Study Groups aren't always a good idea!

- Sometimes it can help to teach and learn from others
- Don't trust an answer you don't fully understand
  - "What's the answer?" is dangerous, "Why is that the answer?" might save you.
- Bad answers often 'go viral'
  - I can usually tell a study group by the patterns of weird errors
  - "Somebody who was very wrong thought they were very right!"
- The very best study group is office hours!

Phonology: The Sound Patterns of Language are awesome

Matt Zaslansky - LIGN 101

Today's Plan

- Review
- Common Phonological Processes
- Natural Classes
- Let's work some problems!

Reviewing Phonemic Analysis

From last time…

Cool. So… how do we do phonemic analysis?

Step 0: Check for minimal pairs

If you have a minimal pair where the meaning changes, the sounds are different phonemes and your work is done. Always.

If you have a minimal pair, the sounds are different phonemes and your work is done.

Phonemic Analysis in four easy steps!

- 0: Check for Minimal Pairs, if none…
- 1: Collect all the environments the sound you're interested in can occur in
- 2: State the distribution of the sounds.
- 3: Decide which allophone is the basic *underlying* form
- 4: Write rules to derive the other allophone(s) from it based on environment

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0: Check for Minimal Pairs, if none…

- Please. PLEASE.

1: Collect all the environments the sound you're interested in can occur in

- Write down what follows and precedes them
- Use __ to help focus your brain on the context

2: State the distribution of the sounds.

- “This one occurs before/after/around/near __”
- Sometimes you can only describe where one happens
- Test hypotheses!

3: Decide which allophone is the basic *underlying* form

- Choose the one you can’t predict
- Often it’s the “everywhere else” allophone

4: Write rules to derive the other allophone(s) from it based on environment

- We’ll talk about writing rules more shortly

All sorts of environments trigger changes

- Adjacent sound or sounds
- Adjacent *types* of sound
- Word boundaries
- Syllable boundaries
- Sounds or later earlier in the word
  - This is a bit more rare, but really neat!

Phonological Rules

So, you've figured out that sounds are allophones of the same phoneme!

- They're in a *complementary* distribution
- You can predict which one will show up based on the environment
- **How do I express that prediction to somebody else?**

Phonological Rules

You describe the distribution of the allophones of a phoneme with phonological rules

An [r] in English?

0:00 / 0:10

Video is from Jynxi (https://www.youtube.com/watch?v=Lot-jfKxr74)

So when Jynxi says [fɪɹst klɪpərə ivnɪŋ], which is a plausible rule for [r]?

A. [r] -> /ɹ/ / V__V

B. /ɹ/ -> [r] / V__V

C. /d/ -> [r] / V__V

D. /d/ -> [r] / C__C

E. [r] -> /d/ / C__C

So when Jynxi says [fɪɹst klɪpərə ivnɪŋ], which is a plausible rule for [r]?

A. [r] -> /ɹ/ / V__V

B. /ɹ/ -> [r] / V__V

C. **/d/ -> [r] / V__V**

D. /d/ -> [r] / C__C

E. [r] -> /d/ / C__C

Phonological Rule Format

- “X turns into Y in environment Z”
- “X -> Y” means “X turns into Y”
  - -> is an arrow, but just easier to type.
- Then the “/” which means “in the environment”
- Then you add a blank, representing where the sound goes that’s getting transformed “__”
- … And you position that blank relative to the conditioning environment.

All of this is on your quick reference chart

- Use it!

A Phoneme

- The Smallest Contrastive Unit of Sound in a language, in a *contrastive distribution* with other phonemes in the language
- Changing phonemes changes meanings, and is perceptible (and often confusing!) for listeners of a language
- Changing between phonemes creates…

Minimal Pairs

- Two words with different meanings which differ by a single sound, indicating that those sounds are **different phonemes**
- Think “boot” and “boon”, or “Niña” and “Piña”

Allophones of a Phoneme

- Different surface-level expressions of the same phoneme, which *alternate* depending on the environment, in a *complementary distribution*
- Which allophone you get is dictated by a rule
- Think about [ej] and [ej:] or the many realizations of /t/ in English

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Underlying Form

- The sound which you decide is the ‘base’ form, from which rules create the other allophones
- This is a *strategic* decision. Choose the form that lets you write the fewest, cleanest rules.

Allomorphs

- Different versions of morphemes which are swapped predictably based on the sound environment.
- Think the many plurals of English,

Free Variation

- Where a group of sounds can replace each other, or not, and there’s no pattern, just chaos
- **Don’t worry about this for LIGN 101, we won’t give you Free Variation on homeworks or exams**

Sounds have relationships with one another

- They can be *independent* phonemes

- They can be *rule-governed* allophones
- They can *chaotically switching* free variation

Signs that two sounds represent different phonemes

- **Minimal pairs**
- Speakers hear them as ‘entirely distinct’
- There’s *no pattern besides changes in meaning which predicts their distribution*

Signs that two sounds are allophones of the same phoneme

- Changing the environment causes the sounds to *alternate*
- The two sounds are predictable
  - “Huh, this one always occurs in that environment!”
- Speakers hear switching between them as ‘a different way of saying’ the same thing
  - Or maybe don’t hear the difference at all

We write phonological rules to describe where allophones occur

- These rules tell us *when* some or all of the forms occur

These rules have formatting conventions

- ‘_’ replaces the sound which is being changed
- ‘#’ means ‘word boundaries’
  - Think of ‘cat’ as being like [#kæt#]
  - _# is at the end of a word
  - #_ is at the start of a word

Aside: Schwa is always an allophone of another vowel

- Schwa (/ə/) is a reduced form of a different vowel
  - Photograph, the, con’vict

- Wedge (/ʌ/) is a specific vowel, with its own identity
  - Not a reduced form of something else

So, now we know how alternations work!

… but why do alternations occur anyways?

Common Phonological Processes

So, now we know how to describe all these crazy rules…

- ## … but what do languages actually DO with them?!

Four Common Types of Phonological Processes

- Assimilation
- Dissimilation
- Insertion / Epenthesis
- Deletion / Elision

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1) Assimilation

- When sounds change to become more like one another
- This is basically Peer Pressure

- 

Example: Nasal Place Assimilation

- “Come on, we’re all being dental, you should try it too!”
- “Pine thugs” -> [pajn̪ θʌgz]
- “Pine guys” -> [pajŋ gajz]

Extreme Example: Nasal Harmony

- When other phones in a word change to match the nasality of a nasal segment
- (13)

/perõra/	[peřõřã]	‘guagua (a groundhog-like animal)’
/ũbusi/	[ʔũ^{m}busi]	‘neck’
/wãhida/	[w̃ãh̃ĩ^{n}da]	‘they went’ (go PAST.PL.)
/wãĩt^{h}ee/	[w̃ãi^{n}t^{h}ee]	‘go’ (future)
/dãwe/	[nãw̃ẽ]	‘mother’
/k^{h}ĩsia/	[k^{h}ĩsiə][3]	‘think’

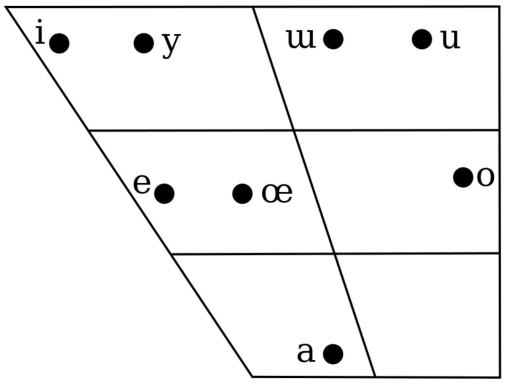
  - “If I’m going to be nasal, you’re all going to be nasal with me, damnit!”
  - From Epena Pedee, in Rose, S. and Walker, R. (2011). Harmony Systems. In The Handbook of Phonological Theory (eds J. Goldsmith, J. Riggle and A. C. Yu). doi:10.1002/9781444343069.ch8
- This also happens with vowels (e.g. Turkish) and elsewhere

Extreme Example: Vowel Harmony

When vowels change to match the other vowels in the word

Turkish has back-front vowel harmony

This means that vowels in a word must be either *all back* or *all front*



Turkish

Turkic - Turkey

Türkiye’-dir - ‘it is Turkey’

- *kapı-dır* - ‘it is the door’
- *gül-dür* - ‘it is the rose’
- *palto-dur* - ‘it is the coat’
- *The vowel in the last syllable changes depending on the other vowels!*

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2) Dissimilation

- When sounds change to become *less* like one another
- 

Example: Liquid Dissimilation

- The third rural bird juror murderer demurred.

- “Colonel” is pronounced /kəɹnəl/
- “Purple” comes from “purpure”
- “surprise” /səɹpɹajz/ is usually /səpɹajz/, same with “berserk” and “february”
  - This is deletion, done for dissimilation reasons

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3) Insertion / Epenthesis

- When a sound pops up to prevent an awkward or undesirable combination
- Basically, showing up on a friend’s bad date
- 

Example: Allomorphs with vowels

- /dɪʃ/ + /s/ -> [dɪʃɪz]
- /ɹat/ + /d/ -> [ɹarɪd]
- The vowel ‘pops in’ to stop /ʃs/ and /td/ from being a thing
- Languages also LOVE to epenthesize to stop VV

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4) Deletion / Elision

- When a sound is removed to stop an awkward or undesirable combination from occurring
- Basically, uninviting your friend’s ex from the party

- 

Example: Elision in English

- Fifth, /fɪfθs/ -> [fɪθs]
- Family, /fæmɪli/ -> [fæmli]
- Natural, /nætʃəɹəl/ -> [nætʃɹəl]

Four Common Types of Phonological Processes

- Assimilation (Peer Pressure)
- Dissimilation (Rebellion)
- Insertion / Epenthesis (Showing up on a friend's date)
- Deletion / Elision (Uninviting and unfriending)

There are other phonological processes

- They're all awesome
- … but those four are super common

I'm humanizing these patterns for a reason

- Before you start looking for a pattern, think about what's changing, arising, or deleting, and what kinds of things might trigger it

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If a language changes /d/ to [t] next to a voiceless C, that's an example of…

A. Assimilation

B. Dissimilation

C. Insertion / Epenthesis

D. Deletion / Elision

If a language changes /d/ to [t] next to a voiceless C, that's an example of…

A. **Assimilation**

B. Dissimilation

C. Insertion / Epenthesis

D. Deletion / Elision

What kinds of things trigger these changes?

Natural Classes

Plural Patterns in English

- [z] after /j g d ɹ n w b m ð l i aj v u ow/
- [s] after /t p k f θ/
- [ɪz] after /tʃ dʒ s ʃ z/

A few reasons why listing sounds is no good

- Lists are *inefficient*
- Lists treat these phenomena as *unmotivated*
- Lists *disguise relationships* among sounds
- Lists aren't *graceful*

Relationships among speech sounds are real

- Phonology is not just algebra with symbols
- Your IPA chart is not just an arbitrary scattering of sounds
- Phonetic motivation for changes is often based on geography

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Relationships can be described in many ways

- … but the easiest way to start thinking is in terms of…

Natural Classes!

Let's play a game!

One of these sounds is not like the other…

/t/ /k/ /p/ /s/

- /s/ is the only fricative, all the rest are voiceless stops

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/m/ /n/ /ŋ/ /b/

- /b/ is the only oral sound, all the rest are nasal sounds

/b/ /a/ /ŋ/ /i/ /s/

- /s/ is the only voiceless sound, all the rest are voiced sounds
- /n/ is the only nasal sound, all the rest are oral

/l/ /s/ /ŋ/ /j/ /i/

- /i/ is the only vowel, all the rest are consonants
- /s/ is the only voiceless sound
- /ŋ/ is the only nasal

/i/ /ɪ/ /ɛ/ /æ/ /ɔ/

- /ɔ/ is the only back vowel, all the rest are front vowels
- /ɔ/ is the only rounded vowel, all the rest are unrounded

/t/ /n/ /s/ /z/ /k/

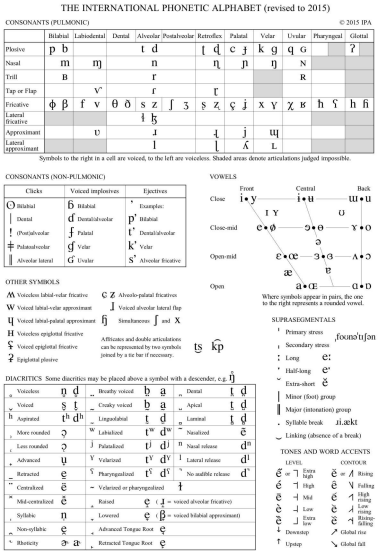
- /k/ is the only non-alveolar sound
- /n/ is the only nasal sound, all the rest are oral

/p/ /t/ /k/ /b/

- /b/ is the only voiced stop

Natural Class

A set of speech sounds in a given language that is able to be uniquely, completely, and succinctly described in terms of the shared phonetic (“natural”) properties of its members.



Natural Class Examples

- Voiceless stops (English & Spanish): [p, t, k]
- Voiced fricatives (English): [v, ð, z, ʒ]
- Voiced fricatives (Spanish): [β, ð, ɣ]
- Front vowels (English): [iː, ɪ, eɪ, ɛ, æ]
- Front vowels (Spanish): [i, e]

Natural Classes in spoken languages are usually very IPA-like

- Common rows, columns, or regions on the IPA chart
- Anything where you can say ‘these share a feature in speech production’
- *Knowing the IPA is hugely helpful in phonology!*

Phonological Rules *typically* involve natural classes

- Natural classes can be the ‘targets’ of rules
  - [p t k] are aspirated in English
- Natural classes can ‘trigger’ rules
  - [tʃ dʒ s ʃ z] trigger the [ɪz] plural

- Very often, rules will act on groups of sounds which share features

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So, as you're writing your phonological rules…

- ## Keep it classy!
  - (Naturally)

Any questions?

Now, let's try some datasets

What is the relationship between [j] and [w] here?

Falsificato	English	Falsificato	English
iji	blacksmith	uwu	small
kaju	monster	jaja	laughter
howaj	sacred	buwe	marker
owowi	surprise	jobowni	person

DO NOT LOOK AT THIS UNTIL YOU'VE WORKED THE PROBLEM

/j/ -> [w] / [rounded vowels]___

- This implies that '/j/ -> [j] / everywhere else'
- You don't have to write the second part, it's assumed

What is the relationship between [t] and [d] here?

Fakodata	English	Fakodata	English
taʃa	kitten	svitat	bird

Fakodata	English	Fakodata	English
pladna	tack	padme	princess
midna	companion	tatanka	buffalo
redmat	rhythm	krita	painter
sitka	tree	gjatzo	ocean

DO NOT LOOK AT THIS UNTIL YOU'VE WORKED THE PROBLEM

/t/ -> [d] / ___[nasals]

- This implies that '/t/ -> [t] / everywhere else'

What's the relationship between [d] and [j]?

Falsificato	English	Falsificato	English
iji	blacksmith	dadeja	paternity
jadas	talking	jowonda	vision
kaju	monster	sijesda	sleep
hodil	invest	buwed	markers
meda	technocrat	jajas	laughing

DO NOT LOOK AT THIS UNTIL YOU'VE WORKED THE PROBLEM

/d/ and /j/ are different phonemes

- There's a minimal pair!

What's the relationship between [t] and [s] here?

Beeyessa	English	Beeyessa	English	Beeyessa	English
tint	dark	asint	less dark	intint	darker

Beeyessa	English	Beeyessa	English	Beeyessa	English
tas	fast	asas	less fast	intas	faster
tust	terrifying	asust	less terrifying	intust	more terrifying
tontin	cute	asontin	less cute	intontin	more cute
tejki	nerdy	asejki	less nerdy	intejki	nerdier

DO NOT LOOK AT THIS UNTIL YOU'VE WORKED THE PROBLEM

/t/ -> [s] / V___

- This is the best answer
- [t] shows up in many more contexts than [s], so it's underlying!
- It is incorrect to say something like '/t/ becomes [s] in 'less' words'.
  - **Phonology just worries about sounds**

Next time

- We'll wrap up phonology, and talk about how words work

Thank you!