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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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The System Thus Far

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 - ▶ **Phonology:** Rules affecting how the word is pronounced.
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 - ▶ (...and a whole bunch more...)

Fact:

There are also rules for forming words of a language.

- ▶ **Morphology** = Rules for forming words.

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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).

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Picture of the Mental Lexicon

Dog:

- ▶ Sound: /dag/
- ▶ 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

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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'.

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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

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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...*

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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*...

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Key Fact:

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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.

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Vocabulary Time!

Morpheme:

A sequence of phonemes to which meaning is assigned.

- ▶ /blɔ:k/ = to ask long-winded questions at linguistics talks
- ▶ /ɪɹ/ = one who performs a given activity

Free Morpheme:

A morpheme that can 'stand alone' as a complete word.

- ▶ /blɔ:k/ "Seth Cable loves to **blork**."
- ▶ /pleɹ/ "My cat loves to **play**."

Bound Morpheme:

Morpheme that can't 'stand alone' as a complete word.

- ▶ /ɪɹ/ "Seth is a real **blorker** / **player** / ***er**."

Affix:

A bound morpheme that can attach to a free morpheme

- ▶ /ɪɹ/ "Seth is a real **blorker** / **player** / ***er**."

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- ▶ /pleɹ/ "My cat loves to **play**."

Bound Morpheme:

Morpheme that can't 'stand alone' as a complete word.

- ▶ /ɪɹ/ "Seth is a real **blorker** / **player** / ***er**."

Suffix:

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

- ▶ /ɪɹ/ "Seth is a real **blorker** / **player** / ***er**."

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Towards Morphological Rules

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

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

Observation 1:

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

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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:
tall *taller (one who is tall?)
angry *angrier (one who is angry?)

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 - ▶ It can't attach to adjectives:
tall *taller (one who is tall?)
angry *angrier (one who is angry?)

The Generalization, Part 1:

Suffix “-er” can only attach to verbs.

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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)
shoot	the shooter	(the one who shoots)

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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)
shoot	the shooter	(the one who shoots)

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.

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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:

$N \rightarrow V + /ɪr/$

- ▶ N = “a noun”
- ▶ \rightarrow = “can be created from”
- ▶ V = “a verb”
- ▶ $+$ = “combined with”

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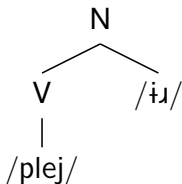
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A Notation for Morphological Structure

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

The Morphological Structure of “Player”



(“Player” is a noun formed from the V “play” and the suffix “ɪɹ”)

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The Suffix “-Ness”

Consider the following pairs of words...

happy happiness

sad sadness

blue blueness

round roundness

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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”

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- ▶ For each of these Adj/N pairs, the N means “state of being Adj”

Hypothesis: $N \rightarrow A + /nɛs/$

(A noun can be formed from an adjective followed by the suffix /nɛs/)

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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 *lame*.

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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 *lame*.
- ▶ You could probably understand this:
“The **grugness** of this talk is undeniable.”

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round	roundness

Hypothesis: $N \rightarrow A + /nɛs/$

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.

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The Suffix “-Ness”

Consider the following pairs of words...

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sad sadness

blue blueness

round roundness

Hypothesis: $N \rightarrow A + /nɛs/$

Confirmation, Part 2:

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

Verbs

*walkness

*stealness

*scrapeness

Nouns

*chairness

*treeness

*hatness

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The Suffix “-Able”

Consider the following pairs of words...

ride rideable

do doable

see seeable

like likeable

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Consider the following pairs of words...

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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”

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Hypothesis: $A \rightarrow V + /əbəl/$

(An adjective can be formed from a verb followed by the suffix /əbəl/)

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Consider the following pairs of words...

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Hypothesis: $A \rightarrow V + /əb\!l/$

Confirmation, Part 1:

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

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Hypothesis: $A \rightarrow V + /əb\!l/$

Confirmation, Part 1:

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

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see seeable

like likeable

Hypothesis: $A \rightarrow V + /əbəl/$

Confirmation, Part 2:

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

Adjectives

*happyable

*sadable

*blueable

Nouns

*chairable

*treeable

*hatable

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Consider the following pairs of words...

bore	boring
tire	tiring
excite	exciting
annoy	annoying

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excite	exciting
annoy	annoying

Observations:

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- ▶ 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”

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Hypothesis: $A \rightarrow V + /ij/$

(An adjective can be formed from a verb followed by the suffix /ij/)

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Hypothesis: $A \rightarrow V + /iŋ/$

Confirmation, Part 1:

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

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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**.”

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bore	boring
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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.

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Consider the following pairs of words...

bore	boring
tire	tiring
excite	exciting
annoy	annoying

Hypothesis: $A \rightarrow V + /iŋ/$

Confirmation, Part 2:

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

Adjectives	Nouns
*happying	*chairing
*sadding	*treeing
*blueing	*hatting

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Consider the following pairs of words...

happy happier

sad sadder

blue bluer

bad badder

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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”

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- ▶ 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: $A \rightarrow A + /ɪr/$

(An adjective can be formed from an adjective followed by suffix /ɪr/)

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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

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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**.

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Consider the following pairs of words...

happy	happier
sad	sadder
blue	bluer
bad	badder

The Conclusion:

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

- ▶ One “-er” suffix combines with Vs to make Ns.
($N \rightarrow V + /i:/$)
- ▶ Another, **homophonous** “-er” suffix combines with As to make As.
($A \rightarrow A + /i:/$)

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Prefix:

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

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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

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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”

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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”

Hypothesis: $V \rightarrow /rɪ/ + V$

(A verb can be formed from a verb, preceded by the prefix /rɪ/)

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Consider the following pairs of words...

do	redo
type	retry
zip	rezip
print	reprint

Hypothesis: $V \rightarrow /ri/ + V$

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The Prefix “Re-”

Consider the following pairs of words...

do	redo
type	retype
zip	rezip
print	reprint

Hypothesis: $V \rightarrow /ri/ + V$

Confirmation, Part 1:

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

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Consider the following pairs of words...

do	redo
type	retype
zip	rezip
print	reprint

Hypothesis: $V \rightarrow /ɹi/ + V$

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.”

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The Prefix “Re-”

Consider the following pairs of words...

do	redo
type	retype
zip	rezip
print	reprint

Hypothesis: $V \rightarrow /ɹi/ + V$

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.

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The Prefix “Re-”

Consider the following pairs of words...

do	redo
type	retype
zip	rezip
print	reprint

Hypothesis: $V \rightarrow /ɹi/ + V$

Confirmation, Part 2:

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

Adjectives	Nouns
*rehappy	*rechair
*resad	*retree
*reblue	*rehat

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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 / $\wedge n$ /)

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Another Prefix “Un-”

Important Fact:

As with “-er”, there is another, homophonous prefix “un-”:

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: $V \rightarrow /ʌn/ + V$

(A verb can be formed from a verb, preceded by the prefix /ʌn/)

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Summary of Our Morphological Rules

Morphological Rule

Illustrative Word:

$N \rightarrow V + /i\lambda/$

player

$N \rightarrow A + /n\epsilon s/$

happiness

$A \rightarrow V + /əb\lambda/$

doable

$A \rightarrow V + /i\eta/$

sickening

$A \rightarrow A + /i\lambda/$

taller

$V \rightarrow /i\lambda/ + V$

reinvest

$A \rightarrow /ʌn/ + A$

uninteresting

$V \rightarrow /ʌn/ + V$

unlock

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Complex Morphological Structures

Key Fact: These morphological rules can **iterate**!

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

Input	Rule	Output
do	$A \rightarrow V + /əb\downarrow/$	doable (able to be done)
doable	$A \rightarrow /ʌn/ + A$	undoable (not doable)
dress	$V \rightarrow /ʌn/ + V$	undress (to reverse dressing)
undress	$V \rightarrow /ɹi/ + V$	reundress (to undress again)

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

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Morphological Ambiguity

Another Key Fact:

Some words can be created in multiple ways, and this affects their meaning.

Illustration: 'Unlockable'

- ▶ 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.

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Two Ways of Creating 'Unlockable'

Derivation One:

Input	Rule	Output
lock	$V \rightarrow /ʌn/ + V$	unlock (to reverse locking)
unlock	$A \rightarrow V + /əb /$	unlockable (able to be unlocked)

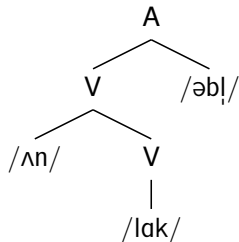
Derivation Two:

Input	Rule	Output
lock	$A \rightarrow V + /əb /$	lockable (able to locked)
lockable	$A \rightarrow /ʌn/ + A$	unlockable (not lockable)

We can represent these two different methods for making 'unlockable' by using two different 'tree structures'.

Two Different Structures for 'Unlockable'

Derivation One:



- ▶ The V /lak/ combines with the prefix /ʌn/, making the V /ʌnlak/ (to reverse locking)
- ▶ The V /ʌnlak/ combines with the suffix /əb|/, making the A /ʌnlakəb|/ (able to be unlocked)

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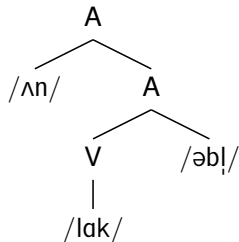
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Two Different Structures for 'Unlockable'

Derivation Two:



- ▶ The V /lak/ combines with the suffix /əb|/, making the A /lakəb|/ (able to be locked)
- ▶ The A /lakəb|/ combines with the prefix /ʌn/, making the A /ʌnlakəb|/ (not able to be locked)

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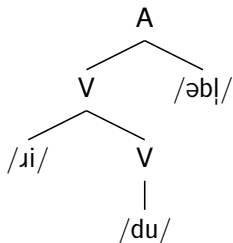
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Rules Determine Structure

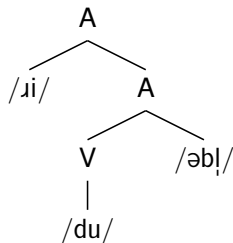
Sometimes, our rules only allow a word to have *one* structure.

Example: The word 'redoable'.

Possible Structure



Not a Possible Structure



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

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