] [bejkts] [fowlid]d
[sajd] [stʌft] [bætid]
[graebd] [frɔθt] [lifid]
[kald] [dʒʌmpbt] [sidid]
[fænd] [kist]
[seqvd] [wɪʃt]

▶ The phones that precede the allomorph [-d]
[z] [aj] [b] [l] [n] [v]
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

- *[bʌzd]*  
- *[sajd]*  
- *[græød]*  
- *[kald]*  
- *[fænd]*  
- *[sejvd]*

- *[bejkt]*  
- *[stʌft]*  
- *[frɔθt]*  
- *[dʒʌmpət]*  
- *[kɪst]*  
- *[wɪft]*

- *[fowldɪd]*  
- *[bætɪd]*  
- *[lɪftɪd]*  
- *[sɪdɪd]*

- ▶ The phones that precede the allomorph [-d]
  - [z] [aj] [b] [l] [n] [v]  
  - Nothing in Common
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

\[
\begin{array}{lll}
[b\text{\&z}d] & [b\text{\&j}kt] & [f\text{\&w}ld\text{\&i}d] \\
[sajd] & [st\text{\&a}ft] & [b\text{\&æ}tid] \\
[græbd] & [fr\text{\&c}θt] & [l\text{\&ift}id] \\
[kald] & [d\text{\&j}mpt] & [s\text{\&id}id] \\
[fænd] & [kist] & \\
[sejvd] & [w\text{\&i}ft] & \\
\end{array}
\]

- The phones that precede the allomorph [-d]
  \[z\] [a\text{\&}] [b] [l] [n] [v]  \textit{Nothing in Common}

- The phones that precede the allomorph [-t]
  \[k\] [f] [θ] [p] [s] [ʃ]
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

- \[\text{[b AZd]} \quad \text{[bejkt]} \quad \text{[fowlid ID]}\]
- \[\text{[sajd]} \quad \text{[stAft]} \quad \text{[baetid]}\]
- \[\text{[græbd]} \quad \text{[frcoth]} \quad \text{[liftid]}\]
- \[\text{[kalid]} \quad \text{[dympt]} \quad \text{[sidid]}\]
- \[\text{[faend]} \quad \text{[kist]}\]
- \[\text{[sejvd]} \quad \text{[wi[th]}\]

- ▶ The phones that precede the allomorph [-d]
  - [z] [aj] [b] [l] [n] [v]
  - Nothing in Common

- ▶ The phones that precede the allomorph [-t]
  - [k] [f] [θ] [p] [s] [ʃ]
  - All Voiceless!
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

- [bæzd]  [bejkt]  [fowldïd]
- [sajd]  [stæft]  [bætïd]
- [græbd]  [fræθt]  [lïftïd]
- [k ald]  [dʒæmt]  [sidïd]
- [fænd]  [kist]
- [sejvd]  [wiʃt]

- The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v] Nothing in Common
- The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ] All Voiceless!
- The phones that precede the allomorph [-ïd]
  [d] [t]
Step 2: Look for Similarities

Illustrative Past-Tense Forms:

- [bæzd] [bejkt] [fowldiđ]
- [sajd] [stæft] [bætidi]
- [græbd] [fɔcθt] [liftdiđ]
- [kæld] [dʒʌmp't] [sididi]
- [fænd] [kist]
- [sæv'd] [wɪft]

▶ The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v] 
  Nothing in Common

▶ The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ] 
  All Voiceless!

▶ The phones that precede the allomorph [-id]
  [d] [t] 
  All Oral Alveolar Stops!
Step 3: Identify the Morpheme

- There will (always) be **one** environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.
Step 3: Identify the Morpheme

Step 3:

- There will (always) be **one** environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

**Illustration:**

- The phones that precede the allomorph [-d]
  
  [z] [aj] [b] [l] [n] [v]  **Nothing in Common**

- The phones that precede the allomorph [-t]
  
  [k] [f] [θ] [p] [s] [ʃ]  **All Voiceless!**

- The phones that precede the allomorph [-ɨd]
  
  [d] [t]  **All Oral Alveolar Stops!**
Step 3: Identify the Morpheme

Step 3:

- There will (always) be **one** environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

**Illustration:**

- The phones that precede the allomorph [-d]
  [z] [aj] [b] [l] [n] [v]  **Nothing in Common**
- The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ]  **All Voiceless!**
- The phones that precede the allomorph [-ɪd]
  [d] [t]  **All Oral Alveolar Stops!**

**Result:**
The allomorph ‘[-d]’ is the (underlying) morpheme /-d/. 
Step 3: Identify the Morpheme

Step 3:

- There will (always) be one environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

The Logic Behind This Step:

- Suppose [X] is an allomorph whose environment doesn’t have any unifying property...
Step 3: Identify the Morpheme

Step 3:

- There will (always) be one environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

The Logic Behind This Step:

- Suppose [X] is an allomorph whose environment doesn’t have any unifying property...
- If [X] weren’t the (underlying) morpheme, then there’d have to be some rule like:
  - “The morpheme /Y/ is pronounced as the allomorph [X] in environment Z.”
Step 3: Identify the Morpheme

Step 3:

- There will (always) be one environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

The Logic Behind This Step:

- Suppose [X] is an allomorph whose environment doesn’t have any unifying property...
- If [X] weren’t the (underlying) morpheme, then there’d have to be some rule like:
  - “The morpheme /Y/ is pronounced as the allomorph [X] in environment Z.”
- But what would the environment ‘Z’ in such a rule be?
  - The sounds in [X]’s environment don’t share anything in common.
Step 3: Identify the Morpheme

Step 3:

- There will (always) be one environment where the phones share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

The Logic Behind This Step:

- Suppose [X] is an allomorph whose environment doesn’t have any unifying property...
- If [X] weren’t the (underlying) morpheme, then there’d have to be some rule like:
  - “The morpheme /Y/ is pronounced as the allomorph [X] in environment Z.”
- But what would the environment ‘Z’ in such a rule be?
  - The sounds in [X]’s environment don’t share anything in common.
- Therefore, there could not be a rule like the one above.
- Therefore, [X] itself must be the underlying morpheme, /X/
The Basics of Morphological Analysis

Supplementary Readings

Introducing Morphophonemics

Morphophonemic Analysis
- Step 1: Determine the Environments
- Step 2: Look for Similarities
- Step 3: Identify the Morpheme
- Step 4: Write the Rules

Morphophonemics and Phonotactics

Practice: The Prefix ‘-in’

More Practice: Swedish Definite Suffixes

The Logic of Morphological Analysis

Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:

'/Y/ → [X] / Z'

(Morpheme /Y/ is pronounced as allomorph [X] in environment Z)

Illustration:
- The phones that precede the allomorph [-1d] [-d] [d] Oral-Alveolar Stops!
- The phones that precede the allomorph [-t] [k] [f] [T] [p] [s] [S] Voiceless!
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:

‘/Y/ → [X] / Z’

(Morpheme /Y/ is pronounced as allomorph [X] in environment Z)
Step 4: Write the Rules

Step 4:
For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z ’
(Morpheme /Y/ is pronounced as allomorph [X] in environment Z)

Illustration:
- The phones that precede the allomorph [-id]
  [d] [t]  All Oral Alveolar Stops!
- The phones that precede the allomorph [-t]
  [k] [f] [θ] [p] [s] [ʃ]  All Voiceless!
Step 4: Write the Rules

Step 4:
For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph \([X]\) is found in environment \(Z\), the rule to write is:

\[ /Y/ \rightarrow [X]/Z \]

(Morpheme \(/Y/\) is pronounced as allomorph \([X]\) in environment \(Z\))

Illustration:

- The phones that precede the allomorph \([-\text{id}]\)
  \([d] [t]\)  
  **All Oral Alveolar Stops!**

- The phones that precede the allomorph \([-t]\)
  \([k] [f] [\theta] [p] [s] [\ʃ]\)  
  **All Voiceless!**

Rule 1:  
\[-d/ \rightarrow [-\text{id}] / \text{Oral-Alveolar-Stop} \]

Rule 2:  
\[-d/ \rightarrow [-t] / \text{Voiceless-C} \]
Morphophonemics and Phonotactics

Morphophonemic Rules for English Past-Tense:

- **Rule 1**: /-d/ → [-ıd] / Oral-Alveolar-Stop
- **Rule 2**: /-d/ → [-t] / Voiceless-C
Morphophonemics and Phonotactics

Morphophonemic Rules for English Past-Tense:

- Rule 1: /-d/ → [-id] / Oral-Alveolar-Stop
- Rule 2: /-d/ → [-t] / Voiceless-C

Important Fact:
These rules ‘fix’ phonological problems created by suffixing /-d/.

- Suffixation of /-d/ sometimes makes a word that can’t be pronounced!
- “bake” /bejk/ + /d/ = /bejkd/ (PROBLEM: /kd/ is not a possible coda!)
- “lift” /lIft/ + /d/ = /lIftd/ (PROBLEM: /td/ is not a possible coda!)
Morphophonemics and Phonotactics

Morphophonemic Rules for English Past-Tense:

- **Rule 1:** /-d/ → [-id] / Oral-Alveolar-Stop
- **Rule 2:** /-d/ → [-t] / Voiceless-C

Important Fact:
These rules ‘fix’ phonological problems created by suffixing /-d/.

- Suffixation of /-d/ sometimes makes a word that can’t be pronounced!
  - “bake” /bejk/ + /d/ = /bejkd/ → [bejkt]
    (SOLUTION: /kt/ is a possible coda!)
  - “lift” /lIft/ + /d/ = /lIftd/ → [lIftid]
    (SOLUTION: /t/ and /d/ are possible codas!)
Morphophonemics and Phonotactics

Morphophonemic Rules for English Past-Tense:

- Rule 1: /-d/ → [-iːd] / Oral-Alveolar-Stop
- Rule 2: /-d/ → [-t] / Voiceless-C

General Lesson:
Morphophonemic rules often exist to ‘fix’ phonological problems created by the morphology.

- Sometimes, morphology makes words that violate phonotactic constraints.
- Morphophonemic rules alter those words, making them consistent with phonotactics.
Morphophonemics and Phonotactics

Morphophonemic Rules for English Past-Tense:

- **Rule 1**: /-d/ → [-ɪd] / Oral-Alveolar-Stop
- **Rule 2**: /-d/ → [-t] / Voiceless-C

General Lesson:
Morphophonemic rules often exist to ‘fix’ phonological problems created by the morphology.

- Sometimes, morphology makes words that violate phonotactic constraints.
- Morphophonemic rules alter those words, making them consistent with phonotactics.

But *sometimes*, morphophonemic rules have **nothing** to do with phonotactics...
Some Negative Prefixes in English

“attentive” [ətˈɛntɪv] “inattentive” [ɪnəˈtɛntɪv]
“dependent” [dɪˈɛndənt] “independent” [ɪnˈdɪəpɛndənt]

“possible” [pəsəˈbəl] “impossible” [ɪmpəsəˈbəl]
“balanced” [bælənства] “imbalanced” [ɪmbælənства]

“complete” [kəmplət] “incomplete” [ɪnkləmplət]
“glorious” [ˈɡlɔriəs] “inglorious” [ˈɪŋɡlɔriəs]

Observations:

- The words on the right look like those on the left, except that they begin with: [ɪn-], [ɪm-], [ɪŋ-]

- The words on the right are the ‘opposites’ of the words on the left (Each prefix means ‘not’)

Step 1: Determine the Environments
Step 2: Look for Similarities
Step 3: Identify the Morpheme
Step 4: Write the Rules

More Practice: Swedish Definite Suffixes
Some Negative Prefixes in English

“attentive” [ətɛntɪv]  “inattentive” [ɪnətɛntɪv]
“dependent” [dɛndɛnt]  “independent” [ɪndɛndɛnt]

“possible” [pəsəbəl]  “impossible” [ɪmpəsəbəl]
“balanced” [bælənst]  “imbalanced” [ɪmbælənst]

“complete” [kwəmplɪt]  “incomplete” [ɪŋkwəmplɪt]
“glorious” [ɡlɔrɪəs]  “inglorious” [ɪŋɡlɔrɪəs]

Question:
Do we really see *three* different prefixes in the words above?
▶ Each prefix has a very similar form:
  ▶ Begins with [ɪ]
  ▶ Ends with a nasal stop: [ŋ], [m], [ŋ]
▶ Each prefix has the same meaning (i.e., ‘not A’)

The Basics of Morphological Analysis
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Practice: The Prefix ‘-/ɪn/’
  Step 1: Determine the Environments
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  Step 4: Write the Rules

More Practice: Swedish Definite Suffixes
The Logic of Morphological Analysis
Some Negative Prefixes in English

“attentive”  [əˈtɛntɪv]  “inattentive”  [ɪnəˈtɛntɪv]
“dependent”  [dɪˈpendənt]  “independent”  [ɪnˈdɛpəndənt]

“possible”  [pəˈsəbl]  “impossible”  [ɪmˈpəsəbl]
“balanced”  [bælənst]  “imbalanced”  [ɪmˈbælənst]

“complete”  [kəmˈplɪt]  “incomplete”  [ɪnˈkəmˈplɪt]
“glorious”  [ˈɡlɔriəs]  “inglorious”  [ˈɪnɡlɔriəs]

Idea:
Let’s apply the steps of ‘morphophonemic’ analysis, to see if we can relate these allomorphs to the same morpheme!
### Step 1: Determine the Environments

<table>
<thead>
<tr>
<th>Word</th>
<th>Phonemes</th>
<th>Word</th>
<th>Phonemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;attentive&quot;</td>
<td>[əˈtɛntɪv]</td>
<td>&quot;inattentive&quot;</td>
<td>[ɪnəˈtɛntɪv]</td>
</tr>
<tr>
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<tr>
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<td>[ˈɡlɔrɪəs]</td>
<td>&quot;inglorious&quot;</td>
<td>[ˈɪŋɡlɔrɪəs]</td>
</tr>
</tbody>
</table>

Phones that follow 

- [In-]: [t], [d]
- [Im-]: [p], [b]
- [IN-]: [k], [ɡ]
Step 1: Determine the Environments

“attentive”   \(\text{[}\text{\textipa{\textae\textntiv}}\text{]}\)   “inattentive”   \(\text{[}\text{\textipa{\textin\textae\textntiv}}\text{]}\)
“dependent”   \(\text{[}\text{\textipa{\textd\textep\textend\textent}}\text{]}\)   “independent”  \(\text{[}\text{\textipa{\textin\textd\textep\textend\textent}}\text{]}\)
“possible”    \(\text{[}\text{\textipa{\textp\textas\texteb\textl}}\text{]}\)   “impossible”   \(\text{[}\text{\textipa{\textim\textp\textas\texteb\textl}}\text{]}\)
“balanced”    \(\text{[}\text{\textipa{\textb\textael\texten\textst}}\text{]}\)   “imbalanced”   \(\text{[}\text{\textipa{\textim\textb\textael\texten\textst}}\text{]}\)
“complete”    \(\text{[}\text{\textipa{\textk\textmpl\textlit}}\text{]}\)   “incomplete”   \(\text{[}\text{\textipa{\textin\textk\textmpl\textlit}}\text{]}\)
“glorious”    \(\text{[}\text{\textipa{\textg\textl\textor\texti\textes}}\text{]}\)   “inglorious”   \(\text{[}\text{\textipa{\textin\textg\textl\textor\texti\textes}}\text{]}\)

▶ Phones that follow \([\text{in-}]:\)
Step 1: Determine the Environments

- “attentive” [ˈætnətɪv]
- “inattentive” [ɪnˈætnətɪv]
- “possible” [ˈpɒsəbl]
- “impossible” [ɪmˈpɒsəbl]
- “balanced” [ˈbælənst]
- “imbalanced” [ɪmˈbælənst]
- “complete” [kəmplɪt]
- “incomplete” [ɪnˈkɒmplɪt]
- “glorious” [ˈɡlɒriəs]
- “inglorious” [ɪŋˈɡlɔriəs]

▶ Phones that follow [ɪn-]: [ʌ],
## Step 1: Determine the Environments

<table>
<thead>
<tr>
<th>“attentive”</th>
<th>inattentive</th>
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</tr>
</thead>
<tbody>
<tr>
<td>[ətɛntɪv]</td>
<td>[ɪnətɛntɪv]</td>
<td>[ɪndɪpesdɛnt]</td>
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<th>“possible”</th>
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<th>imbalanced</th>
</tr>
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<tbody>
<tr>
<td>[pəsəbl]</td>
<td>[ɪmpəsəbl]</td>
<td>[bælənst]</td>
<td>[ɪmbælənst]</td>
</tr>
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<tr>
<td>[kəmplɪt]</td>
<td>[ɪŋkəmplɪt]</td>
<td>[ɡləriəs]</td>
<td>[ɪŋɡləriəs]</td>
</tr>
</tbody>
</table>

- Phones that follow [ɪn-]: [ʌ], [d]
### Step 1: Determine the Environments

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<thead>
<tr>
<th>Word</th>
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- Phones that follow [ɪm-]: [ɪŋ]
Step 1: Determine the Environments

“attentive” [ətɛntɪv]  "inattentive" [ɪnətɛntɪv]
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“complete” [kəmplɪt]  "incomplete" [ɪnˈkəmplɪt]
“glorious” [ˈɡlɔrɪəs]  "inglorious" [ˈɪŋɡlɔrɪəs]

▶ Phones that follow [ɪn-]: [ʌ], [d]
▶ Phones that follow [ɪm-]: [p],
Step 1: Determine the Environments

“attentive” [ətɛntɪv] “inattentive” [ɪnətɛntɪv]
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“complete” [kəmplɪt] “incomplete” [ɪnˈkæmplɪt]
“glorious” [ˈɡlɔrɪəs] “inglorious” [ˈɪŋɡlɔrɪəs]

▶ Phones that follow [ɪn-]: [ʌ], [d]
▶ Phones that follow [ɪm-]: [p], [b]
Step 1: Determine the Environments

“attentive” \[\lambda \text{-}e\text{ntiv}\] “inattentive” \[\text{i}n\lambda \text{-}e\text{ntiv}\]
“dependent” \[\text{d}\text{e}\text{p}\text{e}\text{n}\text{d}\text{e}\text{n}\text{t}\] “independent” \[\text{i}n\text{d}\text{e}\text{p}\text{e}\text{n}\text{d}\text{e}\text{n}\text{t}\]
“possible” \[\text{p}\text{a}\text{s}\text{e}\text{b}\text{e}\text{l}\] “impossible” \[\text{i}m\text{p}\text{a}\text{s}\text{e}\text{b}\text{e}\text{l}\]
“balanced” \[\text{b}\text{æ}\text{l}\text{e}\text{n}\text{t}\text{n}\] “imbalanced” \[\text{i}m\text{b}\text{æ}\text{l}\text{e}\text{n}\text{t}\text{n}\]
“complete” \[\text{k}\text{a}\text{m}\text{p}\text{l}\text{i}\text{t}\] “incomplete” \[\text{i}n\text{k}\text{a}\text{m}\text{p}\text{l}\text{i}\text{t}\]
“glorious” \[\text{g}\text{l}\text{o}\text{r}\text{i}\text{s}\] “inglorious” \[\text{i}n\text{g}\text{l}\text{o}\text{r}\text{i}\text{s}\]

▶ Phones that follow [\text{in-}]: \[\lambda, \text{[d]}\]
▶ Phones that follow [\text{im-}]: \[\text{p}, \text{[b]}\]
▶ Phones that follow [\text{i}\text{n}\text{-}]:
### Step 1: Determine the Environments

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<tr>
<th>Word</th>
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</tr>
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</tr>
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</table>

- Phones that follow [ɪn-]: [ʌ], [d]
- Phones that follow [ɪm-]: [p], [b]
- Phones that follow [ɪŋ-]: [k], [ŋ]
Step 1: Determine the Environments

“attentive” [əˈtɛntiv] “inattentive” [ɪnəˈtɛntiv]
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“glorious” [ˈɡlɔrɪəs] “inglorious” [ˈɪŋɡlɔrɪəs]

▶ Phones that follow [ɪn-]: [ʌ], [d]
▶ Phones that follow [ɪm-]: [p], [b]
▶ Phones that follow [ɪŋ-]: [k], [g]
### Step 2: Look for Similarities

| “attentive” | [ətɛntɪv] | “inattentive” | [ɪnətɛntɪv] |
| “dependent” | [dɛrdɛndənt] | “independent” | [ɪndɛrdɛndənt] |
| “possible” | [pɔsəbə] | “impossible” | [ɪmpɔsəbə] |
| “balanced” | [bælənst] | “imbalanced” | [ɪmbælənst] |
| “complete” | [kəmplɪt] | “incomplete” | [ɪŋkəmplɪt] |
| “glorious” | [ɡlɔrɪəs] | “inglorious” | [ɪŋɡlɔrɪəs] |
Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>“attentive”</th>
<th>[ʌtɛntɪv]</th>
<th>“inattentive”</th>
<th>[ɪnʌtɛntɪv]</th>
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<tr>
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</tr>
</tbody>
</table>

- Phones that follow [ɪn-]: [ʌ], [d]

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*The Basics of Morphological Analysis*

*Supplementary Readings*

*Introducing Morphophonemics*

*Morphophonemic Analysis*

*Morphophonemics and Phonotactics*

*Practice: The Prefix ‘-/ɪn/’*

Step 1: Determine the Environments

Step 2: Look for Similarities

Step 3: Identify the Morpheme

Step 4: Write the Rules

*More Practice: Swedish Definite Suffixes*

*The Logic of Morphological Analysis*
Step 2: Look for Similarities

| “attentive”  | [ətɛntɪv] | “inattentive” | [ɪnətɛntɪv] |
| “dependent”  | [dəˈpɛndənt] | “independent” | [ɪndəˈpɛndənt] |
| “possible”   | [pəsəbəl] | “impossible” | [ɪmpəsəbəl] |
| “balanced”   | [bælənst] | “imbalanced” | [ɪmbælənst] |
| “complete”   | [kəmplɪt] | “incomplete” | [ɪŋkəmplɪt] |
| “glorious”   | [ˈɡlɔːriəs] | “inglorious” | [ˈɪŋɡlɔːriəs] |

- Phones that follow [ɪn-]: [ʌ], [d] | **Nothing in Common**
### Step 2: Look for Similarities

<table>
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<tr>
<th>Word</th>
<th>Phoneme</th>
<th>Word</th>
<th>Phoneme</th>
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<td>“attentive”</td>
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<td>/ɪnəˈtɛntɪv/</td>
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<td>/ˈɪŋɡlərɪəs/</td>
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- Phones that follow [ɪn-]: [ʌ], [d]  
  **Nothing in Common**
- Phones that follow [ɪm-]: [p], [b]
Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>English Word</th>
<th>Phoneme</th>
<th>English Word</th>
<th>Phoneme</th>
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</tbody>
</table>

- Phones that follow [ɪn-]: [ʌ], [d]  Nothing in Common
- Phones that follow [ɪm-]: [p], [b]  Bilabial Oral Stops
Step 2: Look for Similarities

“attentive” [ətɛntɪv] “inattentive” [ɪnətɛntɪv]
“dependent” [dəˈpɛndənt] “independent” [ɪnˈdɛpɛndənt]

“possible” [pəsəbəl] “impossible” [ɪmˈpæsəbəl]
“balanced” [bælənst] “imbalanced” [ɪmˈbælənst]

“complete” [kəmplɪt] “incomplete” [ɪŋkəmplɪt]
“glorious” [ɡləriəs] “inglorious” [ɪŋɡləriəs]

- Phones that follow [ɪn-]: [ʌ], [d] Nothing in Common
- Phones that follow [ɪm-]: [p], [b] Bilabial Oral Stops
- Phones that follow [ɪŋ-]: [k], [ɡ]
Step 2: Look for Similarities

“attentive” [ətɛntɪv] “inattentive” [ɪnətɛntɪv]
“dependent” [dɛpɛndənt] “independent” [ɪndɛpɛndənt]

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“balanced” [bælənst] “imbalanced” [ɪmbaɛlənst]

“complete” [kʌmplɪt] “incomplete” [ɪnkomplɪt]
“glorious” [gloʊrɪəs] “inglorious” [ɪŋglɔrɪəs]

▶ Phones that follow [ɪn-]: [ʌ], [d] Nothing in Common
▶ Phones that follow [ɪm-]: [p], [b] Bilabial Oral Stops
▶ Phones that follow [ɪŋ-]: [k], [ɡ] Velar Oral Stops
Step 3: Identify the Morpheme

-find the allomorph such that the sounds in its environment share nothing in common.

Choose that allomorph as the (underlying) morpheme.
Step 3: Identify the Morpheme

- Find the allomorph such that the sounds in its environment share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

Environments of the Allomorphs:

- Phones that follow [ɪn-]: [ʌ], [d] Nothing in Common
- Phones that follow [ɪm-]: [p], [b] Bilabial Oral Stops
- Phones that follow [ɪŋ-]: [k], [ɡ] Velar Oral Stops
Step 3: Identify the Morpheme

| “attentive”  | [ətɛntɪv] | “inattentive”  | [ɪnətɛntɪv] |
| “dependent” | [dəˈpɛndənt] | “independent”  | [ɪnˈdɛpendənt] |
| “possible”  | [pəˈsɛbl] | “impossible”  | [ɪmˈpæsəbl] |
| “balanced” | [ˈbælənst] | “imbalanced”  | [ɪmˈbælənst] |
| “complete”  | [kəmˈplɪt] | “incomplete”  | [ɪnˈkæmˈplɪt] |
| “glorious” | [ˈɡləriəs] | “inglorious”  | [ˈɪŋɡləriəs] |

Step 3:

- Find the allomorph such that the sounds in its environment share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

Environments of the Allomorphs:

- Phones that follow [ɪn-]: [ʌ], [d]  
  Nothing in Common
### Step 3: Identify the Morpheme

| “attentive” | “inattentive” | “dependent” | “independent” |
| "possible" | “impossible” | “balanced” | “imbalanced” |
| “complete” | “incomplete” | “glorious” | “inglorious” |

#### Environments of the Allomorphs:

- Phones that follow [ɪn-]: [ʌ], [d]  **Nothing in Common**

#### Conclusion:

The underlying morpheme is /ɪn-/
### Step 4: Write the Rules

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#### Step 4:
For the remaining allomorphs, write out the rules that would limit them to their observed environments.

#### Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z’
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z’

Environments for Remaining Allomorphs:
- Phones that follow [Im-]: [p], [b]  Bilabial Oral Stops
- Phones that follow [In-]: [k], [g]  Velar Oral Stops
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z’

Environments for Remaining Allomorphs:

- /İn-/ → [İm] / _____ Biliabial-Oral-Stop
- Phones that follow [İn-]: [k], [g] Velar Oral Stops
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z’

Environments for Remaining Allomorphs:

▶ /in-/ → [im] / _____ Biliabial-Oral-Stop
▶ /in-/ → [ŋ] / _____ Velar-Oral-Stop
Morphophonemics and Phonotactics

Morphophonemic Rules for /ɪn-/:

- /ɪn-/ → [ɪm] / Biliabial-Oral-Stop
- /ɪn-/ → [ɪŋ] / Velar-Oral-Stop

Observation:
- Unlike the rules for past-tense, these rules don’t serve to ‘fix’ phonotactic violations.
- Even if the rules didn’t apply, we could still pronounce the words.

*inpossible
*incompatible

Conclusion:
- Some morphophonemic rules don’t fix phonotactic violations.
- Instead, they kinda take place ‘just because’.
Morphophonemics and Phonotactics

Morphophonemic Rules for /ɪn-/:

- /ɪn-/ → [ɪm] / Biliabial-Oral-Stop
- /ɪn-/ → [ɪŋ] / Velar-Oral-Stop

Observation:

- Unlike the rules for past-tense, these rules don’t serve to ‘fix’ phonotactic violations.
- Even if the rules didn’t apply, we could still pronounce the words.

*impossible [ɪnpəsɪbəl] (unpopular [ʌnpəpjuːlər])
*incompatible [ɪnkəmpətəbl] (uncaring [ʌnkeˈjeəriŋ])
Morphophonemetics and Phonotactics

Morphophonemic Rules for /ɪn-/:

- /ɪn-/ → [ɪm] / _____ Biliabial-Oral-Stop
- /ɪn-/ → [ɪŋ] / _____ Velar-Oral-Stop

Observation:

- Unlike the rules for past-tense, these rules don’t serve to ‘fix’ phonotactic violations.
- Even if the rules didn’t apply, we could still pronounce the words.

*impossible  [ɪmpləsəuble]  (unpopular  [ʌnpəryʌbl])
*incompatible  [ɪnkompləMtəbəl]  (uncaring  [ʌnkeəriŋ])

Conclusion:

- Some morphophonemic rules don’t fix phonotactic violations
- Instead, they kinda take place ‘just because’.
Let’s do one last morphophonemic problem together, just to practice this all one last time.

This problem will contain an extra ‘difficulty’ that you won’t find on the problems you’ll be assigned.
Definite Suffixes in Swedish

Consider the following pairs of words from Swedish:

<table>
<thead>
<tr>
<th>Word</th>
<th>Translation</th>
<th>Word</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[tidniŋ]</td>
<td>‘newspaper’</td>
<td>[tidniŋen]</td>
<td>‘the newspaper’</td>
</tr>
<tr>
<td>[lampa]</td>
<td>‘lamp’</td>
<td>[lampan]</td>
<td>‘the lamp’</td>
</tr>
<tr>
<td>[sofa]</td>
<td>‘sofa’</td>
<td>[sofan]</td>
<td>‘the sofa’</td>
</tr>
<tr>
<td>[katar]</td>
<td>‘cats’</td>
<td>[katarna]</td>
<td>‘the cats’</td>
</tr>
<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarna]</td>
<td>‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna]</td>
<td>‘the chairs’</td>
</tr>
</tbody>
</table>

Observations:
▶ The words on the right look just like those on the left, except they end in [-en], [-n], [-na].
▶ The words on the right mean “the” + the word on the left.
▶ (All three suffixes seem to mean ‘the’).
Definite Suffixes in Swedish

Consider the following pairs of words from Swedish:

<table>
<thead>
<tr>
<th>Swedish</th>
<th>English</th>
<th>Swedish</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[tidni]</td>
<td>‘newspaper’</td>
<td>[tidniлежа]</td>
<td>‘the newspaper’</td>
</tr>
<tr>
<td>[lampa]</td>
<td>‘lamp’</td>
<td>[lampan]</td>
<td>‘the lamp’</td>
</tr>
<tr>
<td>[sofa]</td>
<td>‘sofa’</td>
<td>[sofan]</td>
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</tr>
<tr>
<td>[katar]</td>
<td>‘cats’</td>
<td>[katarna]</td>
<td>‘the cats’</td>
</tr>
<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarna]</td>
<td>‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarна]</td>
<td>‘the chairs’</td>
</tr>
</tbody>
</table>

Observations:

- The words on the right look just like those on the left, except they end in [-en], [-n], [-na]
- The words on the right mean “the” + the word on the left
- (All three suffixes seem to mean ‘the’)

Definite Suffixes in Swedish
**Definite Suffixes in Swedish**

Consider the following pairs of words from Swedish:

<table>
<thead>
<tr>
<th>Swedish Word</th>
<th>Pronunciation</th>
<th>Swedish Definite Suffixes</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol] ‘chair’</td>
<td>[stolen] ‘the chair’</td>
<td></td>
</tr>
<tr>
<td>[kat] ‘cat’</td>
<td>[katen] ‘the chair’</td>
<td></td>
</tr>
<tr>
<td>[tidniŋ] ‘newspaper’</td>
<td>[tidniŋen] ‘the newspaper’</td>
<td></td>
</tr>
<tr>
<td>[lampa] ‘lamp’</td>
<td>[lampan] ‘the lamp’</td>
<td></td>
</tr>
<tr>
<td>[sofa] ‘sofa’</td>
<td>[sofan] ‘the sofa’</td>
<td></td>
</tr>
<tr>
<td>[katar] ‘cats’</td>
<td>[katarna] ‘the cats’</td>
<td></td>
</tr>
<tr>
<td>[bilar] ‘cars’</td>
<td>[bilarna] ‘the cars’</td>
<td></td>
</tr>
<tr>
<td>[stolar] ‘chairs’</td>
<td>[stolarina] ‘the chairs’</td>
<td></td>
</tr>
</tbody>
</table>

**Question:**

▶ Does Swedish really have three different suffixes meaning ‘the’?
▶ Or, can we relate these as allomorphs of the same morpheme?
### Step 1: Determine the Environments

<table>
<thead>
<tr>
<th>Swedish Word</th>
<th>Transcription</th>
<th>Swedish</th>
<th>Transcription</th>
<th>Swedish</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen]</td>
<td>‘the chair’</td>
<td></td>
</tr>
<tr>
<td>[kat]</td>
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<td>[katen]</td>
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<tr>
<td>[tidniŋ]</td>
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<td>[katarna]</td>
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<td>‘cars’</td>
<td>[bilarna]</td>
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<td></td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna]</td>
<td>‘the chairs’</td>
<td></td>
</tr>
</tbody>
</table>

- Phones that precede [−en]: [l][t][N]
- Phones that precede [−n]: [a]
- Phones that precede [−na]: [r]
Step 1: Determine the Environments

[stol] 'chair'  [stolen] ‘the chair’
[kat] ‘cat’  [katen] ‘the chair’
[tidniŋ] ‘newspaper’  [tidniŋen] ‘the newspaper’
[lampa] ‘lamp’  [lampan] ‘the lamp’
[sofa] ‘sofa’  [sofan] ‘the sofa’
[katar] ‘cats’  [katarna] ‘the cats’
[bilar] ‘cars’  [bilarna] ‘the cars’
[stolar] ‘chairs’  [stolarna] ‘the chairs’

▶ Phones that precede [-en]:
Step 1: Determine the Environments

- **Phones that precede [-en]:** [l]

<table>
<thead>
<tr>
<th>Item</th>
<th>Pronunciation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen] ‘the chair’</td>
</tr>
<tr>
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<tr>
<td>[katar]</td>
<td>‘cats’</td>
<td>[katarna] ‘the cats’</td>
</tr>
<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarña] ‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna] ‘the chairs’</td>
</tr>
</tbody>
</table>
Step 1: Determine the Environments

- [stol] ‘chair’
- [kat] ‘cat’
- [tidniŋ] ‘newspaper’
- [lampa] ‘lamp’
- [sofa] ‘sofa’
- [katar] ‘cats’
- [bilar] ‘cars’
- [stolar] ‘chairs’

- [stolen] ‘the chair’
- [katen] ‘the chair’
- [tidniŋen] ‘the newspaper’
- [lampan] ‘the lamp’
- [sofan] ‘the sofa’
- [katarna] ‘the cats’
- [bilarna] ‘the cars’
- [stolarna] ‘the chairs’

Phones that precede [-en]: [l] [t]
### Step 1: Determine the Environments

| [stol]  | ‘chair’   | [stolen] | ‘the chair’  |
| [kat]   | ‘cat’     | [katen]  | ‘the chair’  |
| [tidniŋ] | ‘newspaper’ | [tidniŋen] | ‘the newspaper’ |
| [lampa] | ‘lamp’    | [lampan] | ‘the lamp’   |
| [sofa]  | ‘sofa’    | [sofan]  | ‘the sofa’   |
| [katar] | ‘cats’    | [katarna] | ‘the cats’  |
| [bilar] | ‘cars’    | [bilarña] | ‘the cars’  |
| [stolar] | ‘chairs’  | [stolarña] | ‘the chairs’ |

- Phones that precede [-en]: [l] [t] [ŋ]
Step 1: Determine the Environments

| [stol]  | ‘chair’   | [stolen]  | ‘the chair’ |
| [kat]   | ‘cat’     | [katen]   | ‘the chair’ |
| [tidniŋ] | ‘newspaper’ | [tidniŋen] | ‘the newspaper’ |

| [lampa] | ‘lamp’   | [lampan] | ‘the lamp’ |
| [sofa]  | ‘sofa’   | [sofan]  | ‘the sofa’ |

| [katar] | ‘cats’   | [katarna] | ‘the cats’ |
| [bilar] | ‘cars’   | [bilara]  | ‘the cars’ |
| [stolar] | ‘chairs’ | [stolarna] | ‘the chairs’ |

- Phones that precede [-en]: [l] [t] [ŋ]
- Phones that precede [-n]:
Step 1: Determine the Environments

- **Phones that precede [−en]:** [l] [t] [ŋ]
- **Phones that precede [−n]:** [a]

<table>
<thead>
<tr>
<th>[stol]</th>
<th>‘chair’</th>
<th>[stolen]</th>
<th>‘the chair’</th>
</tr>
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<tbody>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[tidniŋ]</td>
<td>‘newspaper’</td>
<td>[tidniŋen]</td>
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<tr>
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<td>[bilarna]</td>
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</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarña]</td>
<td>‘the chairs’</td>
</tr>
</tbody>
</table>
### Step 1: Determine the Environments

| [stol]   | ‘chair’     | [stolen]   | ‘the chair’ |
| [kat]    | ‘cat’       | [katen]    | ‘the chair’ |
| [tidnį]  | ‘newspaper’ | [tidnįen]  | ‘the newspaper’ |
| [lampa]  | ‘lamp’      | [lampan]   | ‘the lamp’  |
| [sofa]   | ‘sofa’      | [sofan]    | ‘the sofa’  |
| [katar]  | ‘cats’      | [katarna]  | ‘the cats’ |
| [bilar]  | ‘cars’      | [bilarna]  | ‘the cars’ |
| [stolar] | ‘chairs’    | [stolarna] | ‘the chairs’ |

- Phones that precede [-en]: [l] [t] [ŋ]
- Phones that precede [-n]: [a]
- Phones that precede [-na]:
Step 1: Determine the Environments

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen]</td>
</tr>
<tr>
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<td>[katen]</td>
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</tr>
<tr>
<td>[katar]</td>
<td>‘cats’</td>
<td>[katarn]</td>
</tr>
<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarn]</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarn]</td>
</tr>
</tbody>
</table>

- Phones that precede [-en]: [l] [t] [ŋ]
- Phones that precede [-n]: [a]
- Phones that precede [-na]: [r]
### Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>English Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen] ‘the chair’</td>
</tr>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen] ‘the chair’</td>
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<tr>
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<tr>
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<tr>
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<td>[katarna] ‘the cats’</td>
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<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarna] ‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna] ‘the chairs’</td>
</tr>
</tbody>
</table>

- **Phones that precede **[-en]**:**
  - All are consonants

- **Phones that precede **[-n]**:**
  - All are vowels

- **Phones that precede **[-na]**:**
  - All are vowels
**Step 2: Look for Similarities**

<table>
<thead>
<tr>
<th>[stol]</th>
<th>‘chair’</th>
<th>[stolen]</th>
<th>‘the chair’</th>
</tr>
</thead>
<tbody>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen]</td>
<td>‘the chair’</td>
</tr>
<tr>
<td>[tidniŋ]</td>
<td>‘newspaper’</td>
<td>[tidniŋen]</td>
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<tr>
<td>[lampa]</td>
<td>‘lamp’</td>
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<tr>
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</tr>
<tr>
<td>[katar]</td>
<td>‘cats’</td>
<td>[katarəna]</td>
<td>‘the cats’</td>
</tr>
<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarəna]</td>
<td>‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarəna]</td>
<td>‘the chairs’</td>
</tr>
</tbody>
</table>

- Phones that precede [-en]: [l] [t] [n]
Step 2: Look for Similarities

- **[stol]** ‘chair’  
- **[kat]** ‘cat’  
- **[tidniŋ]** ‘newspaper’  
- **[lampa]** ‘lamp’  
- **[sofa]** ‘sofa’  
- **[katar]** ‘cats’  
- **[bilar]** ‘cars’  
- **[stolar]** ‘chairs’  

- **[stolen]** ‘the chair’  
- **[katen]** ‘the chair’  
- **[tidniŋen]** ‘the newspaper’  
- **[lampan]** ‘the lamp’  
- **[sofan]** ‘the sofa’  
- **[katarna]** ‘the cats’  
- **[bilarna]** ‘the cars’  
- **[stolarna]** ‘the chairs’

- Phones that precede [-en]: [l] [t] [ŋ]  
  All are consonants
Step 2: Look for Similarities

| [stol] | ‘chair’ | [stolen] | ‘the chair’ |
| [kat]  | ‘cat’   | [katen]  | ‘the chair’ |
| [tidniŋ] | ‘newspaper’ | [tidniŋen] | ‘the newspaper’ |
| [lampa] | ‘lamp’ | [lampan] | ‘the lamp’ |
| [sofa]  | ‘sofa’ | [sofan]  | ‘the sofa’ |
| [katar] | ‘cats’ | [katarna] | ‘the cats’ |
| [bilar] | ‘cars’ | [bilarña] | ‘the cars’ |
| [stolar] | ‘chairs’ | [stolarna] | ‘the chairs’ |

- Phones that precede [-en]: [l] [t] [ŋ] All are consonants
- Phones that precede [-n]: [a]
Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolen] ‘the chair’</td>
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<td>[katar]</td>
<td>‘cats’</td>
<td>[katarina] ‘the cats’</td>
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<tr>
<td>[bilar]</td>
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<td>[bilarna] ‘the cars’</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna] ‘the chairs’</td>
</tr>
</tbody>
</table>

- Phones that precede [-en]: [l] [t] [ŋ]  All are consonants
- Phones that precede [-n]: [a]  All are [a]
Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
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<tr>
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<td>[bilarña]</td>
</tr>
<tr>
<td>[stolar]</td>
<td>‘chairs’</td>
<td>[stolarna]</td>
</tr>
</tbody>
</table>

- Phones that precede [-en]: [l] [t] [ŋ]  
  All are consonants

- Phones that precede [-n]: [a]  
  All are [a]

- Phones that precede [-na]: [r]  
  All are [a]
Step 2: Look for Similarities

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>[stol]</td>
<td>‘chair’</td>
<td>[stolén] ‘the chair’</td>
</tr>
<tr>
<td>[kat]</td>
<td>‘cat’</td>
<td>[katen] ‘the chair’</td>
</tr>
<tr>
<td>[tidniŋ]</td>
<td>‘newspaper’</td>
<td>[tidniŋen] ‘the newspaper’</td>
</tr>
<tr>
<td>[lampa]</td>
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<tr>
<td>[bilar]</td>
<td>‘cars’</td>
<td>[bilarna] ‘the cars’</td>
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<tr>
<td>[stolar]</td>
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</tbody>
</table>

- Phones that precede [-en]: [l] [t] [ŋ] All are consonants
- Phones that precede [-n]: [a] All are [a]
- Phones that precede [-na]: [r] All are [r]
Step 3: Identify the Morpheme

Find the allomorph such that the sounds in its environment share nothing in common.

Choose that allomorph as the (underlying) morpheme.
Step 3: Identify the Morpheme

| [stol]   | ‘chair’   | [stolen]  | ‘the chair’ |
| [kat]    | ‘cat’     | [katen]   | ‘the chair’ |
| [tidniŋ] | ‘newspaper’| [tidniŋen] | ‘the newspaper’ |
| [lampa]  | ‘lamp’    | [lampan]  | ‘the lamp’  |
| [sofa]   | ‘sofa’    | [sofan]   | ‘the sofa’  |
| [katar]  | ‘cats’    | [katarna] | ‘the cats’  |
| [bilar]  | ‘cars’    | [bilarna] | ‘the cars’  |
| [stolar] | ‘chairs’  | [stolarna]| ‘the chairs’ |

Step 3:

- Find the allomorph such that the sounds in its environment share nothing in common.
- Choose that allomorph as the (underlying) morpheme.

Environments of the Allomorphs:

- Phones that precede [-en]: [l] [t] [ŋ]  All are consonants
- Phones that precede [-n]: [a]  All are [a]
- Phones that precede [-na]: [r]  All are [r]
Step 3: Identify the Morpheme

| [stol] | ‘chair’ | [stolen] | ‘the chair’ |
| [kat] | ‘cat’ | [katen] | ‘the chair’ |
| [tidniŋ] | ‘newspaper’ | [tidniŋen] | ‘the newspaper’ |

| [lampa] | ‘lamp’ | [lampan] | ‘the lamp’ |
| [sofa] | ‘sofa’ | [sofan] | ‘the sofa’ |

| [katar] | ‘cats’ | [katarna] | ‘the cats’ |
| [bilar] | ‘cars’ | [bilarña] | ‘the cars’ |
| [stolar] | ‘chairs’ | [stolarña] | ‘the chairs’ |

Step 3.5 (You Won’t Have to Do This):
- If there is no such allomorph...
- If all the environments have something in common.
- Choose the allomorph with the least specific environment

Environments of the Allomorphs:
- Phones that precede [-en]: [l] [t] [n]  All are consonants
- Phones that precede [-n]: [a]  All are [a]
- Phones that precede [-na]: [r]  All are [r]
Step 3: Identify the Morpheme

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<tr>
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<th>Explanation</th>
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<tbody>
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Step 3.5 (You Won’t Have to Do This):

- If there is no such allomorph...
- If all the environments have something in common.
- Choose the allomorph with the least specific environment

Environments of the Allomorphs:

- Phones that precede [-en]: [l] [t] [n] All are consonants
### Step 3: Identify the Morpheme

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### Step 3.5 (You Won’t Have to Do This):
- If there is no such allomorph...
- If *all* the environments have *something* in common.
- Choose the allomorph with the *least specific environment*

### Environments of the Allomorphs:
- Phones that precede [-en]: [l] [t] [ŋ]  
  All are consonants

### Conclusion:
The underlying morpheme is /-en/
### Step 4: Write the Rules

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<th>Rule</th>
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### Step 4:
For the remaining allomorphs, write out the rules that would limit them to their observed environments.

### Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
‘/Y/ → [X] / Z’
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:
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Environments for Remaining Allomorphs:
- Phones that precede [-n]: [a]  
  All are [a]
- Phones that precede [-na]: [r]  
  All are [r]
Step 4: Write the Rules

For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
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Environments for Remaining Allomorphs:
▶ /-en/ → [-n] / [a] ----
▶ Phones that precede [-na]: [r] All are [r]
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For the remaining allomorphs, write out the rules that would limit them to their observed environments.

Rule of Thumb:
If allomorph [X] is found in environment Z, the rule to write is:

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Environments for Remaining Allomorphs:

▶ /-en/ → [-n] / [a] ___
▶ /-en/ → [-na] / [r] ___
Conclusion: The Swedish Definite Suffix

Question:

▶ Does Swedish really have three different suffixes meaning ‘the’?
▶ Or, can we relate these as allomorphs of the same morpheme?
Conclusion: The Swedish Definite Suffix

Question:
- Does Swedish really have three different suffixes meaning ‘the’?
- Or, can we relate these as allomorphs of the same morpheme?

Answer:
- Swedish only has one suffix meaning ‘the’.
- This suffix is /-en/.
- This suffix undergoes the following morphophonemic rules, which affect the way it ends up being pronounced:
  - /-en/ → [-n] / [a] ____
  - /-en/ → [-na] / [r] ____
Conclusion: The Swedish Definite Suffix

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- Does Swedish really have three different suffixes meaning ‘the’?
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Answer:

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- This suffix is /-en/.
- This suffix undergoes the following morphophonemic rules, which affect the way it ends up being pronounced:
  - /-en/ → [-n] / [a] ___
  - /-en/ → [-na] / [r] ___

Having gone through these examples, you now have the tools for doing morphophonemic analysis on your own!
Finally, let’s also make clear the procedure for determining what allomorphs a language has, and what they mean.

This procedure gets a little challenging when a language has a lot of affixes it can use to make complex words.
Complex Words in Turkish

Consider the following words from Turkish:

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
[eve] ‘to a house’
[elim] ‘my hand’
[diʃler] ‘teeth’
Complex Words in Turkish

Consider the following words from Turkish:

[denizdzikde]  ‘in a little ocean’
[evdzikden]   ‘from a little house’
[ev]          ‘to a house’
[elim]        ‘my hand’
[diJler]       ‘teeth’

Observation:
Turkish can express in one word what English does in many words.

Reasonable Guess:
▶ Maybe some of these words contain a bunch of affixes?
▶ Maybe that’s how they get so long and get such ‘big’ meanings?
(like ‘antidisestablishmentarianism’ in English)

Question:
How do we show this?
Complex Words in Turkish

Consider the following words from Turkish:

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
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Complex Words in Turkish

Consider the following words from Turkish:

- [denizdzikde] – ‘in a little ocean’
- [evdzikden] – ‘from a little house’
- [eve] – ‘to a house’
- [elim] – ‘my hand’
- [diʃleɾ] – ‘teeth’

Observation:
Turkish can express in one word what English does in many words.

Reasonable Guess:
- Maybe some of these words contain a bunch of affixes?
- Maybe that’s how they get so long and get such ‘big’ meanings? (like ‘antidisestablishmentarianism’ in English)

Answer: We can’t (yet)
- We need more words of Turkish.
- With more words, we can start to look for systematic patterns of sound and meaning!
Complex Words in Turkish

So, consider now *these* words of Turkish:

- [denizdzikde]  ‘in a little ocean’
- [evdzikden]  ‘from a little house’
- [eve]  ‘to a house’
- [elim]  ‘my hand’
- [difler]  ‘teeth’
- [deniz]  ‘an ocean’
- [denize]  ‘to an ocean’
- [evden]  ‘from a house’
- [elde]  ‘in a hand’
- [evdziklerimizde]  ‘in our little houses’
Complex Words in Turkish

So, consider now these words of Turkish:

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
- [eve] ‘to a house’
- [elim] ‘my hand’
- [difier] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
- [evden] ‘from a house’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’

▶ Now we have enough words to start figuring out how ‘[denizdzikde]’ is broken down into morphemes.

▶ Here’s how we do this step-by-step...
Step 1: Identify the Meaning

For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
- [eve] ‘to a house’
- [elim] ‘my hand’
- [dişler] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
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- [elde] ‘in a hand’
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Step 1: Identify the Meaning

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
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Step 1:
For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration: [denizdzikde] ‘in a little ocean’
Step 1: Identify the Meaning

For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration: [denizdzikde] ‘in a little ocean’
### Step 2: Find Words with that Meaning

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</table>

**Step 2:** Gather up all the words that share that part of the meaning you’ve identified.

**Illustration:** [denizdzikde] ‘in a little ocean’
Step 2: Find Words with that Meaning

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
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[denize] ‘to an ocean’
[evden] ‘from a house’
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[evdziklerimizde] ‘in our little houses’

Step 2:
Gather up all the words that share that part of the meaning you’ve identified.

Illustration: [denizdzikde] ‘in a little ocean’
▶ [denizdzikde] ‘in a little ocean’
▶ [deniz] ‘an ocean’
▶ [denize] ‘to an ocean’
Step 3: Find the Common Sounds

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
- [eve] ‘to a house’
- [elim] ‘my hand’
- [diʃı] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
- [evden] ‘from a house’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’

Step 3:

- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

Illustration:  
[denizdzikde] ‘in a little ocean’

- [denizdzikde] ‘in a little ocean’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
Step 3: Find the Common Sounds

| [denizdzikde]  | ‘in a little ocean’       |
| [evdzikden]    | ‘from a little house’     |
| [eve]          | ‘to a house’              |
| [elim]         | ‘my hand’                 |
| [dişler]       | ‘teeth’                   |
| [deniz]        | ‘an ocean’                |
| [denize]       | ‘to an ocean’             |
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Step 3:
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Illustration: [denizdzikde] ‘in a little ocean’
- [denizdzikde] ‘in a little ocean’
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- [denizdzikde] ‘in a little ocean’
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Step 3:
- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

Conclusion: [deniz] = ‘ocean’

- [denizdzikde] ‘in a little ocean’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
Step 3: Find the Common Sounds

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Step 3:

▶ Out of those words, find the largest (continuous) sequence of phones they have in common
▶ That is (most likely) the morpheme that expresses that meaning.

Conclusion: [deniz] = ‘ocean’

Now let’s iterate this procedure, to figure out what the other morphemes in ‘[denizdzikde]’ are.
Step 1: Identify the Meaning

For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration: [denizdzikde] ‘in a little ocean’
Step 1: Identify the Meaning

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
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Step 1:
For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration: [denizdzikde] ‘in a little ocean’
Step 2: Find Words with that Meaning

[denizdzikde] ‘in a little ocean’
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Step 2:
Gather up all the words that share that part of the meaning you’ve identified.

Illustration: [denizdzikde] ‘in a little ocean’
Step 2: Find Words with that Meaning

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Illustration: [denizdzikde] ‘in a little ocean’

- [denizdzikde] ‘in a little ocean’
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Step 3: Find the Common Sounds

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<tr>
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<tr>
<td>[dijler]</td>
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<td>[deniz]</td>
<td>‘an ocean’</td>
</tr>
<tr>
<td>[denize]</td>
<td>‘to an ocean’</td>
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<tr>
<td>[evden]</td>
<td>‘from a house’</td>
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<td>[elde]</td>
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</tr>
<tr>
<td>[evdziklerimizde]</td>
<td>‘in our little houses’</td>
</tr>
</tbody>
</table>

Step 3:
▶ Out of those words, find the largest (continuous) sequence of phones they have in common
▶ That is (most likely) the morpheme that expresses that meaning.

Illustration:  [denizdzikde]  ‘in a little ocean’
▶ [denizdzikde]  ‘in a little ocean’
▶ [evdzikden]  ‘from a little house’
▶ [evdziklerimizde]  ‘in our little houses’
Step 3: Find the Common Sounds

[denizdzikde]  ‘in a little ocean’
[evdzikden]  ‘from a little house’
[eve]  ‘to a house’
[elim]  ‘my hand’
[dijler]  ‘teeth’
[deniz]  ‘an ocean’
[denize]  ‘to an ocean’
[evden]  ‘from a house’
[elde]  ‘in a hand’
[evdziklerimizde]  ‘in our little houses’

Step 3:
▶ Out of those words, find the largest (continuous) sequence of phones they have in common
▶ That is (most likely) the morpheme that expresses that meaning.

Illustration:  [denizdzikde]  ‘in a little ocean’
▶ [denizdzikde]  ‘in a little ocean’
▶ [evdzikden]  ‘from a little house’
▶ [evdziklerimizde]  ‘in our little houses’
Step 3: Find the Common Sounds

- [denizdzikde] = ‘in a little ocean’
- [evdzikden] = ‘from a little house’
- [eve] = ‘to a house’
- [elim] = ‘my hand’
- [dişler] = ‘teeth’
- [deniz] = ‘an ocean’
- [denize] = ‘to an ocean’
- [evden] = ‘from a house’
- [elde] = ‘in a hand’
- [evdziklerimizde] = ‘in our little houses’

Step 3:
▶ Out of those words, find the largest (continuous) sequence of phones they have in common
▶ That is (most likely) the morpheme that expresses that meaning.

Conclusion: [dzik] = ‘little’

- [denizdzikde] = ‘in a little ocean’
- [evdzikden] = ‘from a little house’
- [evdziklerimizde] = ‘in our little houses’
Step 3: Find the Common Sounds

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
[eve] ‘to a house’
[elim] ‘my hand’
[dijler] ‘teeth’
[deniz] ‘an ocean’
[denize] ‘to an ocean’
[evden] ‘from a house’
[elde] ‘in a hand’
[evdziklerimizde] ‘in our little houses’

Step 3:

- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

Conclusion: [dzik] = ‘little’

Let’s do this one more time, to figure out the third and final morpheme in ‘[denizdzikde]’.
Step 1: Identify the Meaning

For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration:  [denizdzikde]  ‘in a little ocean’
Step 1: Identify the Meaning

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>[denizdzikde]</td>
<td>‘in a little ocean’</td>
</tr>
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Step 1: For the word you are interested in, identify that part of the word’s meaning that you want to find the morpheme for.

Illustration: [denizdzikde] ‘in a little ocean’
Step 2: Find Words with that Meaning

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
[eve] ‘to a house’
[elim] ‘my hand’
[dijler] ‘teeth’
[deniz] ‘an ocean’
[denize] ‘to an ocean’
[evden] ‘from a house’
[elde] ‘in a hand’
[evdziklerimizde] ‘in our little houses’

Step 2: Gather up all the words that share that part of the meaning you’ve identified.

Illustration: [denizdzikde] ‘in a little ocean’
Step 2: Find Words with that Meaning

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
- [eve] ‘to a house’
- [elim] ‘my hand’
- [dijler] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
- [evden] ‘from a house’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’

Step 2:
Gather up all the words that share that part of the meaning you’ve identified.

Illustration: [denizdzikde] ‘in a little ocean’
- [denizdzikde] ‘in a little ocean’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’
Step 3: Find the Common Sounds

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
- [eve] ‘to a house’
- [elim] ‘my hand’
- [dişler] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
- [evden] ‘from a house’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’

Step 3:
- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

Illustration: [denizdzikde] ‘in a little ocean’
- [denizdzikde] ‘in a little ocean’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’
Step 3: Find the Common Sounds

[denizdzikde] ‘in a little ocean’
[evdzikden] ‘from a little house’
[eve] ‘to a house’
[elim] ‘my hand’
[dijler] ‘teeth’
[deniz] ‘an ocean’
[denize] ‘to an ocean’
[evden] ‘from a house’
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[evdziklerimizde] ‘in our little houses’

Step 3:
- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

Illustration: [denizdzikde] ‘in a little ocean’
- [denizdzikde] ‘in a little ocean’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’
Step 3: Find the Common Sounds

- [denizdzikde] ‘in a little ocean’
- [evdzikden] ‘from a little house’
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- [elim] ‘my hand’
- [dijler] ‘teeth’
- [deniz] ‘an ocean’
- [denize] ‘to an ocean’
- [evden] ‘from a house’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’

**Step 3:**

- Out of those words, find the largest (continuous) sequence of phones they have in common
- That is (most likely) the morpheme that expresses that meaning.

**Conclusion:**  
[de] = ‘in’

- [denizdzikde] ‘in a little ocean’
- [elde] ‘in a hand’
- [evdziklerimizde] ‘in our little houses’
Step 3: Find the Common Sounds

- [denizdzikde] = ‘in a little ocean’
- [evdzikden] = ‘from a little house’
- [eve] = ‘to a house’
- [elim] = ‘my hand’
- [difler] = ‘teeth’
- [deniz] = ‘an ocean’
- [denize] = ‘to an ocean’
- [evden] = ‘from a house’
- [elde] = ‘in a hand’
- [evdziklerimizde] = ‘in our little houses’

Summary:
We’ve figured out all the morphemes in [denizdzikde]’

- [deniz] = ‘ocean’
- [dzik] = ‘little’
- [de] = ‘in’
Step 3: Find the Common Sounds

[denizdzikde]  ‘in a little ocean’
[evdzikden]  ‘from a little house’
[eve]  ‘to a house’
[elim]  ‘my hand’
[dijler]  ‘teeth’
[deniz]  ‘an ocean’
[denize]  ‘to an ocean’
[evden]  ‘from a house’
[elde]  ‘in a hand’
[evdziklerimizde]  ‘in our little houses’

Summary:
We’ve figured out all the morphemes in [denizdzikde]’

►  [deniz] = ‘ocean’
►  [dzik] = ‘little’
►  [de] = ‘in’

We could continue this process for all the words above, but let’s just stop here...