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“Somebody who was very wrong thought they were very right!”

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“Somebody who was very wrong thought they were very right!”

The very best study group is office hours!

Phonology II:

The Sound Patterns of Language are Awesome!

Today's Plan

Review

Today's Plan

Review

Common phonological processes

Today's Plan

Review

Common phonological processes

Natural Classes

Today's Plan

Review

Common phonological processes

Natural Classes

Let's work through some problems!

Reviewing Phonemic Analysis

A Phoneme

The Smallest Contrastive Unit of Sound in a language, in a ***contrastive distribution*** with other phonemes in the language

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Changing between phonemes creates...

Minimal Pairs

Two words with different meanings which differ by a single sound, indicating that those sounds are **different phonemes**

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[pɪ**t**] — “pit”
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Two words with different meanings which differ by a single sound, indicating that those sounds are **different phonemes**

[pɪ**t**] — “pit”
[pɪ**n**] — “pin”

[b**u**] — “mud”
[b**y**] — “drank”

Allophones of a Phoneme

Different surface-level expressions of the same phoneme, which ***alternate*** depending on the environment, in a ***complementary distribution***

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Which allophone you get is dictated by a rule

Think about [ej] and [ej:] in English or [t] and [t͡s] in Canadian French

Underlying Form

The sound which you decide is the 'base' form, from which rules create the other allophones

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The “elsewhere case”, or the allophone that shows up in the broadest environment

Think of Canadian French, where [t͡s] shows up only before high front vowels, while [t] shows up everywhere else

Underlying Form

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Think of Canadian French, where [t͡s] shows up only before high front vowels, while [t] shows up everywhere else

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.

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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

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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

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They can be *rule-governed* allophones

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They can be *rule-governed* allophones

They can be in *chaotically switching* free variation

Signs that two different sounds represent different phonemes

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Speakers hear them as 'entirely distinct'

Signs that two different 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*

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The two sounds are predictable

"Huh, this one always occurs in that environment!"

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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

I.e. they tell us the *context* in which the predictable allophone(s) will occur

Phonological Rule template

/A/ —> [B] / (C) __ (D)

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__ represents the sound that’s getting transformed

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—> is an arrow, it means “turns into”

B is the allophone that we can predict

/ means “in the environment”

__ represents the sound that’s getting transformed

C and D represent the environment that conditions the change

C and D are in brackets because in some cases it’s what comes before the sound that matters, and in other cases it’s what comes after the sound!

These rules have formatting conventions

/A/ —> [B] / (C) __ (D)

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/A/ —> [B] / (C) __ (D)

/A/ is **always** in / /

These rules have formatting conventions

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'_' replaces the sound which is being changed

These rules have formatting conventions

/A/ —> [B] / (C) __ (D)

/A/ is **always** in / /

[B] is **always** in [ ]

'_' replaces the sound which is being changed

You won't always need to fill in both the C and D slots

That's why they're in brackets!

Phonemic Analysis in four easy steps!

0: Check for Minimal Pairs, if none...

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

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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

Let’s try a dataset!

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] ___

/j/ —> **[w] / [rounded vowels] ___**

This implies that '/j/ -> [j] / everywhere else'

/j/ —> **[w] / [rounded vowels] ___**

This implies that '/j/ -> [j] / everywhere else'

You don't have to write the second part, it's assumed

Aside: Schwa is always an allophone of another vowel

Schwa (/ə/) is a reduced form of a different vowel

Photograph, the, con'vict

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

Four common types of phonological processes

Assimilation

Dissimilation

Four common types of phonological processes

Assimilation

Dissimilation

Insertion / Epenthesis

Four common types of phonological processes

Assimilation

Dissimilation

Insertion / Epenthesis

Deletion / Elision

1) Assimilation

When sounds change to become more like one another

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Example: Nasal Place Assimilation

"Come on, we're all being dental, you should try it too!"

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"Pine thugs" -> [pajn̪ θʌgz]

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"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

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(13)	/peɾõɾa/	[peɾ̃õɾ̃ã]	‘guagua (a groundhog-like animal)’
	/ũbɯsi/	[ʔũ^{m}bɯsi]	‘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’

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"If I'm going to be nasal, you're all going to be nasal with me, damnit!"

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	/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

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

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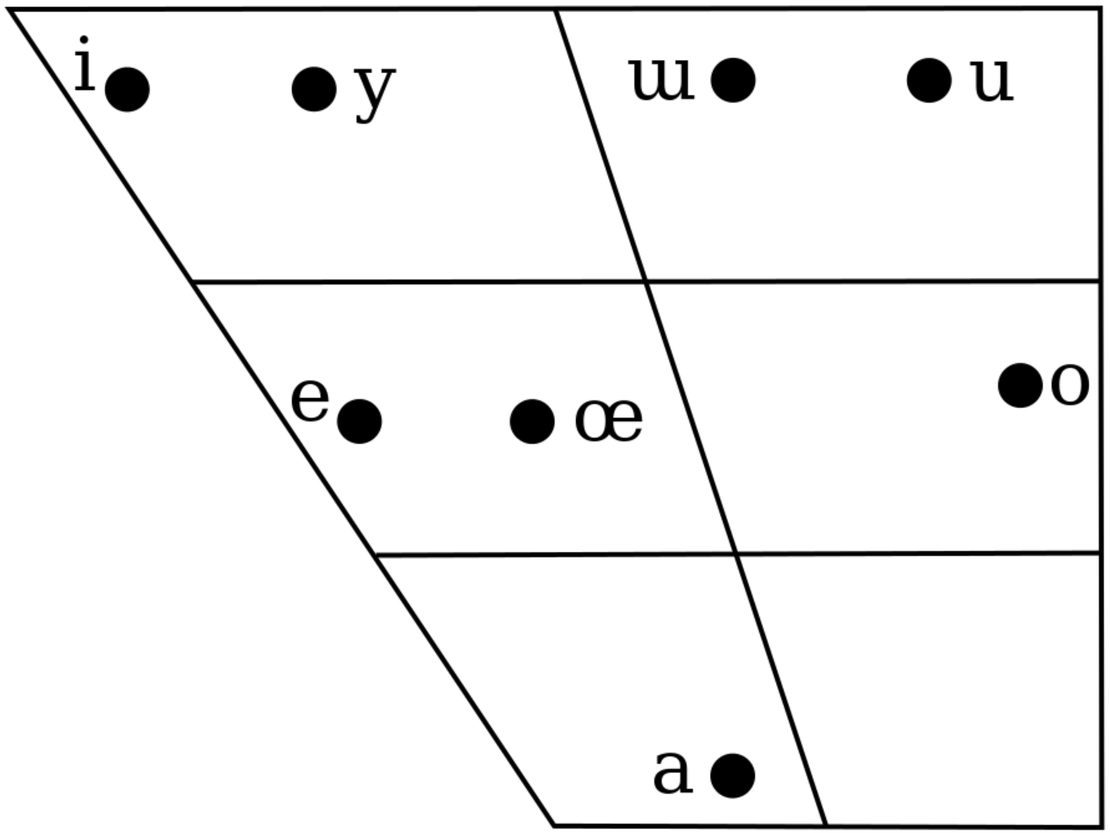

Turkish

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!

Questions about assimilation?

2) Dissimilation

When sounds change to become *less* like one another

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When sounds change to become *less* like one another

Example: Voicing Dissimilation

When a sound changes to be *different* in voicing from other sounds in the word

In Gikuyu (Bantu — Kenya)...

The voiceless velar stop /k/

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The voiceless velar stop /k/

Alternates with the voiced velar approximant /ɰ/

In Gikuyu (Bantu — Kenya)...

The voiceless velar stop /k/

Alternates with the voiced velar approximant /ɰ/

When the next syllable begins with a voiceless sound

Allomorphs of the diminutive marker

Gikuyu (Bantu — Kenya)

ka-ɰoko ‘small chicken’	*ɰa-çera* ‘small path’
ka-ɦiti ‘small hyena’	*ɰa-ko* ‘small piece of firewood’
ka-βori ‘small goat’	*ɰa-tɛgwa* ‘small ox’

Davy, J. I. M., & Nurse, D. (1982). Synchronic versions of Dahl’s Law: The multiple applications of a phonological dissimilation rule.

Example: Liquid Dissimilation

The third rural bird juror murderer demurred.

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"Colonel" is pronounced /kəɹnəl/

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This is deletion, done for dissimilation reasons

Questions about dissimilation?

3) Epenthesis

When a sound pops up to prevent an awkward or undesirable combination

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Basically, showing up on a friend's bad date

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Example: Allomorphs with vowels

/dɪʃ/ + /s/ -> [dɪʃɪz]

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The vowel 'pops in' to stop /ʃs/ and /td/ from being a thing

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/ɹat/ + /d/ -> [ɹaɾɪd]

The vowel 'pops in' to stop /ʃs/ and /td/ from being a thing

Languages also LOVE to epenthesize to stop VV

Questions about epenthesis?

4) Deletion/Elision

When a sound is removed to stop an awkward or undesirable combination from occurring

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When a sound is removed to stop an awkward or undesirable combination from occurring

Basically, uninviting your friend's ex from the party

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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]

Example: Elision in English

Fifth, /fɪfθs/ -> [fɪθs]

Family, /fæmɪli/ -> [fæmli]

Example: Elision in English

Fifth, /fɪfθs/ -> [fɪθs]

Family, /fæmɪli/ -> [fæmli]

Natural, /nætʃəɹəl/ -> [nætʃɹəl]

Questions about Elision?

Four Common Types of Phonological Processes

Assimilation (Peer Pressure)

Four Common Types of Phonological Processes

Assimilation (Peer Pressure)

Dissimilation (Rebellion)

Four Common Types of Phonological Processes

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Insertion / Epenthesis (Showing up on a friend's date)

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

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

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

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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/

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/

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*

A few reasons why listing sounds is no good

Lists are *inefficient*

Lists treat these phenomena as *unmotivated*

A few reasons why listing sounds is no good

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Lists treat these phenomena as *unmotivated*

Lists *disguise relationships* among sounds

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

Relationships among speech sounds are real

Phonology is not just algebra with symbols

Your IPA chart is not just an arbitrary scattering of sounds

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

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 others...

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

One of these sounds is not like the others...

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

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

/m/ /n/ /ŋ/ /b/

/m/ /n/ /ŋ/ /b/

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

/b/ /a/ /ŋ/ /i/ /s/

/b/ /a/ /ŋ/ /i/ /s/

/s/ is the only voiceless sound, all the rest are voiced 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/

/l/ /s/ /ŋ/ /j/ /i/

/i/ is the only vowel, all the rest are consonants

/l/ /s/ /ŋ/ /j/ /i/

/i/ is the only vowel, all the rest are consonants

/s/ is the only voiceless sound

/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/

/i/ /ɪ/ /ɛ/ /æ/ /ɔ/

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

/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/

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

/k/ is the only non-alveolar sound

/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/

/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.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2015)

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

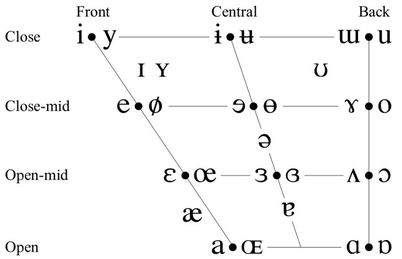
Clicks	Voiced implosives	Ejectives
ʘ Bilabial	ɓ Bilabial	ʼ Examples:
ǀ Dental	ɗ Dental/alveolar	pʼ Bilabial
ǃ (Post)alveolar	ʄ Palatal	tʼ Dental/alveolar
ǂ Palatoalveolar	ɠ Velar	kʼ Velar
ǁ Alveolar lateral	ʛ Uvular	sʼ Alveolar fricative

OTHER SYMBOLS

- ʍ Voiceless labial-velar fricative
- w Voiced labial-velar approximant
- ɥ Voiced labial-palatal approximant
- ʜ Voiceless epiglottal fricative
- ʢ Voiced epiglottal fricative
- ʡ Epiglottal plosive
- ɕ ʑ Alveolo-palatal fricatives
- ɺ Voiced alveolar lateral flap
- ʧ Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary. t͡s k͡p

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

SUPRASEGMENTALS

- ˈ Primary stress ˌfoʊnəˈtɪʃən
- ˌ Secondary stress
- ː Long eː
- ˑ Half-long eˑ
- ˘ Extra-short ĕ
- | Minor (foot) group
- ‖ Major (intonation) group
- . Syllable break ɹi.ækt
- ‿ Linking (absence of a break)

TONES AND WORD ACCENTS

LEVEL			CONTOUR	
e̋ or ˥	Extra high		ě or ˩˥	Rising
é	˦	High	ê	˥˩ Falling
ē	˧	Mid	e᷄	˧˥ High rising
è	˨	Low	e᷅	˩˧ Low rising
ȅ	˩	Extra low	e᷈	˥˩˥ Rising-falling
↓	Downstep		↗	Global rise
↑	Upstep		↘	Global fall

DIACRITICS

Some diacritics may be placed above a symbol with a descender, e.g. n̥ŋ̊

◌̥	Voiceless	n̥ d̥	◌̤	Breathy voiced	b̤ a̤
◌̬	Voiced	s̬ t̬	◌̰	Creaky voiced	b̰ a̰
◌ʰ	Aspirated	tʰ dʰ	◌̼	Linguolabial	t̼ d̼
◌̹	More rounded	ɔ̹	◌ʷ	Labialized	tʷ dʷ
◌̜	Less rounded	ɔ̜	◌ʲ	Palatalized	tʲ dʲ
◌̟	Advanced	u̟	◌ˠ	Velarized	tˠ dˠ
◌̠	Retracted	e̠	◌ˤ	Pharyngealized	tˤ dˤ
◌̈	Centralized	ë	◌̴	Velarized or pharyngealized	ɫ
◌̽	Mid-centralized	e̽	◌˕	Raised	e̝ (ɹ̝ = voiced alveolar fricative)
◌̩	Syllabic	n̩	◌˔	Lowered	e̞ (β̞ = voiced bilabial approximant)
◌̯	Non-syllabic	e̯	◌̘	Advanced Tongue Root	e̘
◌˞	Rhoticity	ɚ a˞	◌̙	Retracted Tongue Root	e̙
◌̃	Nasalized	ẽ	◌ⁿ	Nasal release	dⁿ
◌ˡ	Lateral release	dˡ	◌̚	No audible release	d̚

Natural Class Examples

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Natural Classes in spoken language are usually very IPA-like

Common rows, columns, or regions on the IPA chart

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Knowing the IPA is hugely helpful in phonology!

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Natural classes can be the 'targets' of rules

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

So, as you're writing your phonological rules...

Keep it classy!

(Naturally)

Any questions?

Now, let's try some more datasets!

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

Fakodata	English	Fakodata	English
taʃa	kitten	svitat	bird
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

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/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
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

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[t] —> /**s**/ / **V**___

This is the best answer

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Phonology just worries about sounds

Next Time

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

Thank you!