Introduction to Linguistics
LIN101
Lecture 9: Rules & derivations

Fall 2024, University of Toronto, St. George
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Announcements

- November: Four more lectures to go
- Quiz II on November 11th
- Turn announcements on, otherwise you may miss the quiz… and unless you have a good (i.e., documented) reason for not having missed the quiz, you'll get a 0.
- Next 2 weeks: Morphology I and II
- Last week: Quiz III on Monday and Sociolinguistics on the last lecture
- December 2nd: Quiz IV on sociolinguistics covering chapters 2 & 10.
- Today: Phonological rules & derivations
- But first: Discussion of HW3

Phonological rules

Phonological rules

- Recap: phonemic analysis
- French dataset in chapter 4.6
- Phones of interest:
  [m] and [m̥];
  [l] and [l̥];
  [ʀ] and [ʀ̥]

[ʀym]	‘cold/flu’	[il]	‘island’
[mɛʀ]	‘mother’	[tabl]	‘table’
[tɛʀm]	‘term’	[kasabl]	‘breakable’
[film]	‘film’	[ɛl]	‘she’
[limite]	‘limited’	[klemã]	‘merciful’
[liʀ]	‘to read’	[simetʀikmã]	‘symmetrically’
[lɛvʀ]	‘lip’	[ɛtʀ̥]	‘to be’
[plɛziʀ]	‘pleasure’	[ʃifʀ̥]	‘number/figure’
[tʀivjal]	‘trivial’	[mɛtʀ̥]	‘to put’
[ʀali]	‘race-meeting’	[mɛkɔnɛtʀ̥]	‘to fail to recognize’
[ʀymatismal]	‘rheumatic’	[pœpl̥]	‘people’
[ʀɔ̃fle]	‘to snore’	[ɔ̃kl̥]	‘uncle’
[ekʀiʀ]	‘to write’	[tãpl̥]	‘temple’
[tɔʀdʀ]	‘to wring’	[ʀitm̥]	‘rhythm’
[pɛʀs]	‘Persian’	[ʀymatism̥]	‘rheumatism’

Phonological rules

	[m]		[m̥]	
y	y_#	ɛ	s_#	#
#	#_ɛ	#	t_#	
ʀ	ʀ_#	i		
l	l_#	a		
i	i_i	ã		
s	y_a	e		
e	s_a			
k	e_ã			
	i_e			
	k_ã			

s
t

- Overlap on both the left and right sounds…
- Does this automatically mean that the two sounds are contrastive?
- But the exact same environment is not listed in both columns
- We have to assume the dataset contains the complete truth
- The two sounds cannot be contrastive

Phonological rules

	[m]		[m̥]	
y	y_#	ɛ	s_#	#
#	#_ɛ	#	t_#	
ʀ	ʀ_#	i		
l	l_#	a		
i	i_i	ã		
s	y_a	e		
e	s_a			
k	e_ã			
	i_e			
	k_ã			

- The preceding and following sounds alone cannot lead us far. We must look further.
- [m] and [m̥] can both be at the end of a word, but not under the same conditions.
- In a final position, [m̥] must be preceded by a voiceless consonants while [m] must be preceded by sonorous sounds

Phonological rules

[m]

y_#
#_ɛ
ʀ_#
l_#
i_i
y_a
s_a
e_ã
i_e
k_ã

y
#
ʀ
l
i
s
e
k

ɛ
#
i
a
ã
e

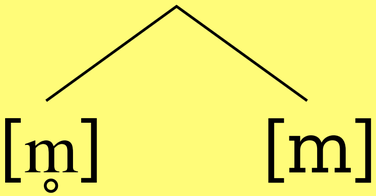
[m̥]

s_#
t_#

s
t

#

/m/



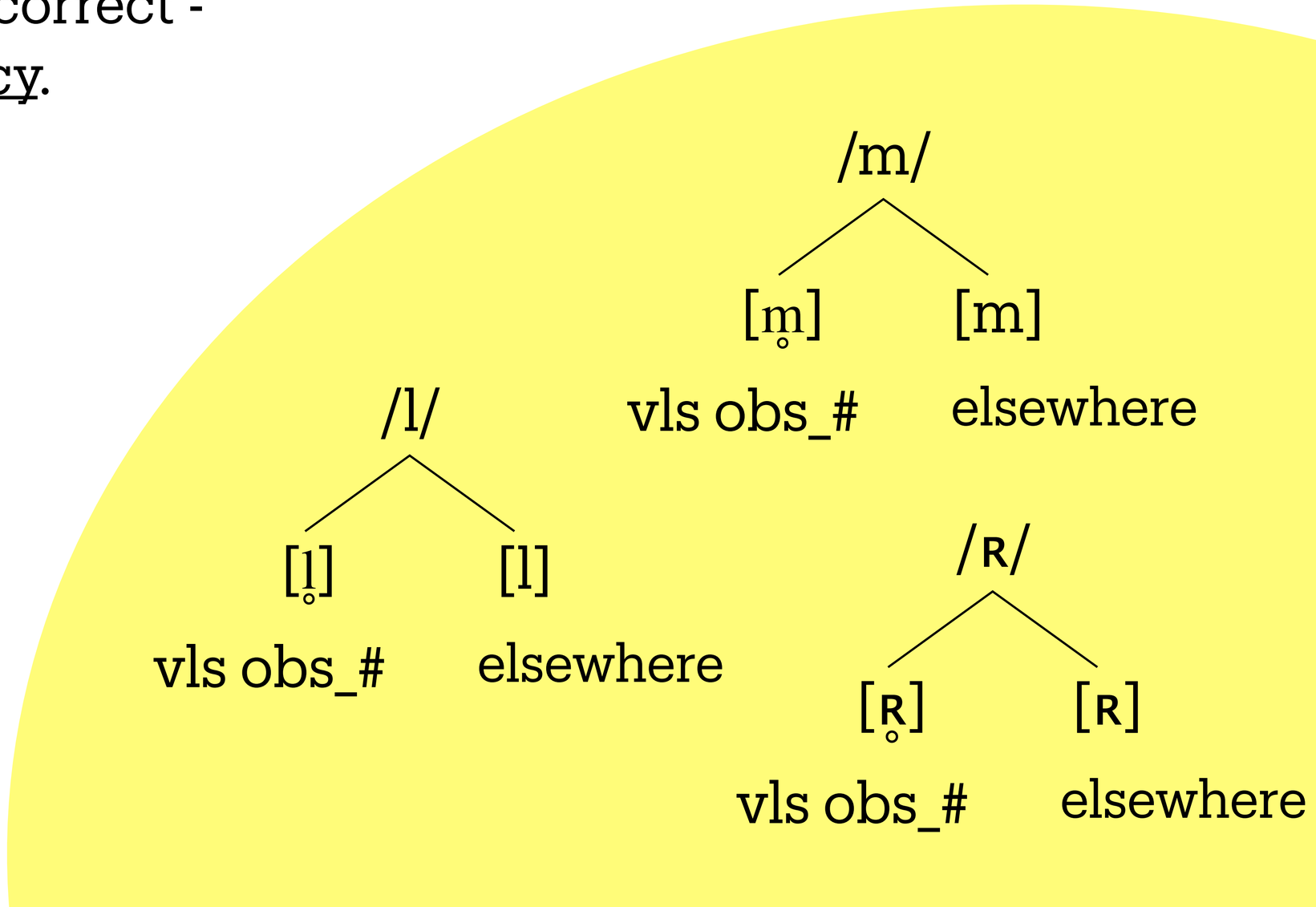
[m̥] [m]

vls obs_# elsewhere

- /m/ becomes [m̥] when it is in a word-final position and is preceded by a voiceless obstruent
- and appears as [m] elsewhere

Phonological rules

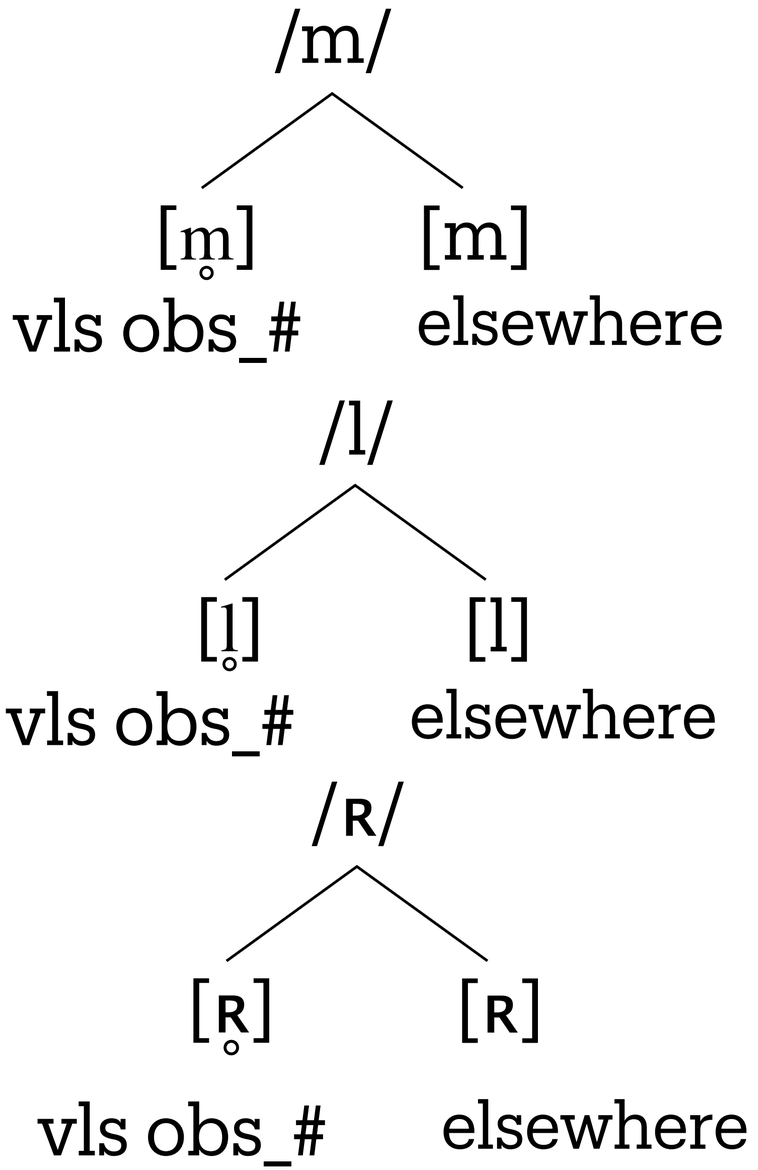
- This analysis - though correct - suffers from redundancy.
- It misses an important generalization
- Is it a coincidence that the voiceless allophone appears next to a voiceless obstruent?
- If not, can we say something more general?



Phonological rules

Eliminating redundancy with faithfulness

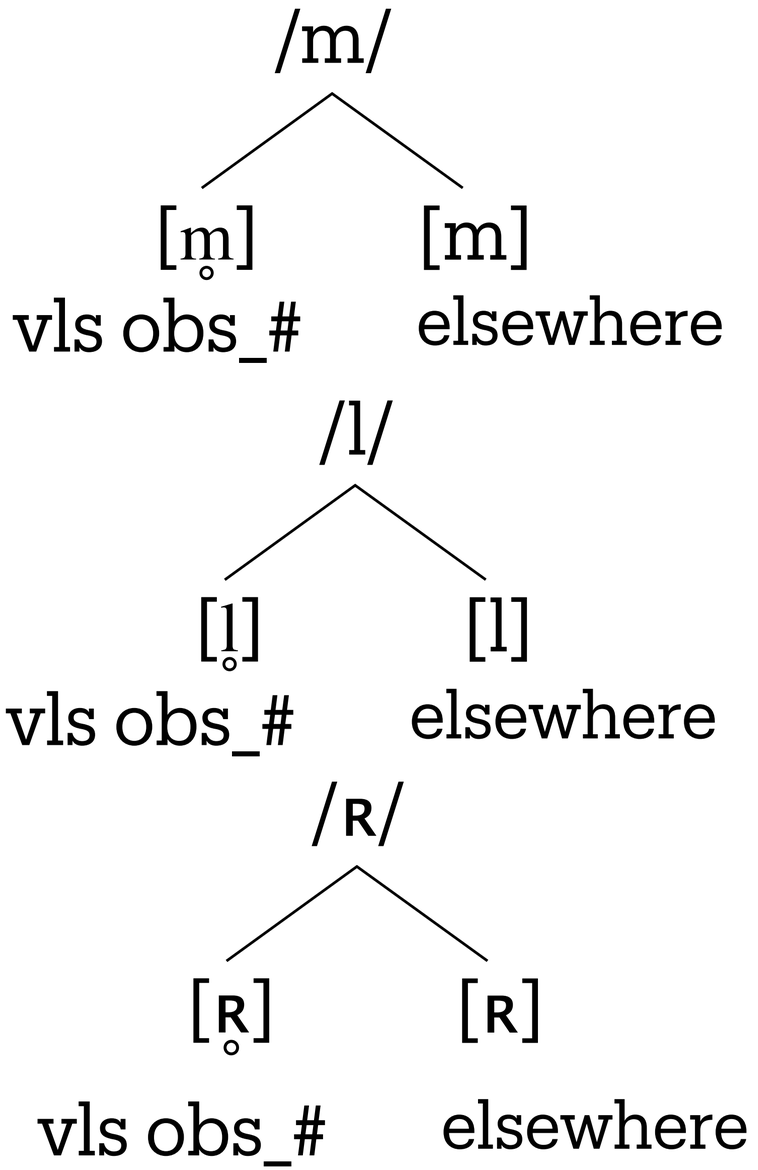
- "elsewhere"
- The default allophone is always the one that appears "elsewhere" (i.e. in a diverse set of environments)
- This is phenomenon is called as the principle of faithfulness
- The default allophone is most "faithful" to the phoneme it represents



Phonological rules

Eliminating redundancy with faithfulness

- /m/ is pronounced as [m̥] word-finally after a voiceless obstruent
- and appears as [m] elsewhere
- /l/ is pronounced as [l̥] word-finally after a voiceless obstruent
- and appears as [l] elsewhere
- /ʀ/ is pronounced as [ʀ̥] word-finally after a voiceless obstruent
- and appears as [ʀ] elsewhere



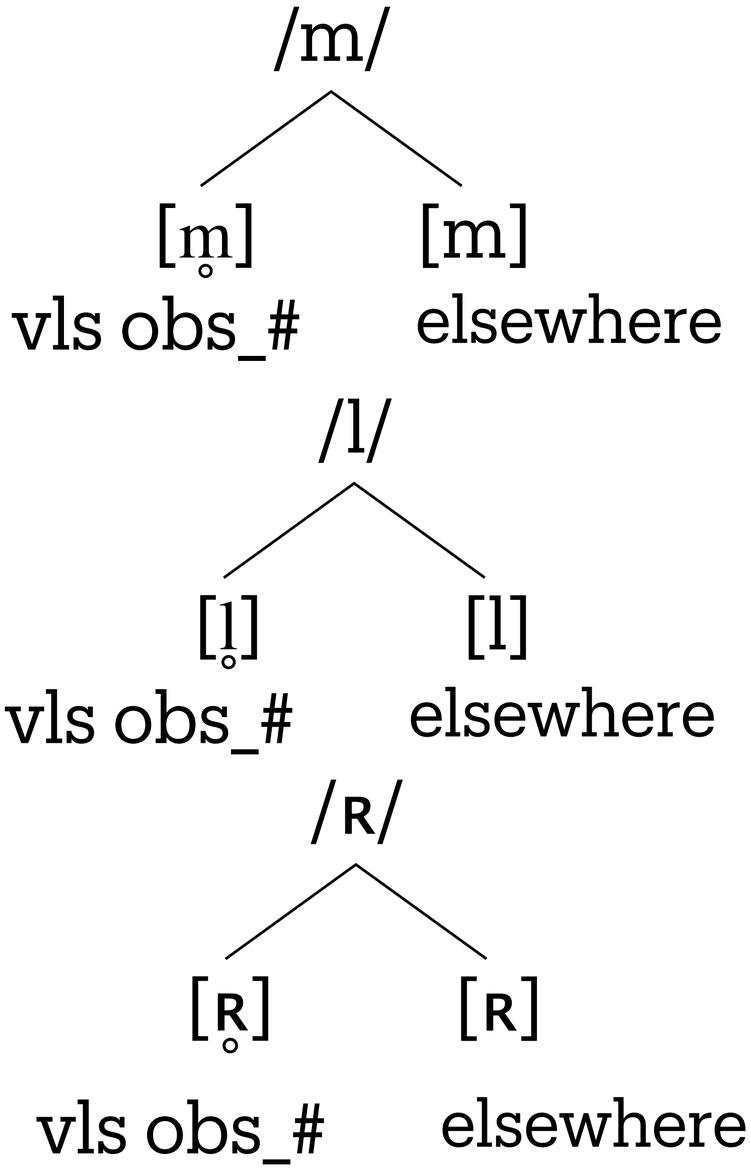
Phonological rules

Eliminating redundancy with faithfulness

- /m/ is pronounced as [m̥] word-finally after a voiceless obstruent
- /l/ is pronounced as [l̥] word-finally after a voiceless obstruent
- /ʀ/ is pronounced as [ʀ̥] word-finally after a voiceless obstruent

still redundant…

voiceless sonorants



Phonological rules

Eliminating redundancy with simplicity

- /m/ is pronounced as [m̥] word-finally after a voiceless obstruent
- /l/ is pronounced as [l̥] word-finally after a voiceless obstruent
- /ʀ/ is pronounced as [ʀ̥] word-finally after a voiceless obstruent

sonorants

Could we say there is a general rule that applies to sonorants in French?

Phonological rules

Eliminating redundancy with simplicity

- If we formulate a general rule:
- "Sonorants in French lose their voicing in a word-final position when preceded by voiceless obstruents"
- This should apply to all sonorants.
- French sonorants include [n] and [j] as well:
- Our rule must therefore apply to these sounds, too.
- Not enough data in the dataset!
- Have to assume [n] and [j] cannot occur in the relevant environment

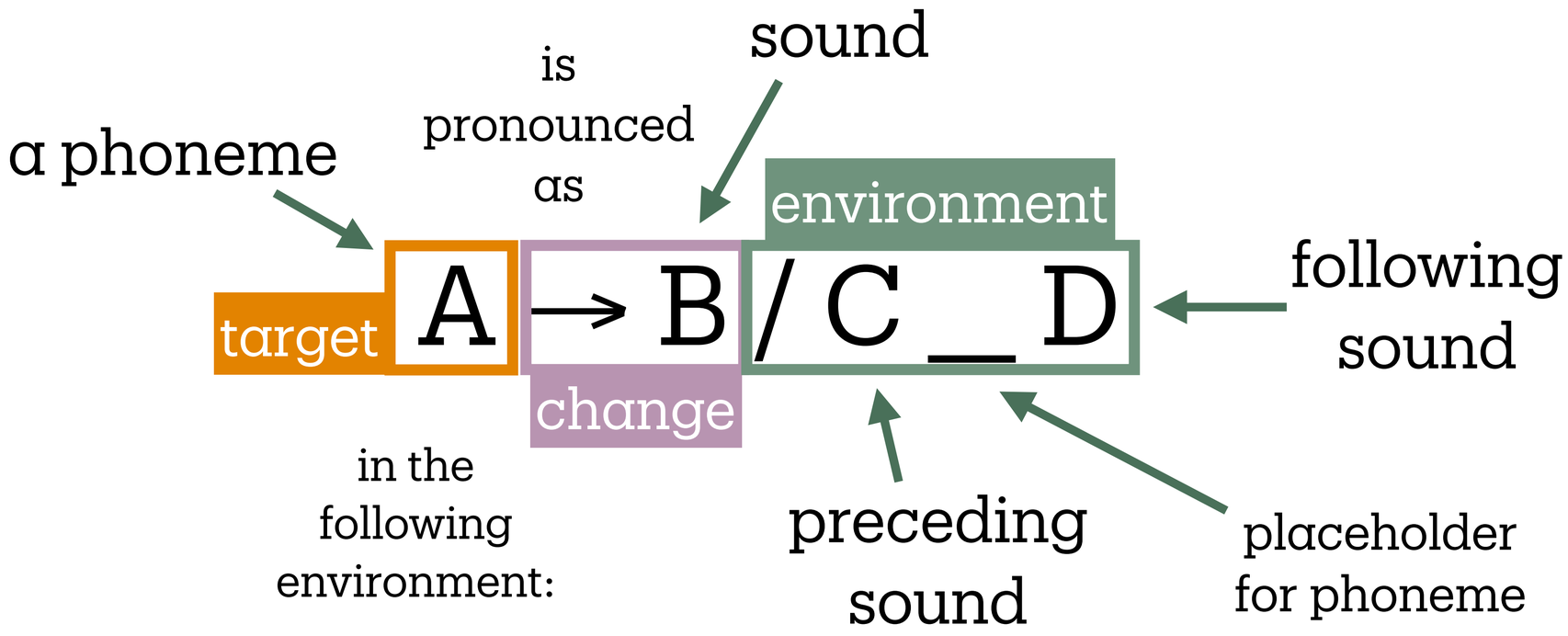
Phonological rules

Eliminating redundancy with simplicity

- Even though the three phonemes /m/, /l/, and /ʀ/ do not exhaust the natural class of sonorants in French,
- We find no sonorant that contradicts the general rule we came up with, therefore we'll go by this rule:
- "Sonorants in French lose their voicing in a word-final position when preceded by voiceless obstruents"
- Statements like this are called phonological rules
- and can be written up following a uniform template

Phonological rules

Writing phonological rules



Phonological rules

Writing phonological rules

What is the change?

Where does this change happen?

is pronounced as

a phoneme A

sound B

sonorant → voiceless / voiceless obstruent _ #

in the following environment:

preceding sound

following sound

Phonological rules

- A list of useful abbreviations
- You are always welcome to write the entire word insetad of the abbreviation.

vcd	voiced
vls	voiceless
lab	labial
cor	coronal
dor	dorsal
bilab	bilabial
labdent	labiodental
dent	(inter)dental
alv	alveolar
postalv	postalveolar
retr	retroflex
pal	palatal
vel	velar
uvu	uvular
phar	pharyngeal
epiglot	epiglottal
glot	glottal

plos	plosive
fric	fricative
affric	affricate
lat	lateral
cent	central
approx	approximant
obs	obstruent
son	sonorant
cont	continuant
nas	nasal stop / nasal(ized)
hi	high
lo	low
bk	back
rd	round
unrd	unrounded
tns	tense

Generative phonology and levels of representation

Generative phonology and levels of representation

Generative phonology

- There are various ways one can build a phonological theory: multiple phonological frameworks exist.
- Not all phonologists like making reference to phonemes.
- However, whether phonemes exist or not, they are a very useful tool in understanding phonology.
- Generative phonology (developed in the 1950s) builds on ideas developed by Saussure, Bloomfield, Trubetzkoy, Jakobson, and others
- …all of whom were influenced by the concepts and methods that were developed by Pānini, an Indian grammarian from 500 BC.

Generative phonology and levels of representation

Generative phonology

Leonard Bloomfield

Ferdinand de Saussure

Nikolai Trubetzkoy

Roman Jakobson

wikipedia.org

Generative phonology and levels of representation

UR and SR

- In generative phonology, words are associated with two phonological forms
- Underlying vs. surface representation
- **SR** = Surface (phonetic) representation: a string of phones representing the actual pronounciation of a word
- **UR** = Underlying (phonemic) representation: a string of phonemes*
- The SR consists of a string of allophones of the phonemes of the UR

* The term "phoneme" evolved later

Georgian:
[xeli] 'hand'
[t͡ʃoli] 'wife'

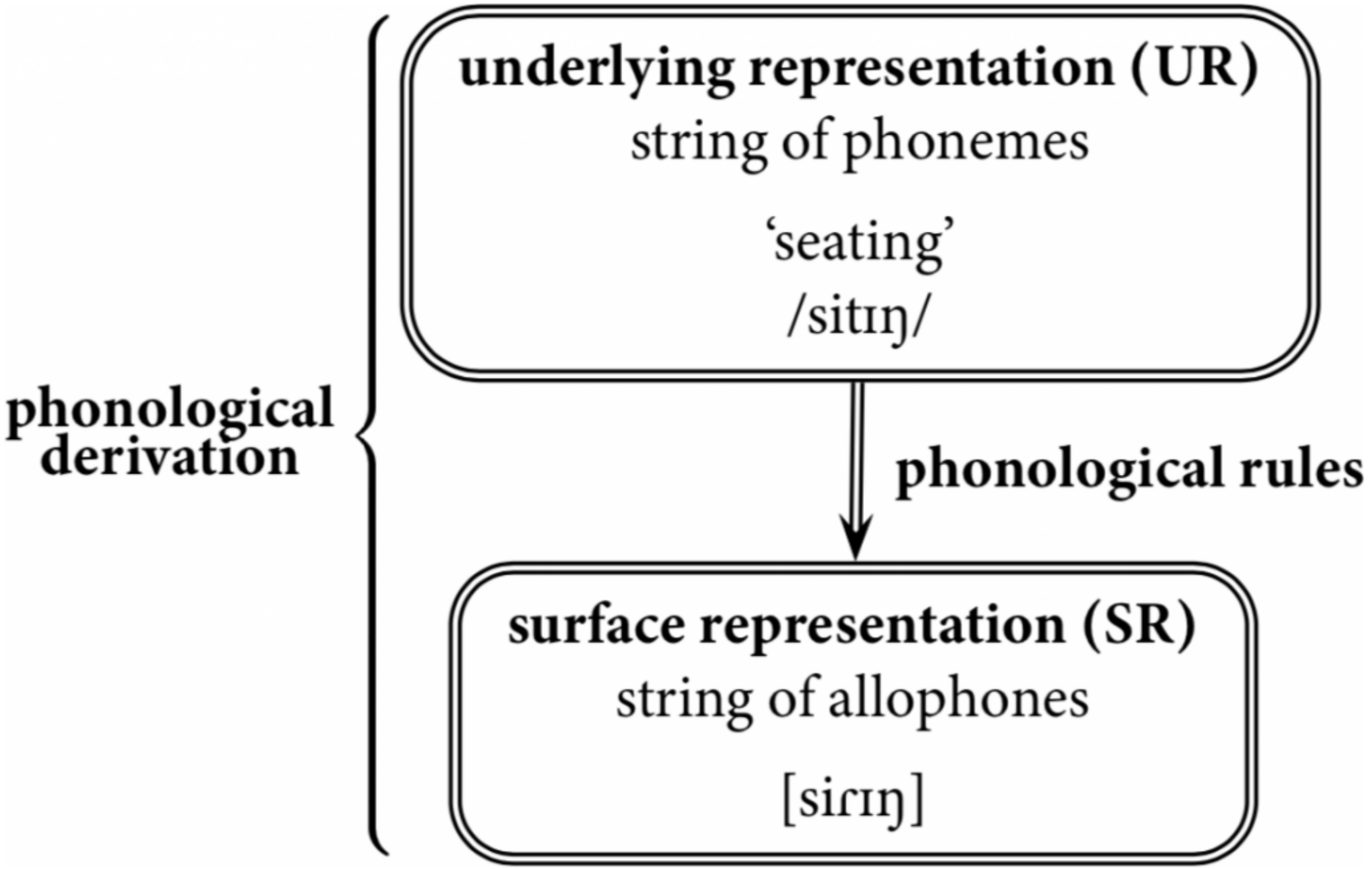
Generalization (see Lecture 8):
The default allophone is [ɬ] because [l] only occurs before high vowels

UR: /xeɬi/, SR: [xeli]
UR: /t͡ʃoɬi/, SR: [t͡ʃoli]

Generative phonology and levels of representation

UR and SR

- Input: the underlying representation
- Output: the surface representation
- The output is a result of applying phonological rules to the input

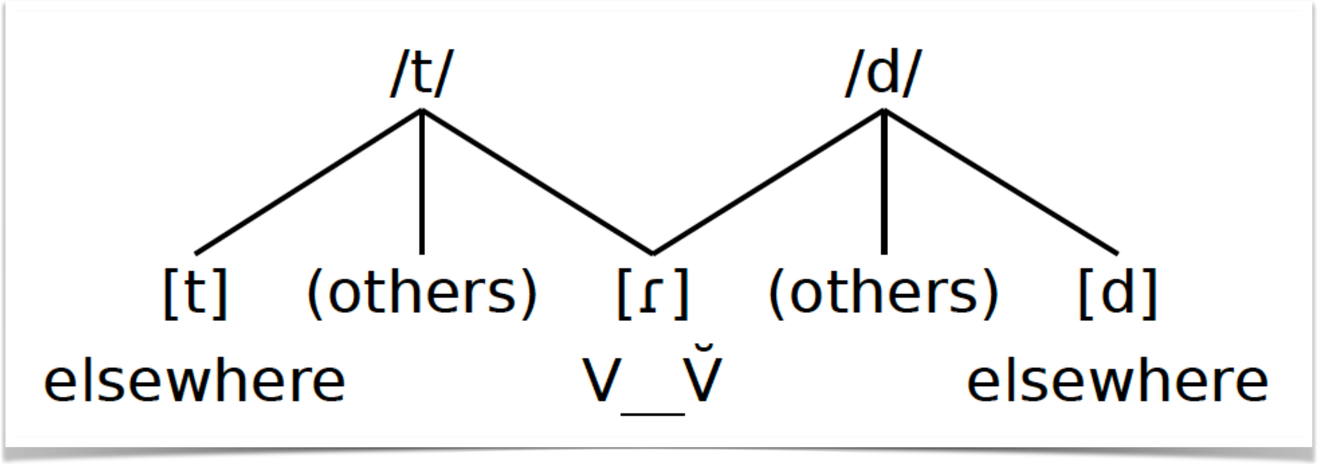


Generative phonology and levels of representation

UR and SR

- One advantage of underlying and surface representations is that we can account for neutralization
- Phonemes can share allophones! Example: /t/–/d/ neutralization in English

- *seating* /sitɪŋ/ [sirɪŋ]
- *seeding* /sidɪŋ/ [sirɪŋ]



(simplified representation!)

Phonological derivations

Phonological derivations

- After completing the phonemic analysis, we identify some rule
- The next step is to demonstrate that the rule works:
- The rule has to be shown on a few critical words
- These words must cover a representative set of phonemes in the target natural class
- French example:
  - /m/
  - /l/
  - /ʀ/

  different kinds of sonorants
- If you make a claim about vowels, you must show both high and low vowels, front and back vowels, etc.

Phonological derivations

- In addition to showing cases where the application of the rule is seen, we must also present cases where it is not seen.
- These cases should only be ones where the environment does not make it possible for the rule to apply.
- Imagine you claim that you can blow away candles.
- Someone asks you to prove it and hands you a candle but not a lighter.
- You won't be able to demonstrate your candle-blowing skills.
- But only because some conditions aren't met.

Phonological derivations

Determine the URs

- The same goes for phonological rules:
- They can only apply in a certain environment.
- If you want to prove the validity of a certain rule, it always has to apply in the environment specified in the rule,
- but if the environment is not as specified in the rule, that does not count as counterevidence.

sonorant → voiceless / voiceless obstruent _ #

/ritm/	/õkl/	/ɛtr/	/tabl/	/ekʀiʀ/	/limite/
[ritm̥]	✔	✔	✘	✘	✘

Phonological derivations

Derivation table

- Create a table with the UR, the SR, and any rules in between the two.
- Have some columns for a representative sample of words.

gloss UR	‘rhythm’ /ʀitm/	‘uncle’ /õkl/	‘to be’ /ɛtʀ/	‘table’ /tabl/	‘to write’ /ekʀiʀ/	‘limited’ /limite/
devoicing	ʀitm̥	õkl̥	ɛtʀ̥	—	—	—
SR	[ʀitm̥]	[õkl̥]	[ɛtʀ̥]	[tabl]	[ekʀiʀ]	[limite]

label your rule

dashes wherever the rule doesn't apply

Types of phonological rules

Types of phonological rules

- Phonological rules are language-specific
- In Kalaallisut, /i/ lowers to /e/ when followed by a uvular sound, but this doesn't mean that it happens the same way in every language.
- Yet it makes sense to generalize when we think about the types of phonological rules.
- Assimilation rules: a phoneme changes to an allophone in a way that it matches its environment.
- The point of assimilation is to ease production: the more features two adjacent sounds share, the easier that sound sequence is produced.
- There are various kinds of assimilation rules.

Types of phonological rules

Phonation assimilation: devoicing

- The French devoicing rule belongs here
- Other examples for devoicing
- Polish

/vɪkaz pism/ → [vɪkas pism] 'list of journals'
/dxu/ → [txu] 'of breath'

- German

/rad/ → [rat] 'wheel', 'bike'
/t͡sug/ → [t͡suk] 'train'

Types of phonological rules

Phonation assimilation: voicing

- The opposite process, voicing assimilation is also possible.
- Wemba Wemba

/panpar/ → [panbar] 'shovel'
/tanʈa/ → [tanɳɖa] 'touch'

- Korean

/ta/ → [t^ha] 'all'
/hata/ → [hada] 'do'

Types of phonological rules

Place assimilation

- Assimilation can also be based on place of articulation
- Persian

  /χædʃe/ → [χæd̪ʃe] 'flaw'
  /ʔenʃɒ/ → [ʔen̪ʃɒ] 'essay'

Nasality assimilation

- Ka'apor (Tupian language spoken in Brazil)

  /uruma/ → [urumã] 'duck'
  /tamui/ → [tamũi] 'old man'

Types of phonological rules

- There are other types of rules out there, for example:
- epenthesis (insertion of a sound)
- deletion (deletion of a sound)
- Knowing what types of rules we can choose from can help figure out allophones.
- Phonemic analysis and rule discovery go hand in hand.

Signed language phonology

Signed language phonology

- Are signed languages subject to phonological rules?
- They are, only not in the same way as spoken languages.
- The phonological rules found in signed languages are not productive
- They do not apply to every single case where it could, like phonological rules do in spoken languages.
- We can still call these rules because their function is the same - ease of production.
- It's two-hand signs in particular that are subject to phonological rules, because they are more complex and complexity comes with more effort.

Signed language phonology

Weak hand freeze

- When both hands move, one of the hand can stay in place: "freezing"
- Examples:

- SENTENCE (two-handed movement)
  https://www.signingsavvy.com/media2/mp4-ld/8/8611.mp4
- SENTENCE (with weak hand freeze)
  https://www.signingsavvy.com/media2/mp4-ld/8/8612.mp4

Signed language phonology

Weak hand drop

- In two-handed signs, the immobile hand may not be used at all.
- Examples:
- CHOOSE (two-handed movement)
  https://www.signingsavvy.com/media2/mp4-ld/22/22784.mp4
- CHOOSE (with weak hand drop)
  https://www.signingsavvy.com/media2/mp4-ld/30/30828.mp4

Signed language phonology

Lowering

- The sign is articulated at a lower location compared to its "official" position
- Producing it at a lower location involves less effort
- KNOW (original) https://www.signingsavvy.com/media2/mp4-ld/21/21554.mp4
- KNOW (with lowering) https://www.signingsavvy.com/media2/mp4-ld/30/30441.mp4

Signed language phonology

Distalization and proximalization

- distal joints: joints further from the torso
- proximal joints: joints closer to the torso
- Distalization: using more proximal joints instead of more distal ones
- Proximalization: using more distal joints instead of more proximal ones
- CHAT (proximal)
  https://www.signingsavvy.com/media2/mp4-ld/22/22579.mp4
- CHAT (distal)
  https://www.signingsavvy.com/media2/mp4-ld/22/22578.mp4

End of lecture 9