The Basics of Morphology
Course Readings

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

- Contemporary Linguistics: Chapter 4 (pp. 115-127)

The following reading (on Moodle) is not essential, but might be helpful:

- Language Instinct; Chapter 5 (119-152)
The System Thus Far

The Fundamental Question:
What are the rules and mental representations that underlie our ability to speak and understand a language?

The Answer Thus Far:

- **Mental Representations:**
  - A memorized representation of the *phonemes* making up the word.

- **The Rules:**
  - **Phonology:** Rules affecting how the word is pronounced.
    - The Syllabification Rule
    - The Aspiration Rule
    - The V-Lengthening Rule
    - (...and a whole bunch more...)
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  - **Phonology:** Rules affecting how the word is pronounced.
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    - The Aspiration Rule
    - The V-Lengthening Rule
    - (...and a whole bunch more...)

**Fact:**
There are also rules for forming words of a language.

- **Morphology** = Rules for forming words.
Vocabulary:

**The (Mental) Lexicon** = the information about words that you store in memory.

- For each word, you memorize a ton of stuff:
  - its phonemic representation
  - its meaning
  - its ‘part of speech’ (noun, verb, adjective, etc.)
  - ...etc....

- Part of our knowledge of English is a huge database of words (a mental lexicon).
Picture of the Mental Lexicon

Dog:
- Sound: /dæɡ/
- Part of Speech: Noun
- Meaning: *canis familiaris*

Cat:
- Sound: /kæt/
- Part of Speech: Noun
- Meaning: *felis domesticus*

Love:
- Sound: /lʌv/
- Part of Speech: Verb
- Meaning: To feel strong affection for
Words and Rules

Key Fact:

- The mental lexicon doesn’t store *all* the words that we know.
- Some words you know but haven’t ‘memorized’.

Illustration:

- Imagine I told you this was a technical term in linguistics:
  - ‘Blorking’ = to ask really long-winded questions at linguistics talks
Words and Rules

Key Fact:

▶ The mental lexicon doesn’t store all the words that we know.
▶ Some words you know but haven’t ‘memorized’.

Illustration:

▶ Imagine I told you this was a technical term in linguistics:
  ▶ ‘Blorking’ = to ask really long-winded questions at linguistics talks

▶ Now suppose I said the following to you:
  ▶ “Seth Cable is a notorious blorker.”

▶ You would understand the word blorker, even though you’d never actually heard it before...
Words and Rules

Key Fact:

- The mental lexicon doesn’t store *all* the words that we know.
- Some words you know but haven’t ‘memorized’.

Conclusion:
Since you’d never heard **blorker** before...

- It wasn’t memorized in your “mental lexicon”...
- So, your knowledge of its meaning came from *somewhere else*...
Words and Rules

Key Fact:

- The mental lexicon doesn’t store all the words that we know.
- Some words you know but haven’t ‘memorized’.

Conclusion:
Since you’d never heard blorker before...

- It wasn’t memorized in your “mental lexicon”...
- So, your knowledge of its meaning came from somewhere else...

The Rule:
For any verb V, adding “er” to the end of V makes a noun that means “one who Vs”
(“blorker” = one who ‘blorks’)

Major Conclusion:
English (and other languages) has rules for forming words.

- Morphology = Rules for forming words.
Vocabulary Time!

Morpheme:
A sequence of phonemes to which meaning is assigned.

▶ /blɔrk/ = to ask long-winded questions at linguistics talks
▶ /ɪ/ = one who performs a given activity

Free Morpheme:
A morpheme that can ‘stand alone’ as a complete word.

▶ /blɔrk/ “Seth Cable loves to blork.”
▶ /plej/ “My cat loves to play.”

Bound Morpheme:
Morpheme that can’t ‘stand alone’ as a complete word.

▶ /ɪ/ “Seth is a real blorker / player / *er.”

Affix:
A bound morpheme that attaches to another morpheme

▶ /ɪ/ “Seth is a real blorker / player / *er.”
Vocabulary Time!

Morpheme:
A sequence of phonemes to which meaning is assigned.
  ▶ /blɔrk/ = to ask long-winded questions at linguistics talks
  ▶ /ɪɛl/ = one who performs a given activity

Free Morpheme:
A morpheme that can ‘stand alone’ as a complete word.
  ▶ /blɔrk/ “Seth Cable loves to blork.”
  ▶ /plej/ “My cat loves to play.”

Bound Morpheme:
Morpheme that can’t ‘stand alone’ as a complete word.
  ▶ /ɪɛl/ “Seth is a real blorker / player / *er.”

Suffix:
An affix that attaches to the end of a morpheme.
  ▶ /ɪɛl/ “Seth is a real blorker / player / *er.”
Towards Morphological Rules

Let’s work towards the rule for suffix “-er” in English...
Towards Morphological Rules

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Observation 1:

- Suffix “-er” can attach to verbs.
  - blorker, player, baker, dancer, etc.
Towards Morphological Rules

Let's work towards the rule for suffix “-er” in English...

Observation 1:

- Suffix “-er” can attach to verbs.
  - blorker, player, baker, dancer, etc.

- Suffix “-er” can’t attach to other kinds of words
  - It can’t attach to nouns:
    - piano *pianoer (one who is a piano?)
    - book *booker (one who is a book?)
  - It can’t attach to adjectives:
    - fun *funner (one who is fun?)
    - dead *deader (one who is dead?)
Towards Morphological Rules

Let’s work towards the rule for suffix “-er” in English...

Observation 1:

- Suffix “-er” can attach to verbs.
  - blorker, player, baker, dancer, etc.

- Suffix “-er” can’t attach to other kinds of words
  - It can’t attach to nouns:
    - piano *pianoer (one who is a piano?)
    - book *booker (one who is a book?)

  - It can’t attach to adjectives:
    - fun *funner (one who is fun?)
    - dead *deader (one who is dead?)

The Generalization, Part 1:
Suffix “-er” can only attach to verbs.
Towards Morphological Rules

Let’s work towards the rule for suffix “-er” in English...

Observation 2:
When “-er” attaches to a verb, the resulting word is a noun.

- blork the blorker (the one who blorks)
- play the player (the one who plays)
- dance the dancer (the one who dances)
- bake the baker (the one who bakes)
- write the writer (the one who writes)
Towards Morphological Rules

Let’s work towards the rule for suffix “-er” in English...

Observation 2: When “-er” attaches to a verb, the resulting word is a noun.

- blork the blorker (the one who blorks)
- play the player (the one who plays)
- dance the dancer (the one who dances)
- bake the baker (the one who bakes)
- write the writer (the one who writes)

The Generalization, Part 2: Suffix “-er” attaches to verbs, and thereby creates nouns.

Stated as Rule: A noun (in English) can be created by affixing “er” to the end of a verb.
A Formal Notation for Rules

The Rule (Informally Stated):
A noun (in English) can be created by affixing “er” to the end of a verb.

A Formal Notation for Morphological Rules:
N → V + /ɨr/

- N = “a noun”
- → = “can be created from”
- V = “a verb”
- + = “combined with”
A Notation for Morphological Structure

The morphological composition of a word can be diagrammed by a “tree structure”.

The Morphological Structure of “Player”

```
N
  V  /ɪʌ/
    /
  /plej/
```

(“Player” is a noun formed from the V “play” and the suffix “ɪʌ”)
The Suffix “-Ness”

Consider the following pairs of words...

happy     happiness
sad       sadness
blue      blueness
round     roundness
The Suffix “-Ness”

Consider the following pairs of words...

happy  happiness
sad    sadness
blue   blueness
round  roundness

Key Observations:

▶ The words on the left are adjectives.
▶ The words on the right are nouns.
▶ The words on the right are just like the words on the left, except that they end with “-ness”.
▶ For each of these Adj/N pairs, the N means “state of being Adj”
The Suffix “-Ness”

Consider the following pairs of words...

happy    happiness
sad      sadness
blue     blueness
round    roundness

Key Observations:

▶ The words on the left are adjectives.
▶ The words on the right are nouns.
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▶ For each of these Adj/N pairs, the N means “state of being Adj”

Hypothesis: \[ N \rightarrow A + /\text{n}\varepsilon s/ \]

(A noun can be formed from an adjective followed by the suffix /\text{n}\varepsilon s/)
The Suffix “-Ness”

Consider the following pairs of words...

happy  happiness
sad   sadness
blue  blueness
round  roundness

Hypothesis:  \( N \rightarrow A + /nɛs/ \)
The Suffix “-Ness”

Consider the following pairs of words...

happy  happiness
sad    sadness
blue   blueness
round  roundness

Hypothesis:  N \rightarrow A + /\nɛs/

Confirmation, Part 1:

- Suppose I said that in linguistics, “grug” means \textit{lame}. 
The Suffix “-Ness”

Consider the following pairs of words...

- happy  happiness
- sad    sadness
- blue   blueness
- round  roundness

Hypothesis:  \( N \rightarrow A + /n\varepsilon s/ \)

Confirmation, Part 1:

- Suppose I said that in linguistics, “grug” means *lame*.
- You could probably understand this:
  “The **grugness** of this talk is undeniable.”
The Suffix “-Ness”

Consider the following pairs of words...

happy  happiness
sad    sadness
blue   blueness
round  roundness

Hypothesis:  N → A + /nɛs/

Confirmation, Part 1:

▶ Suppose I said that in linguistics, “grug” means lame.
▶ You could probably understand this:
  “The grugness of this talk is undeniable.”
▶ You could only understand “grugness” if you had the rule above.
The Suffix “-Ness”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>Verbs</th>
<th>Nouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>happy</td>
<td>happiness</td>
</tr>
<tr>
<td>sad</td>
<td>sadness</td>
</tr>
<tr>
<td>blue</td>
<td>blueness</td>
</tr>
<tr>
<td>round</td>
<td>roundness</td>
</tr>
</tbody>
</table>

Hypothesis: \( N \rightarrow A + /nɛs/ \)

Confirmation, Part 2:
If we put “-ness” after something that’s *not* an adjective, it doesn’t sound right.

*walkness *chairness
*stealness *treeness
*scrapeness *hatness
The Suffix “-Able”

Consider the following pairs of words...

ride rideable
do doable
see seeable
like likeable
The Suffix “-Able”

Consider the following pairs of words...

ride   rideable
do     doable
see    seeable
like   likeable

Key Observations:

► The words on the left are verbs.
► The words on the right are adjectives.
► The ones on the right are just like the ones on the left, except they end with “-able”.
► For each of these V/Adj pairs, the Adj means “able to be V-ed”
The Suffix “-Able”

Consider the following pairs of words...

ride    rideable
do      doable
see     seeable
like    likeable

Key Observations:

▶ The words on the left are verbs.
▶ The words on the right are adjectives.
▶ The ones on the right are just like the ones on the left, except they end with “-able”.
▶ For each of these V/Adj pairs, the Adj means “able to be V-ed”

Hypothesis:  \( A \rightarrow V + /əbə/ \)
(An adjective can be formed from a verb followed by the suffix /əbə/)
The Suffix “-Able”

Consider the following pairs of words...

ride  rideable
do    doable
see   seeable
like  likeable

Hypothesis: A → V + /əbl/
The Suffix “-Able”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>ride</th>
<th>rideable</th>
</tr>
</thead>
<tbody>
<tr>
<td>do</td>
<td>doable</td>
</tr>
<tr>
<td>see</td>
<td>seeable</td>
</tr>
<tr>
<td>like</td>
<td>likeable</td>
</tr>
</tbody>
</table>

Hypothesis: \[ A \rightarrow V + /əb\] 

Confirmation, Part 1:

- Suppose I said that in linguistics “croob” means ‘analyze’.
The Suffix “-Able”

Consider the following pairs of words...

ride  rideable
do   doable
see  seeable
like likeable

Hypothesis: A → V + /əbəl/

Confirmation, Part 1:

► Suppose I said that in linguistics “croob” means ‘analyze’.
► You could probably understand this: “This language’s phonology is totally croobable.”
The Suffix “-Able”

Consider the following pairs of words...

ride rideable
do doable
see seeable
like likeable

Hypothesis: \( A \rightarrow V + /əb\|/ \)

Confirmation, Part 1:

- Suppose I said that in linguistics “croob” means ‘analyze’.
- You could probably understand this: “This language’s phonology is totally croobable.”
- You could only understand “croobable” if you had the rule above.
The Suffix “-Able”

Consider the following pairs of words...

ride    rideable
do      doable
see     seeable
like    likeable

Hypothesis: \[ A \rightarrow V + /\text{əb}l/ \]

Confirmation, Part 2:
If we put “-able” after something that’s not a verb, it doesn’t sound right.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Nouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>*happyable</td>
<td>*chairable</td>
</tr>
<tr>
<td>*sadable</td>
<td>*treeable</td>
</tr>
<tr>
<td>*blueable</td>
<td>*hatable</td>
</tr>
</tbody>
</table>
The Suffix “-Ing”

Consider the following pairs of words...

- bore    boring
- tire    tiring
- excite  exciting
- annoy   annoying

Observations:
▶ The words on the left are verbs.
▶ The words on the right are adjectives.
▶ The ones on the right are just like the ones on the left, except they end with “-ing”.

Hypothesis: A V + /iN/ (An adjective can be formed from a verb followed by the suffix /iN/).
The Suffix “-Ing”

Consider the following pairs of words...

bore    boring

tire    tiring

excite  exciting

annoy   annoying

Observations:

► The words on the left are verbs.
► The words on the right are adjectives.
► The ones on the right are just like the ones on the left, except they end with “-ing”.
► For each of these V/Adj pairs, the Adj means “tends to V people”
The Suffix “-Ing”

Consider the following pairs of words...

- bore    boring
- tire    tiring
- excite  exciting
- annoy   annoying

Observations:

- The words on the left are verbs.
- The words on the right are adjectives.
- The ones on the right are just like the ones on the left, except they end with “-ing”.
- For each of these V/Adj pairs, the Adj means “tends to V people”

Hypothesis: \( A \rightarrow V + /iŋ/ \)
(An adjective can be formed from a verb followed by the suffix /iŋ/)
The Suffix “-Ing”

Consider the following pairs of words...

bore   boring

tire   tiring

excite exciting

annoy annoying

Hypothesis: A → V + /iŋ/
The Suffix “-Ing”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>bore</th>
<th>boring</th>
</tr>
</thead>
<tbody>
<tr>
<td>tire</td>
<td>tiring</td>
</tr>
<tr>
<td>excite</td>
<td>exciting</td>
</tr>
<tr>
<td>annoy</td>
<td>annoying</td>
</tr>
</tbody>
</table>

Hypothesis: \( A \rightarrow V + /\iota/ \)

Confirmation, Part 1:

- Suppose I said that in linguistics “drass” means *to make angry*. 
The Suffix “-Ing”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>bore</th>
<th>boring</th>
</tr>
</thead>
<tbody>
<tr>
<td>tire</td>
<td>tiring</td>
</tr>
<tr>
<td>excite</td>
<td>exciting</td>
</tr>
<tr>
<td>annoy</td>
<td>annoying</td>
</tr>
</tbody>
</table>

Hypothesis: \( A \rightarrow V + /iŋ/ \)

Confirmation, Part 1:

- Suppose I said that in linguistics “drass” means *to make angry*.
- You could probably understand this: “That comment on my paper was really *drassing*.”
The Suffix “-Ing”

Consider the following pairs of words...

bore  boring
  tire  tiring
  excite exciting
  annoy annoying

Hypothesis: \( A \rightarrow V + /iŋ/ \)

Confirmation, Part 1:

- Suppose I said that in linguistics “drass” means *to make angry*.
- You could probably understand this: “That comment on my paper was really *drassing*.”
- You could only understand “drassing” if you had the rule above.
The Suffix “-Ing”

Consider the following pairs of words...

bore  boring  
tire  tiring  
excite exciting  
annoy annoying

Hypothesis:  A → V + /iŋ/

Confirmation, Part 2:
If we put “-ing” after something that’s not an verb, it doesn’t sound right.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Nouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>*happying</td>
<td>*chairing</td>
</tr>
<tr>
<td>*sadding</td>
<td>*treeing</td>
</tr>
<tr>
<td>*blueing</td>
<td>*hatting</td>
</tr>
</tbody>
</table>
Another Suffix “-Er”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>Adj</th>
<th>Adj+er</th>
</tr>
</thead>
<tbody>
<tr>
<td>happy</td>
<td>happier</td>
</tr>
<tr>
<td>sad</td>
<td>sadder</td>
</tr>
<tr>
<td>blue</td>
<td>bluer</td>
</tr>
<tr>
<td>bad</td>
<td>badder</td>
</tr>
</tbody>
</table>
Another Suffix “-Er”

Consider the following pairs of words...

happy   happier
sad     sadder
blue   bluer
bad     badder

Key Observations:

- The words on the left are adjectives.
- The words on the right are also adjectives.
- The ones on the right are just like the ones on the left, except they end with “-er”.
- For each of these pairs, ‘Adj+er’ means “more Adj”
Another Suffix “-Er”

Consider the following pairs of words...

happy  happier
sad    sadder
blue   bluer
bad    badder

Key Observations:

▶ The words on the left are adjectives.
▶ The words on the right are also adjectives.
▶ The ones on the right are just like the ones on the left, except they end with “-er”.
▶ For each of these pairs, ‘Adj+er’ means “more Adj”

Hypothesis: \( A \rightarrow A + /\mathit{\iota}\mathit{\mu}/ \)
(An adjective can be formed from an adjective followed by suffix \( /\mathit{\iota}\mathit{\mu}/ \))
Another Suffix “-Er”

Consider the following pairs of words...

- happy happier
- sad sadder
- blue bluer
- bad badder

But Wait!:
Didn’t we already see that “-er” is a suffix that (i) combines with Vs, (ii) produces Ns, and (iii) means “one who Vs”?

- play player
- dance dancer
- bake baker
- shoot shooter
- call caller
Another Suffix “-Er”

Consider the following pairs of words...

- happy happier
- sad sadder
- blue bluer
- bad badder

Homophonous Morphemes

- There are many pairs of words that (i) sound exactly the same, but (ii) have totally different meanings:
  - red read
  - blue blew
  - shed (hair) shed (a building)
  - bank (river) bank (financial institution)

- Such pairs of words are called homophones.
Another Suffix “-Er”

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>happy</th>
<th>happier</th>
</tr>
</thead>
<tbody>
<tr>
<td>sad</td>
<td>sadder</td>
</tr>
<tr>
<td>blue</td>
<td>bluer</td>
</tr>
<tr>
<td>bad</td>
<td>badder</td>
</tr>
</tbody>
</table>

The Conclusion:

Just as with words (free morphemes), affixes (bound morphemes) can be homophones.

- One “-er” suffix combines with Vs to make Ns.
  \[(N \rightarrow V + /ɪr/)\]
- Another, homophonous “-er” suffix combines with As to make As.
  \[(A \rightarrow A + /ɪr/)\]
The Prefix “Re-”

Prefix: An affix that attaches to the *beginning* of a morpheme.

Consider the following pairs of words...

- do redo
- type retype
- zip rezip
- print reprint

Key Observations:

▶ The words on the left are verbs.
▶ The words on the right are verbs.
▶ The ones on the right are just like the ones on the left, except they begin with “re-”.
▶ For each of these pairs, ‘re+V’ means “to V again”
The Basics of Morphology

Course Readings
Motivating Morphology
Basic Concepts and Notation
More Suffixation Rules
Prefixes
The Prefix “Re-”
The Prefix “Un-”
Another Prefix “Un-”
Morphological Structure and Ambiguity

The Prefix “Re-”

Prefix:
An affix that attaches to the *beginning* of a morpheme.

Consider the following pairs of words...

<table>
<thead>
<tr>
<th>Prefixes</th>
<th>Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>do</td>
<td>redo</td>
</tr>
<tr>
<td>type</td>
<td>retype</td>
</tr>
<tr>
<td>zip</td>
<td>rezip</td>
</tr>
<tr>
<td>print</td>
<td>reprint</td>
</tr>
</tbody>
</table>

Prefix:
An affix that attaches to the **beginning** of a morpheme.

Consider the following pairs of words...

| do       | redo  |
| type     | retype|
| zip      | rezip |
| print    | reprint|

**Key Observations:**
- The words on the left are verbs.
- The words on the right are verbs.
- The ones on the right are just like the ones on the left, except they begin with “re-”.
- For each of these pairs, ‘re+V’ means “to V again”.

**Hypothesis:**

A verb can be formed from a verb, preceded by the prefix */ôi/.


The Prefix “Re-”

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An affix that attaches to the *beginning* of a morpheme.

Consider the following pairs of words...

- do    redo
- type  retype
- zip   rezip
- print reprint

Key Observations:

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  do   redo
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Key Observations:
▶ The words on the left are verbs.
▶ The words on the right are verbs.
▶ The ones on the right are just like the ones on the left, except they begin with “re-”.
▶ For each of these pairs, ‘re+V’ means “to V again”

Hypothesis: \[ V \rightarrow /\text{i}/ + V \]
(A verb can be formed from a verb, preceded by the prefix /\text{i}/)
The Prefix “Re-”

Consider the following pairs of words...

- do       redo
- type     retype
- zip      rezip
- print    reprint

Hypothesis: \( V \rightarrow /\mu i/ + V \)
The Prefix “Re-”

Consider the following pairs of words...

- do  redo
- type retype
- zip  rezip
- print reprint

Hypothesis: \( V \rightarrow /\mu i/ + V \)

Confirmation, Part 1:

- Suppose I said that in linguistics “croob” means *to analyze*.
The Prefix “Re-”

Consider the following pairs of words...

- do     redo
- type   retype
- zip    rezip
- print  reprint

Hypothesis: \( V \rightarrow /\mu i/ + V \)

Confirmation, Part 1:

- Suppose I said that in linguistics “croob” means *to analyze*.
- You could probably understand this: “We need to *recroob* this language’s phonology.”
The Prefix “Re-”

Consider the following pairs of words...

do   redo

type retype

zip   rezip

print reprint

Hypothesis: \( V \rightarrow /\mu i/ + V \)

Confirmation, Part 1:

➤ Suppose I said that in linguistics “croob” means *to analyze*.

➤ You could probably understand this: “We need to recroob this language’s phonology.”

➤ You could only understand “recroob” if you had the rule like above.
The Prefix “Re-”

Consider the following pairs of words...

- do redo
- type retype
- zip rezip
- print reprint

Hypothesis: \( V \rightarrow /\text{i}/ + V \)

Confirmation, Part 2:
If we put “re-” before something that’s not a verb, it doesn’t sound right.

<table>
<thead>
<tr>
<th>Adjectives</th>
<th>Nouns</th>
</tr>
</thead>
<tbody>
<tr>
<td>*rehappy</td>
<td>*rechair</td>
</tr>
<tr>
<td>*resad</td>
<td>*retree</td>
</tr>
<tr>
<td>*reblue</td>
<td>*rehat</td>
</tr>
</tbody>
</table>
The Prefix “Un-”

Consider the following pairs of words...

happy  unhappy
sound  unsound
cool  uncool

Key Observations:

- The words on the left are adjectives.
- The words on the right are adjectives.
- The ones on the right are just like the ones on the left, except they begin with “un-”.
- For each of these pairs, ‘un+Adj’ means “not Adj”

Hypothesis: $A \rightarrow /\wedge n/ + A$

(An adjective can be formed from an adjective, preceded by $/\wedge n/$)
Another Prefix “Un-”

Consider the following pairs of words...

do undo
zip unzip
dress undress

Key Observations:

▶ The words on the left are verbs.
▶ The words on the right are verbs.
▶ The ones on the right are just like the ones on the left, except they begin with “un-”.
▶ For each of these pairs, ‘un+V’ means “to reverse V-ing”

Hypothesis: \[ V \rightarrow /\mu n/ + V \]
(A verb can be formed from a verb, preceded by the prefix \(/\mu n/\))

Conclusion:
Just as with “-er”, there are two homophonomous prefixes “un-”:
### Summary of Our Morphological Rules

<table>
<thead>
<tr>
<th>Morphological Rule</th>
<th>Illustrative Word:</th>
</tr>
</thead>
<tbody>
<tr>
<td>N → V + /i\mu/</td>
<td>player</td>
</tr>
<tr>
<td>N → A + /nɛs/</td>
<td>happiness</td>
</tr>
<tr>
<td>A → V + /əbl\l/</td>
<td>doable</td>
</tr>
<tr>
<td>A → V + /i\j/</td>
<td>sickening</td>
</tr>
<tr>
<td>A → A + /i\mu/</td>
<td>taller</td>
</tr>
<tr>
<td>V → /\i/ + V</td>
<td>reinvest</td>
</tr>
<tr>
<td>A → /\n/ + A</td>
<td>uninteresting</td>
</tr>
<tr>
<td>V → /\n/ + V</td>
<td>unlock</td>
</tr>
</tbody>
</table>
Complex Morphological Structures

Key Fact: These morphological rules can iterate!

- The word output by one rule can be the input to another rule.

<table>
<thead>
<tr>
<th>Input</th>
<th>Rule</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>do</td>
<td>$A \rightarrow V + /əbl/$</td>
<td>doable (able to be done)</td>
</tr>
<tr>
<td>doable</td>
<td>$A \rightarrow /ən/ + A$</td>
<td>undoable (not doable)</td>
</tr>
<tr>
<td>dress</td>
<td>$V \rightarrow /ən/ + V$</td>
<td>undress (to reverse dressing)</td>
</tr>
<tr>
<td>undress</td>
<td>$V \rightarrow /əi/ + V$</td>
<td>reundress (to undress again)</td>
</tr>
</tbody>
</table>

- By iterating the rules this way, we can make some really complex words:
  - Antidisestablishmentarianism
    (anti-dis-establish-ment-arian-ism)
Morphological Ambiguity

Another Key Fact:
Some words can be created in multiple ways, and this affects their meaning.

Illustration: ‘Unlockable’ has two meanings!

- able to be unlocked
  (the door is unlockable; I can open it with my keys)
- not able to be locked
  (the door is unlockable; the lock is broken)

Observation:
Our morphological rules predict this ambiguity!
- There are two ways our rules make ‘unlockable’
- Each way of making the word will give a different meaning.
Two Ways of Creating ‘Unlockable’

**Derivation One:**

<table>
<thead>
<tr>
<th>Input</th>
<th>Rule</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>lock</td>
<td>V $\rightarrow$ /\n/ + V</td>
<td>unlock (to reverse locking)</td>
</tr>
<tr>
<td>unlock</td>
<td>A $\rightarrow$ V + /əbI/</td>
<td>unlockable (able to be unlocked)</td>
</tr>
</tbody>
</table>

**Derivation Two:**

<table>
<thead>
<tr>
<th>Input</th>
<th>Rule</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>lock</td>
<td>A $\rightarrow$ V + /əbI/</td>
<td>lockable (able to locked)</td>
</tr>
<tr>
<td>lockable</td>
<td>A $\rightarrow$ /\n/ + A</td>
<td>unlockable (not lockable)</td>
</tr>
</tbody>
</table>

We can represent these two different methods for making ‘unlockable’ by using two different ‘tree structures’.
Two Different Structures for ‘Unlockable’

Derivation One:

A

V /əbl/

/ʌn/ V

/ʌlak/

- The V /ʌlak/ combines with the prefix /ʌn/, making the V /ʌnlak/ (to reverse locking)
- The V /ʌnlak/ combines with the suffix /əbl/, making the A /ʌnlakəbl/ (able to be unlocked)
Two Different Structures for ‘Unlockable’

Derivation Two:

A

/ʌn/

A

V /əbl/

/lak/

▶ The V /lak/ combines with the suffix /əbl/, making the A /lakəbl/ (able to be locked)

▶ The A /lakəbl/ combines with the prefix /ʌn/, making the A /ʌnlakəbl/ (not able to be locked)
Rules Determine Structure

Sometimes, our rules only allow a word to have one structure.

Example: The word ‘redoable’.

Possible Structure

```
A
  /ələ/
```

```
 V
 /ələ/
```

```
 /ələ/
```

```
 /ələ/
```

Not a Possible Structure

```
A
 /ələ/
```

```
 V
 /ələ/
```

```
 /ələ/
```

```
 /ələ/
```

- Our rules only allow /ələ/ to combine with Vs (not As)
- So, in ‘redoable’, /ələ/ can’t be combining with the A ‘doable’
- Instead, /ələ/ must be combining with the V ‘do’...
- And then ‘redo’ combines with ‘able’ (= able to be done again)