Phonology III

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Week 4
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LING 20001: Introduction to Linguistics

Quick recap

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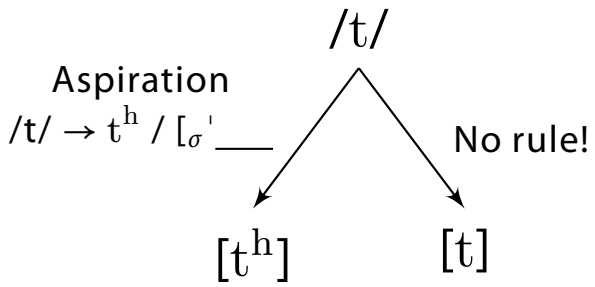

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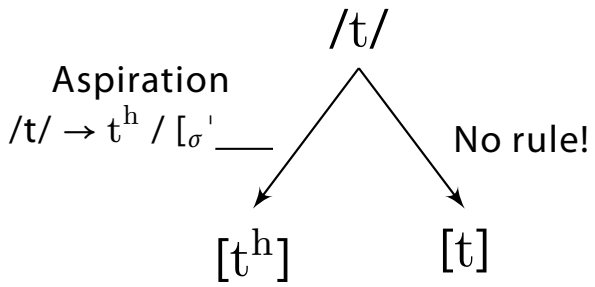

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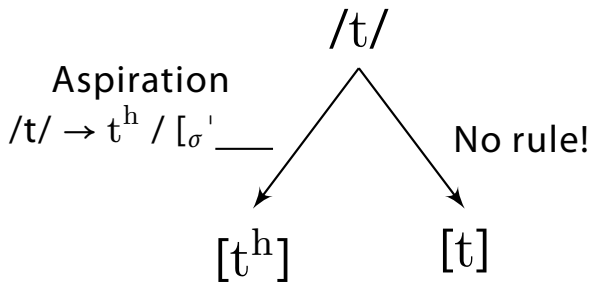

- What about when we have more than one phonological rule?

Alternations

[kɔt]	‘cat’	[kɔtɨ]	‘cats’
[kɔt]	‘code’	[kɔdɨ]	‘codes’

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	/kɔt-ɨ/	/kɔd-ɨ/
	[kɔdɨ]	[kɔdɨ]

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[kɔt]	[kɔdɨ]	[kɔt]	[kɔdɨ]

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	[kɔt]	[kɔdɨ]	[kɔt]	[kɔdɨ]

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	‘cat’ /kɔt/	‘cats’ /kɔt-ɨ/	‘code’ /kɔd/	‘codes’ /kɔd-ɨ/
Rule X	—	—	kɔt	—
	[kɔt]	[kɔdɨ]	[kɔt]	[kɔdɨ]

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- What is this Rule X?

Alternations

	‘cat’ [kɔt]	‘cats’ /kɔt-ɨ/	‘code’ /kɔd/	‘codes’ /kɔd-ɨ/
Final devoicing	—	—	kɔt	—
	[kɔt]	[kɔdɨ]	[kɔt]	[kɔdɨ]

- What is this Rule X?

Final Devoicing:

[voiced stop] → [voiceless stop] / ___#

‘A voiced stop becomes a voiceless stop at the end of a word’

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- If we did not take into account the relatedness of the words, we might wrongly conclude that [kɔt] has an underlying /t/ in both ‘cat’ and ‘code’.

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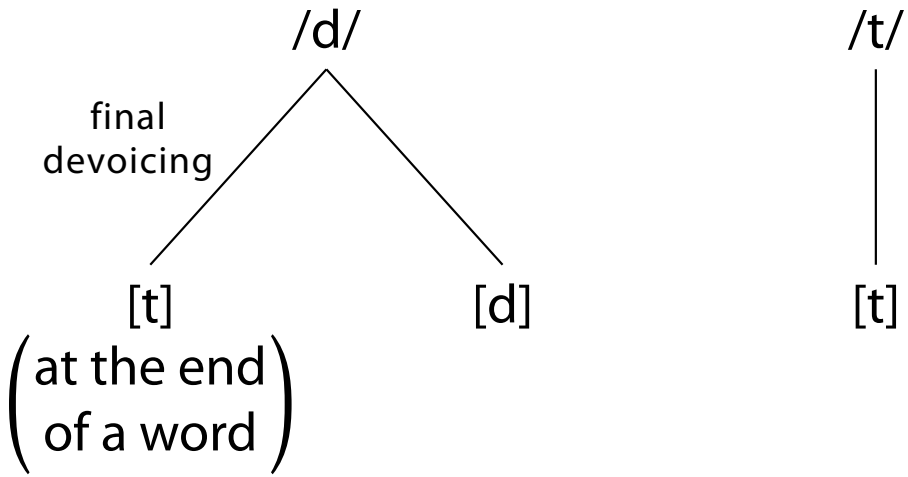

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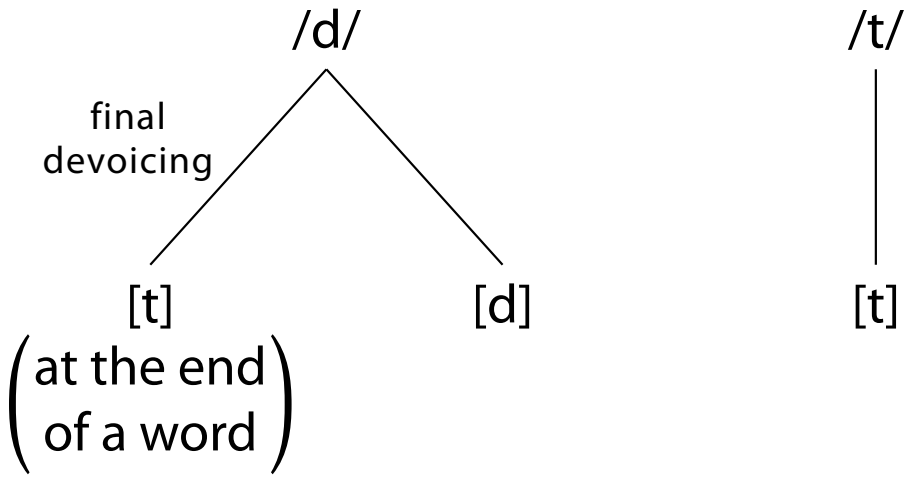

- Looking at the same word in different contexts is a crucial step in figuring out both underlying representations and phonological rules that apply to them.

Lardil

- What do the following data suggest about the underlying representations of these Lardil words?

simple	non-future	future	
[kæntapal]	[kæntapal-in]	[kæntapal-uɻ]	‘dugong’
[kæt̪aɾ]	[kæt̪aɾ-in]	[kæt̪aɾ-uɻ]	‘river’
[mæla]	[mæla-n]	[mæla-ɻ]	‘sea’
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Vowel deletion:

V → Ø / V___

'Delete a vowel when it is immediately preceded by another vowel'

Lardil

Vowel deletion (V → Ø / V___)		
[mæla]	[mæla-n]	[mæla-ɻ̥]

Lardil

	/mæla/	/mæla-in/	/mæla-uɻ/
Vowel deletion (V → Ø / V___)			
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Lardil

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Lardil

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Lardil

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	[mæla]	[mæla-n]	[mæla-ɻ]	[kæntapal-uɻ]

Lardil

	/mæla/	/mæla-in/	/mæla-uɻ/	/kæntapal-uɻ/
Vowel deletion (V → Ø / V___)	—	mæla-n	mæla-ɻ	
	[mæla]	[mæla-n]	[mæla-ɻ]	[kæntapal-uɻ]

Lardil

	/mæla/	/mæla-in/	/mæla-uɻ/	/kæntapal-uɻ/
Vowel deletion (V → Ø / V___)	—	mæla-n	mæla-ɻ	—
	[mæla]	[mæla-n]	[mæla-ɻ]	[kæntapal-uɻ]

Lardil

Now, take a look at this data:

non-future	future	
[papi-n]	[papi-wuɻ]	‘father’s mother’
[ŋiɳi-n]	[ŋiɳi-wuɻ]	‘skin’
[wanka-n]	[wanka-ɻ]	‘arm’
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	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ		
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Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

Is the right result?

Lardil

Now, take a look at this data:

non-future	future	
[papi-n]	[papi-wuɻ]	'father's mother'
[ŋiɳi-n]	[ŋiɳi-wuɻ]	'skin'
[wanka-n]	[wanka-ɻ]	'arm'
[mæla-n]	[mæla-ɻ]	'sea'

What's the underlying representation?

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
	[mæla-n]	[mæla-ɻ]	[papi-n]	*[papi-ɻ]

Is the right result?

Lardil

Now, take a look at this data:

non-future	future	
[papi-n]	[papi-wuɻ]	'father's mother'
[ŋiɳi-n]	[ŋiɳi-wuɻ]	'skin'
[wanka-n]	[wanka-ɻ]	'arm'
[mæla-n]	[mæla-ɻ]	'sea'

What's the underlying representation?

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
	[mæla-n]	[mæla-ɻ]	[papi-n]	*[papi-ɻ]

Is the right result? No, we want to have the SR [papi-wuɻ] for the UR /papi-uɻ/

Lardil

Now, take a look at this data:

non-future	future	
[papi-n]	[papi-wuɻ]	'father's mother'
[ŋiɳi-n]	[ŋiɳi-wuɻ]	'skin'
[wanka-n]	[wanka-ɻ]	'arm'
[mæla-n]	[mæla-ɻ]	'sea'

What's the underlying representation?

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
	[mæla-n]	[mæla-ɻ]	[papi-n]	*[papi-ɻ]

Is the right result? No, we want to have the SR [papi-wuɻ] for the UR /papi-uɻ/

The Vowel deletion rule incorrectly deletes the /u/ and we don't have any way of getting a [w] in the surface form.

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)				
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)				
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)				
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)				
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	mæla-n			
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	mæla-n			
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ		
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ		
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Lardil

	/mæla-in/	/mæla-uɻ/	/papi-in/	[papi-uɻ]
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

To solve this, we need to add a rule to get the right form. What would it look like?

/w/ Epenthesis:

Ø → w / i___u

'Insert a w between a sequence of /iu/'

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

- Why doesn't the vowel deletion rule apply anymore?

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

- Why doesn't the vowel deletion rule apply anymore?
- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

- Why doesn't the vowel deletion rule apply anymore?
- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)
- When the context for a rule is removed by the application of a preceding rule, we call this kind of rule interaction **bleeding**.

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

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- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)
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- /w/-Epenthesis **bleeds** Vowel deletion

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	papi-wuɻ
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	[papi-wuɻ]

- Why doesn't the vowel deletion rule apply anymore?
- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)
- When the context for a rule is removed by the application of a preceding rule, we call this kind of rule interaction **bleeding**.
- /w/-Epenthesis **bleeds** Vowel deletion
- If the rules had applied in the opposite order, vowel deletion would apply.

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	*[papi-ɻ]

- Why doesn't the vowel deletion rule apply anymore?
- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)
- When the context for a rule is removed by the application of a preceding rule, we call this kind of rule interaction **bleeding**.
- /w/-Epenthesis **bleeds** Vowel deletion
- If the rules had applied in the opposite order, vowel deletion would apply.

Bleeding

	/mæla-in/	/mæla-uɻ/	/papi-in/	/papi-uɻ/
Vowel deletion (V → Ø / V___)	mæla-n	mæla-ɻ	papi-n	papi-ɻ
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
	[mæla-n]	[mæla-ɻ]	[papi-n]	*[papi-ɻ]

- Why doesn't the vowel deletion rule apply anymore?
- The /w/-Epenthesis rule removes the context for Vowel deletion to apply (the sequence /iu/)
- When the context for a rule is removed by the application of a preceding rule, we call this kind of rule interaction **bleeding**.
- /w/-Epenthesis **bleeds** Vowel deletion
- If the rules had applied in the opposite order, vowel deletion would apply.
- This would give us the incorrect surface form *[papi-ɻ] for /papi-uɻ/

Lardil

Now, let's look at a different set of Lardil words:

simple	non-future	future	
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'
[mæla]	[mæla-n]	[mæla-ɻ]	'sea'
[t̪awa]	[t̪awa-n]	[t̪awa-ɻ]	'rat'

What is the relevant rule here?

Lardil

Now, let's look at a different set of Lardil words:

simple	non-future	future	
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
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[mæla]	[mæla-n]	[mæla-ɻ]	'sea'
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[mæla]	[mæla-n]	[mæla-ɻ]	'sea'
[t̪awa]	[t̪awa-n]	[t̪awa-ɻ]	'rat'

What is the relevant rule here?

Apocope:

V → Ø / VCVC___#

'Delete a vowel before a word boundary when it is preceded by two (or more) vowels/syllables'

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC___#)				
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC___#)				
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)				
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)	—			
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)	—			
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—	mæla-n		
Apocope (V → Ø / VCVC___#)	—			
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—	mæla-n		
Apocope (V → Ø / VCVC___#)	—	—		
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	mæla-n		
Apocope (V → Ø / VCVC___#)	—	—		
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	mæla-n	—	
Apocope (V → Ø / VCVC___#)	—	—		
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	mæla-n	—	
Apocope (V → Ø / VCVC___#)	—	—	jalul	
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	mæla-n	—	
Apocope (V → Ø / VCVC___#)	—	—	jalul	
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	mæla-n	—	jalulu-n
Apocope (V → Ø / VCVC___#)	—	—	jalul	
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

	/mæla/	/mæla-in/	/jalulu/	/jalulu-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	mæla-n	—	jalulu-n
Apocope (V → Ø / VCVC___#)	—	—	jalul	—
	[mæla-n]	[mæla-n]	[jalul]	[jalulu-n]

Lardil

Here's even more Lardil words:

simple	non-future	future	
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	'anthill'
[waŋal]	[waŋalk-in]	[waŋalk-uɻ]	'boomerang'
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'

Lardil

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simple	non-future	future	
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	'anthill'
[waŋal]	[waŋalk-in]	[waŋalk-uɻ]	'boomerang'
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'

What underlying representations do these alternations suggest?

Lardil

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simple	non-future	future	
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	'anthill'
[waŋal]	[waŋalk-in]	[waŋalk-uɻ]	'boomerang'
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'

What underlying representations do these alternations suggest?

Do we have a rule to account for them already?

Lardil

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simple	non-future	future	
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	'anthill'
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[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'

What underlying representations do these alternations suggest?

Do we have a rule to account for them already? No.

Lardil

Here's even more Lardil words:

simple	non-future	future	
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	'anthill'
[waŋal]	[waŋalk-in]	[waŋalk-uɻ]	'boomerang'
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	'rainbow'
[jalul]	[jalulu-n]	[jalulu-ɻ]	'flame'

What underlying representations do these alternations suggest?

Do we have a rule to account for them already? No.

Cluster simplification:

$C \rightarrow \emptyset$ / C___#

'Delete a consonant when it follows another consonant at the end of a word'

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC___#)				
Cluster simplification (C → Ø / C___#)				
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC___#)				
Cluster simplification (C → Ø / C___#)				
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)				
Cluster simplification (C → Ø / C___#)				
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)	majar			
Cluster simplification (C → Ø / C___#)				
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—			
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)	majar			
Cluster simplification (C → Ø / C___#)	—			
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—			
Apocope (V → Ø / VCVC___#)	majar			
Cluster simplification (C → Ø / C___#)	—			
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—	majara-n		
Apocope (V → Ø / VCVC___#)	majar			
Cluster simplification (C → Ø / C___#)	—			
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—	majara-n		
Apocope (V → Ø / VCVC___#)	majar	—		
Cluster simplification (C → Ø / C___#)	—			
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—		
Vowel deletion (V → Ø / V___)	—	majara-n		
Apocope (V → Ø / VCVC___#)	majar	—		
Cluster simplification (C → Ø / C___#)	—	—		
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	majara-n		
Apocope (V → Ø / VCVC___#)	majar	—		
Cluster simplification (C → Ø / C___#)	—	—		
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majaɾa/	/majaɾa-in/	/makaɾk/	/makaɾk-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	majaɾa-n	—	
Apocope (V → Ø / VCVC___#)	majaɾ	—		
Cluster simplification (C → Ø / C___#)	—	—		
	[majaɾ]	[majaɾa-n]	[makaɾ]	[makaɾk-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	majara-n	—	
Apocope (V → Ø / VCVC___#)	majar	—	—	
Cluster simplification (C → Ø / C___#)	—	—		
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	
Vowel deletion (V → Ø / V___)	—	majara-n	—	
Apocope (V → Ø / VCVC___#)	majar	—	—	
Cluster simplification (C → Ø / C___#)	—	—	makar	
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	majara-n	—	
Apocope (V → Ø / VCVC___#)	majar	—	—	
Cluster simplification (C → Ø / C___#)	—	—	makar	
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	majara-n	—	—
Apocope (V → Ø / VCVC___#)	majar	—	—	
Cluster simplification (C → Ø / C___#)	—	—	makar	
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	majara-n	—	—
Apocope (V → Ø / VCVC___#)	majar	—	—	—
Cluster simplification (C → Ø / C___#)	—	—	makar	
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

	/majara/	/majara-in/	/makark/	/makark-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	majara-n	—	—
Apocope (V → Ø / VCVC___#)	majar	—	—	—
Cluster simplification (C → Ø / C___#)	—	—	makar	—
	[majar]	[majara-n]	[makar]	[makark-in]

Lardil

What about these data?

Lardil

What about these data?

simple	non-future	future	
[jukaɾ]	[jukaɾpa-n]	[jukaɾpa-ɻ]	‘husband’
[wulun]	[wulunka-n]	[wulunka-ɻ]	‘species of fruit’
[makaɾ]	[makaɾk-in]	[makaɾk-uɻ]	‘anthill’
[waŋal]	[waŋalk-in]	[waŋalk-uɻ]	‘boomerang’
[majaɾ]	[majaɾa-n]	[majaɾa-ɻ]	‘rainbow’
[jalul]	[jalulu-n]	[jalulu-ɻ]	‘flame’

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Do we need to add any rules to account for the new examples?

Lardil

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simple	non-future	future	
[jukaɾ]	[jukaɾpa-n]	[jukaɾpa-ɻ]	‘husband’
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[jalul]	[jalulu-n]	[jalulu-ɻ]	‘flame’

Do we need to add any rules to account for the new examples? No!

Feeding

	/makaɾk/	/makaɾk-in/
/w/ Epenthesis (Ø → w / i___u)		
Vowel deletion (V → Ø / V___)		
Apocope (V → Ø / VCVC(C)___#)		
Cluster simplification (C → Ø / C___#)		
	[makaɾ]	[makaɾk-in]

	[jakaɾ]	[jakaɾpa-n]
/w/ Epenthesis (Ø → w / i___u)		
Vowel deletion (V → Ø / V___)		
Apocope (V → Ø / VCVC(C)___#)		
Cluster simplification (C → Ø / C___#)		
	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
Cluster simplification (C → Ø / C___#)				
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
Cluster simplification (C → Ø / C___#)	makaɾ	—	jukaɾ	—
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
Cluster simplification (C → Ø / C___#)	makaɾ	—	jukaɾ	—
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

- Apocope creates the context for the Cluster simplification rule (**feeding**)

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
Cluster simplification (C → Ø / C___#)	makaɾ	—	jukaɾ	—
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

- Apocope creates the context for the Cluster simplification rule (**feeding**)
- Apocope **feeds** Cluster simplification

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
Cluster simplification (C → Ø / C___#)	makaɾ	—	jukaɾ	—
	[makaɾ]	[makaɾk-in]	[jakaɾ]	[jakaɾpa-n]

- Apocope creates the context for the Cluster simplification rule (**feeding**)
- Apocope **feeds** Cluster simplification
- If Apocope did not apply before it, we wouldn't get the desired output

Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
Cluster simplification (C → Ø / C___#)				
Apocope (V → Ø / VCVC(C)___#)				

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Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)				
Cluster simplification (C → Ø / C___#)				
Apocope (V → Ø / VCVC(C)___#)				

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Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Cluster simplification (C → Ø / C___#)				
Apocope (V → Ø / VCVC(C)___#)				

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Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Cluster simplification (C → Ø / C___#)	makaɾ	—	—	—
Apocope (V → Ø / VCVC(C)___#)				

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Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Cluster simplification (C → Ø / C___#)	makaɾ	—	—	—
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—

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Feeding

	/makaɾk/	/makaɾk-in/	/jukaɾpa/	/jukaɾpa-in/
/w/ Epenthesis (Ø → w / i___u)	—	—	—	—
Vowel deletion (V → Ø / V___)	—	—	—	jukaɾpa-n
Cluster simplification (C → Ø / C___#)	makaɾ	—	—	—
Apocope (V → Ø / VCVC(C)___#)	—	—	jukaɾp	—
	[makaɾ]	[makaɾk-in]	***[jakaɾp]**	[jakaɾpa-n]

- Apocope creates the context for the Cluster simplification rule (**feeding**)
- Apocope **feeds** Cluster simplification
- If Apocope did not apply before it, we wouldn't get the desired output

Another Lardil example

We can test our analysis with another set of forms:

/w/ Epenthesis
(Ø → w / i___u)

Vowel deletion
(V → Ø / V___)

Apocope
(V → Ø / VCVC(C)___#)

Cluster simplification
(C → Ø / C___#)

[wuɻal]	[wuɻalt^{j}i-n]	[wuɻalt^{j}i-wuɻ]	‘meat’

Another Lardil example

We can test our analysis with another set of forms:

	/wuɻaltʲi/	/wuɻaltʲi-in/	/wuɻaltʲi-uɻ/	
/w/ Epenthesis (Ø → w / i___u)				
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[wuɻal]	[wuɻaltʲi-n]	[wuɻaltʲi-wuɻ]	‘meat’

Another Lardil example

We can test our analysis with another set of forms:

	/wuɻaltʲi/	/wuɻaltʲi-in/	/wuɻaltʲi-uɻ/	
/w/ Epenthesis (Ø → w / i___u)	—	—	wuɻaltʲi-wuɻ	
Vowel deletion (V → Ø / V___)				
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[wuɻal]	[wuɻaltʲi-n]	[wuɻaltʲi-wuɻ]	‘meat’

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	/wuɻaltʲi/	/wuɻaltʲi-in/	/wuɻaltʲi-uɻ/	
/w/ Epenthesis (Ø → w / i___u)	—	—	wuɻaltʲi-wuɻ	
Vowel deletion (V → Ø / V___)	—	wuɻaltʲi-n	—	
Apocope (V → Ø / VCVC(C)___#)				
Cluster simplification (C → Ø / C___#)				
	[wuɻal]	[wuɻaltʲi-n]	[wuɻaltʲi-wuɻ]	‘meat’

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	/wuɻaltʲi/	/wuɻaltʲi-in/	/wuɻaltʲi-uɻ/	
/w/ Epenthesis (Ø → w / i___u)	—	—	wuɻaltʲi-wuɻ	
Vowel deletion (V → Ø / V___)	—	wuɻaltʲi-n	—	
Apocope (V → Ø / VCVC(C)___#)	wuɻaltʲ	—	—	
Cluster simplification (C → Ø / C___#)				
	[wuɻal]	[wuɻaltʲi-n]	[wuɻaltʲi-wuɻ]	‘meat’

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We can test our analysis with another set of forms:

	/wuɻaltʲi/	/wuɻaltʲi-in/	/wuɻaltʲi-uɻ/	
/w/ Epenthesis (Ø → w / i___u)	—	—	wuɻaltʲi-wuɻ	
Vowel deletion (V → Ø / V___)	—	wuɻaltʲi-n	—	
Apocope (V → Ø / VCVC(C)___#)	wuɻaltʲ	—	—	
Cluster simplification (C → Ø / C___#)	wuɻal	—	—	
	[wuɻal]	[wuɻaltʲi-n]	[wuɻaltʲi-wuɻ]	‘meat’

Interim summary

We have seen two kinds of ways in which phonological rules can interact:

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- A rule can remove the context for another rule to apply (**bleeding**)

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Are there other possibilities?

Interim summary

We have seen two kinds of ways in which phonological rules can interact:

- A rule can remove the context for another rule to apply (**bleeding**)
- A rule can create the context for another rule to apply (**feeding**)

Are there other possibilities? Yes!

Back to Polish

Consider this set of Polish words:

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

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- What alternations do you notice?

Back to Polish

Consider this set of Polish words:

noun		*noun+i*	
[klu**p**]	‘club’	[klu**b**ɨ]	‘clubs’
[trup]	‘corpse’	[trupɨ]	‘corpses’
[snɔp]	‘sheaf’	[snɔpɨ]	‘sheaves’
[ʒwu**p**]	‘crib’	[ʒwɔ**b**ɨ]	‘cribs’

- What alternations do you notice?
- Voiced stops are realized as voiceless in word final position:

Back to Polish

Consider this set of Polish words:

noun		*noun+ɨ*	
[klup]	‘club’	[klubɨ]	‘clubs’
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[ʒwup]	‘crib’	[ʒwɔbɨ]	‘cribs’

- What alternations do you notice?
- Voiced stops are realized as voiceless in word final position:

Final Devoicing:
[voiced stop] → [voiceless stop] / ___#

Back to Polish

Consider this set of Polish words:

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[klup]	'club'	[klubɨ]	'clubs'
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[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

- What about the vowels?

Back to Polish

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- What about the vowels?
- We know that the underlying representation will either have /ɔ/ or /u/

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[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

- What about the vowels?
- We know that the underlying representation will either have /ɔ/ or /u/
- So what could the rules be?

Back to Polish

Consider this set of Polish words:

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

- What about the vowels?
- We know that the underlying representation will either have /ɔ/ or /u/
- So what could the rules be?

Vowel raising:

/ɔ/ → u / ___p

Vowel lowering:

/u/ → ɔ / ___b

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel raising/Vowel lowering?

Final Devoicing				
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

Final Devoicing				
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing				
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing	klup			
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing	klup	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing	klup	—	—	
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing	klup	—	—	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

Let's check that final devoicing works

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/
Final Devoicing	klup	—	—	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/		
Final Devoicing	klup	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/		
Final Devoicing	klup	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/		
Final Devoicing	klup	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	
Final Devoicing	klup	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	***[ʒwubɨ]**

What about the underlying representation for [ʒwup] and [ʒwɔbɨ]?

Let's assume it has an /u/

Back to Polish

noun		*noun+ɨ*	
[klup]	‘club’	[klubɨ]	‘clubs’
[trup]	‘corpse’	[trupɨ]	‘corpses’
[snɔp]	‘sheaf’	[snɔpɨ]	‘sheaves’
[ʒwup]	‘crib’	[ʒwɔbɨ]	‘cribs’

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel raising/Vowel lowering?

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel lowering: /u/ → ɔ / ___bɨ

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Vowel lowering	—		—	—	—	
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#
Vowel lowering: /u/ → ɔ / ___bɨ

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Vowel lowering	—		—	—	—	ʒwɔbɨ
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel lowering: /u/ → ɔ / ___bɨ

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Vowel lowering	—		—	—	—	ʒwɔbɨ
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

But we cannot stop it from wrongly applying to /klubɨ/ as well!

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel lowering: /u/ → ɔ / ___bɨ

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Vowel lowering	—	klɔbɨ	—	—	—	ʒwɔbɨ
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

But we cannot stop it from wrongly applying to /klubɨ/ as well!

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel lowering: /u/ → ɔ / ___bɨ

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Vowel lowering	—	klɔbɨ	—	—	—	ʒwɔbɨ
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	***[klɔbɨ]**	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Can we add a Vowel lowering rule to turn /u/ into [ɔ]?

But we cannot stop it from wrongly applying to /klubɨ/ as well!

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Back to Polish

noun		*noun+ɨ*	
[klup]	‘club’	[klubɨ]	‘clubs’
[trup]	‘corpse’	[trupɨ]	‘corpses’
[snɔp]	‘sheaf’	[snɔpɨ]	‘sheaves’
[ʒwup]	‘crib’	[ʒwɔbɨ]	‘cribs’

Final devoicing: /b/ → p / _____#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwub/	/ʒwubɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Instead, let’s change the underlying vowel in the pair to /ɔ/.

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Instead, let's change the underlying vowel in the pair to /ɔ/.

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Instead, let's change the underlying vowel in the pair to /ɔ/.

What kind of rule do we need now?

Back to Polish

noun		*noun+ɨ*	
[klup]	‘club’	[klubɨ]	‘clubs’
[trup]	‘corpse’	[trupɨ]	‘corpses’
[snɔp]	‘sheaf’	[snɔpɨ]	‘sheaves’
[ʒwup]	‘crib’	[ʒwɔbɨ]	‘cribs’

Final devoicing: /b/ → p / _____#

Vowel raising: /ɔ/ → u / ___b#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising						
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Instead, let’s change the underlying vowel in the pair to /ɔ/.

What kind of rule do we need now?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel raising: /ɔ/ → u / ___b#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising						
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Now, we don't have any problem with the other forms

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
[trup]	'corpse'	[trupɨ]	'corpses'
[snɔp]	'sheaf'	[snɔpɨ]	'sheaves'
[ʒwup]	'crib'	[ʒwɔbɨ]	'cribs'

Final devoicing: /b/ → p / _____#

Vowel raising: /ɔ/ → u / ___b#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising					ʒwub	
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Now, we don't have any problem with the other forms

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
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Final devoicing: /b/ → p / _____#

Vowel raising: /ɔ/ → u / ___b#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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[klup]	'club'	[klubɨ]	'clubs'
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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What kind of rule interaction is this? Feeding?

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

What kind of rule interaction is this? Feeding?

No, because the context for each rule is present in /ʒwɔb/

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Final devoicing: /b/ → p / _____#

Vowel raising: /ɔ/ → u / ___b#

	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Does the order of rules matter?

Back to Polish

noun		*noun+ɨ*	
[klup]	'club'	[klubɨ]	'clubs'
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Final devoicing: /b/ → p / _____#

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

Does the order of rules matter?

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Final Devoicing						
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup					
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—				
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—	—			
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—		
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—	—	—	ʒwɔp	
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising						
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising	—	—	—	—		
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising	—	—	—	—	—	
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising	—	—	—	—	—	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising	—	—	—	—	—	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	***[ʒwɔp]**	[ʒwɔbɨ]

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Final Devoicing	klup	—	—	—	ʒwɔp	—
Vowel raising	—	—	—	—	—	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	***[ʒwɔp]**	[ʒwɔbɨ]

Does the order of rules matter?

Yes! Since Final devoicing bleeds Vowel raising, it must apply **after** it

Back to Polish

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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	/klub/	/klubɨ/	/snɔp/	/snɔpɨ/	/ʒwɔb/	/ʒwɔbɨ/
Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

This is what is known as an **opaque** rule interaction: Final devoicing could have bled vowel raising if it had applied before it (so only one order of rules is possible).

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Vowel raising	—	—	—	—	ʒwub	—
Final Devoicing	klup	—	—	—	ʒwup	—
	[klup]	[klubɨ]	[snɔp]	[snɔpɨ]	[ʒwup]	[ʒwɔbɨ]

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The signature of this opacity is that we have a rule (vowel raising) whose expected output (a /b/ preceding a /u/) is not met in the surface form.

Summary: Rule interaction

- We can learn more about phonological rules and underlying representations by looking at **alternations** in the surface realization of related words (when preceding different kinds of suffixes).

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- The other option is that, in a given order of rules (rule B > rule A), rule A could have fed/bled rule B if the order of the rules had been reversed (rule A > rule B), but didn't (i.e. Vowel raising and Final devoicing in Polish).

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- The other option is that, in a given order of rules (rule B > rule A), rule A could have fed/bled rule B if the order of the rules had been reversed (rule A > rule B), but didn't (i.e. Vowel raising and Final devoicing in Polish).
- The terminology for this kind of interaction is a little confusing: **counter-feeding** and **counter-bleeding** (you can think of it like 'counterfactual feeding/bleeding' if it helps.)

Realization of English <l>

[blu]	‘blue’	[pl̥eɪ]	‘play’	[puɬ]	‘pool’
[glim]	‘gleam’	[sl̥ɪp]	‘slip’	[hɪɬ]	‘hill’
[blɪzɻd]	‘blizzard’	[kl̥iɹ]	‘clear’	[stiɬ]	‘steel’
[glu]	‘glue’	[fl̥aɪt]	‘flight’	[dʒeɪɬ]	‘jail’
[lus]	‘loose’	[fɪɬ̪θ]	‘filth’		
[əlaʊ]	‘allow’	[hɛɬ̪θ]	‘health’		
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What are the various form of <l> and in what context?

Realization of English <l>

[blu]	‘blue’	[pl̥eɪ]	‘play’	[puɬ]	‘pool’
[glim]	‘gleam’	[sl̥ɪp]	‘slip’	[hɪɬ]	‘hill’
[blɪzɻd]	‘blizzard’	[kl̥iɹ]	‘clear’	[stiɬ]	‘steel’
[glu]	‘glue’	[fl̥aɪt]	‘flight’	[dʒeɪɬ]	‘jail’
[lus]	‘loose’	[fɪɬ̪θ]	‘filth’		
[əlaʊ]	‘allow’	[hɛɬ̪θ]	‘health’		
[loʊ]	‘low’	[wɛɬ̪θ]	‘wealth’		

What are the various form of <l> and in what context?

- [l̥] after a voiceless consonant (or partially de-voiced: [l͡l̥])

Realization of English <l>

[blu]	‘blue’	[pl̥eɪ]	‘play’	[puɬ]	‘pool’
[glim]	‘gleam’	[sl̥ɪp]	‘slip’	[hɪɬ]	‘hill’
[blɪzɻd]	‘blizzard’	[kl̥iɹ]	‘clear’	[stiɬ]	‘steel’
[glu]	‘glue’	[fl̥aɪt]	‘flight’	[dʒeɪɬ]	‘jail’
[lus]	‘loose’	[fɪɬ̪θ]	‘filth’		
[əlaʊ]	‘allow’	[hɛɬ̪θ]	‘health’		
[loʊ]	‘low’	[wɛɬ̪θ]	‘wealth’		

What are the various form of <l> and in what context?

- [l̥] after a voiceless consonant (or partially de-voiced: [l͡l̥])
- [ɬ] at the end of a word

Realization of English <l>

[blu]	‘blue’	[pl̥eɪ]	‘play’	[puɬ]	‘pool’
[glim]	‘gleam’	[sl̥ɪp]	‘slip’	[hɪɬ]	‘hill’
[blɪzɻ̩d]	‘blizzard’	[kl̥iɹ]	‘clear’	[stiɬ]	‘steel’
[glu]	‘glue’	[fl̥aɪt]	‘flight’	[dʒeɪɬ]	‘jail’
[lus]	‘loose’	[fɪɬ̪θ]	‘filth’		
[əlaʊ]	‘allow’	[hɛɬ̪θ]	‘health’		
[loʊ]	‘low’	[wɛɬ̪θ]	‘wealth’		

What are the various form of <l> and in what context?

- [l̥] after a voiceless consonant (or partially de-voiced: [$\widetilde{\text{l̥l̥}}$])
- [ɬ] at the end of a word
- [ɬ̪] before [θ]

Realization of English <l>

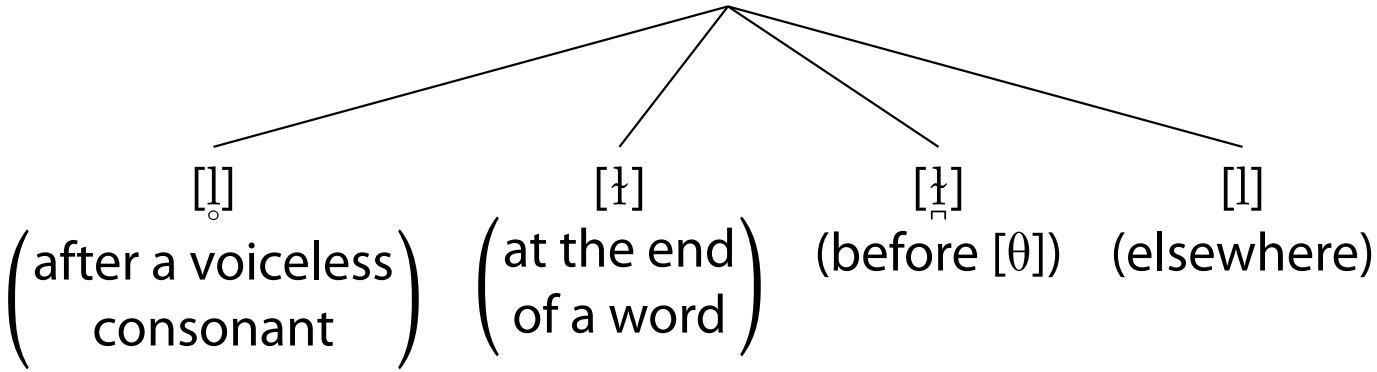
[blu]	‘blue’	[pl̥eɪ]	‘play’	[puɬ]	‘pool’
[glim]	‘gleam’	[sl̥ɪp]	‘slip’	[hɪɬ]	‘hill’
[blɪzɻd]	‘blizzard’	[kl̥iɹ]	‘clear’	[stiɬ]	‘steel’
[glu]	‘glue’	[fl̥aɪt]	‘flight’	[dʒeɪɬ]	‘jail’
[lus]	‘loose’	[fɪɬ̪θ]	‘filth’		
[əlaʊ]	‘allow’	[hɛɬ̪θ]	‘health’		
[loʊ]	‘low’	[wɛɬ̪θ]	‘wealth’		

What are the various form of <l> and in what context?

- [l̥] after a voiceless consonant (or partially de-voiced: [l͡l̥])
- [ɬ] at the end of a word
- [ɬ̪] before [θ]
- [l] after voiced stops, beginning of word/syllable

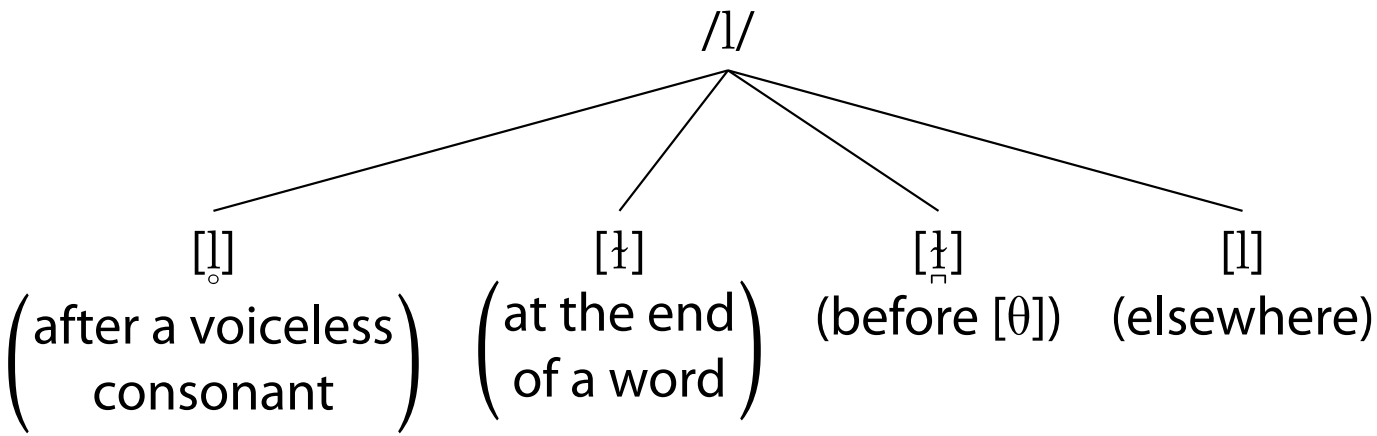
Allophones of /l/

Is it the case that rules always interact?



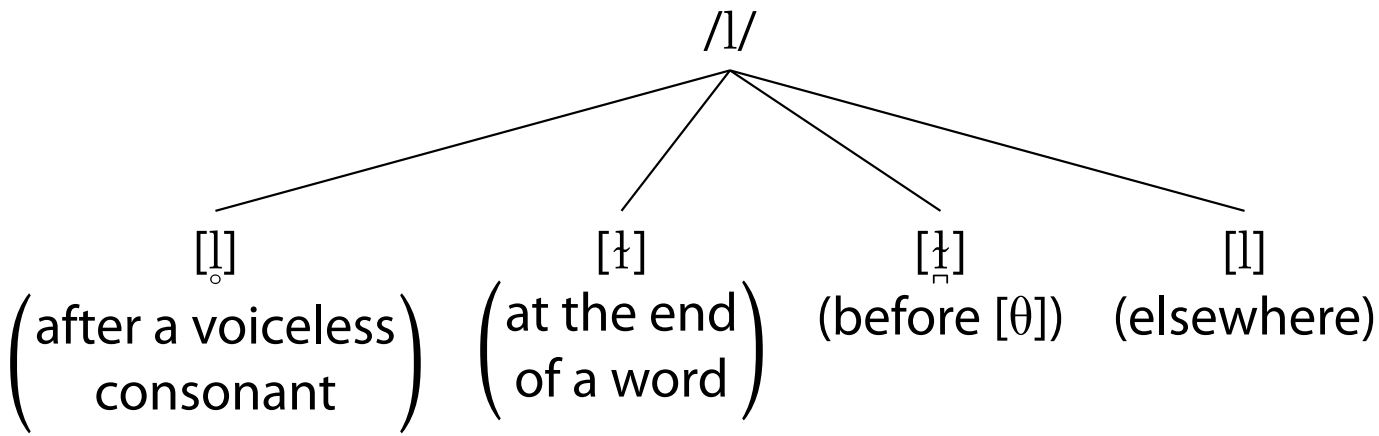
Allophones of /l/

Is it the case that rules always interact?



Allophones of /l/

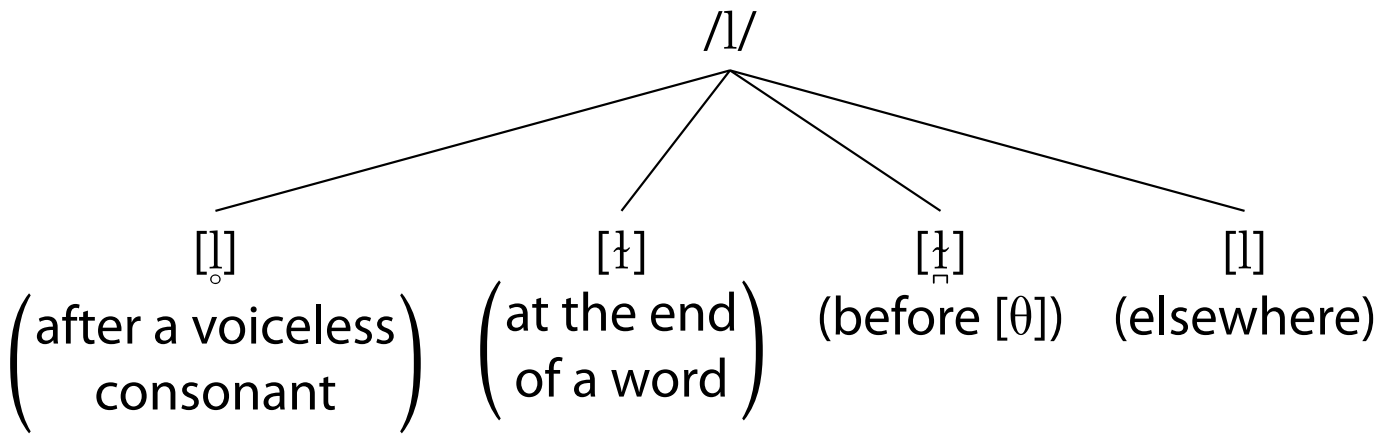
Is it the case that rules always interact?



What are the rules for the allophones of /l/?

Allophones of /l/

Is it the case that rules always interact?

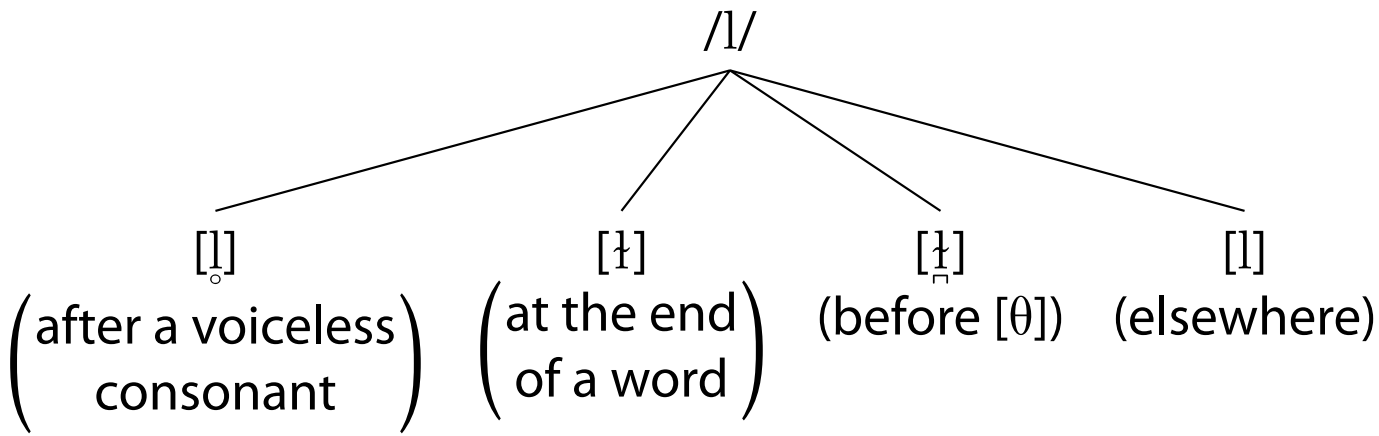


What are the rules for the allophones of /l/?

/l/ → [l̪̥] / [voiceless consonant]___ (Devoicing)

Allophones of /l/

Is it the case that rules always interact?

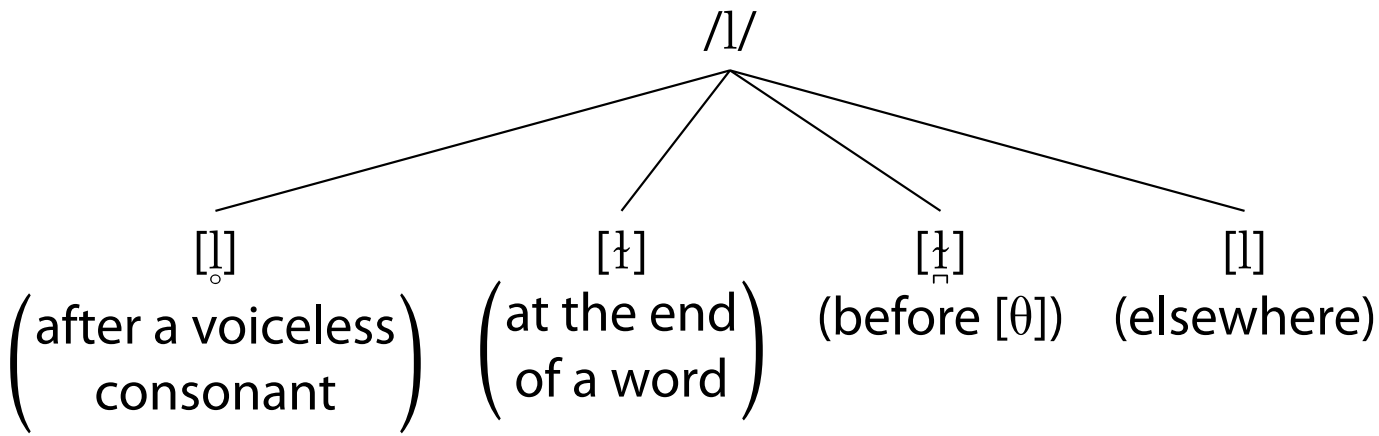


What are the rules for the allophones of /l/?

/l/ → [l̪] / [voiceless consonant]___ (Devoicing)
/l/ → [ɬ] / ___# (Velarization)

Allophones of /l/

Is it the case that rules always interact?



What are the rules for the allophones of /l/?

/l/ → [l̪̊] / [voiceless consonant]___ (Devoicing)
/l/ → [l̪̚] / ___# (Velarization)
/l/ → [l̪̟] / ___θ (Dentalization)

Allophones of /l/

‘steel’ ‘flight’ ‘blue’ ‘health’

/l/ → [l̥] / [voiceless consonant]____ (Devoicing)
/l/ → [ɫ] / ____# (Velarization)
/l/ → [l̪] / ____θ (Dentalization)

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)				
/l/ → [ɬ] / ____# (Velarization)				
/l/ → [l̪] / ____θ (Dentalization)				

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____# (Velarization)				
/l/ → [l̪] / ____θ (Dentalization)				

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____# (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)				

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____# (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____# (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____# (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [ɬ̪] / ____θ (Dentalization)	—	—	—	hɛɬ̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛɬ̪θ]

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛl̪θ]

- Are these rules missing anything?

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [ɮ̪] / ____θ (Dentalization)	—	—	—	hɛɮ̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛɮ̪θ]

- Are these rules missing anything?
- Think about the words ‘Baltic’ [bɑɬtɪk], ‘pulpit’ [pʌɬpɪt], ‘stealthy’ [stɛɮ̪θi] and ‘filthy’ [fɪɮ̪θi].

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [ɫ̪] / ____θ (Dentalization)	—	—	—	hɛɫ̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛɫ̪θ]

- Are these rules missing anything?
- Think about the words ‘Baltic’ [bɑɬtɪk], ‘pulpit’ [pʌɬpɪt], ‘stealthy’ [stɛɫ̪θi] and ‘filthy’ [fɪɫ̪θi].
- The rule for Velarization has to be more general: It applies to any consonant in a syllable coda (even if it precedes [θ]!

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____# (Velarization)	stiɬ	—	—	—
/l/ → [ɬ̪] / ____θ (Dentalization)	—	—	—	hɛɬ̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛɬ̪θ]

- Are these rules missing anything?
- Think about the words ‘Baltic’ [bɑɬtɪk], ‘pulpit’ [pʌɬpɪt], ‘stealthy’ [stɛɬ̪θi] and ‘filthy’ [fɪɬ̪θi].
- The rule for Velarization has to be more general: It applies to any consonant in a syllable coda (even if it precedes [θ]!
- /l/ → [ɬ] / ____]$_{\text{coda}}$

Allophones of /l/

‘steel’ ‘flight’ ‘blue’ ‘health’

/l/ → [l̥] / [voiceless consonant]____ (Devoicing)
/l/ → [ɫ] / ____]$_{coda}$ (Velarization)
/l/ → [l̪] / ____θ (Dentalization)

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/

/l/ → [l̥] / [voiceless consonant]____ (Devoicing)

/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)

/l/ → [l̪] / ____θ (Dentalization)

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)				
/l/ → [l̪] / ____θ (Dentalization)				

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)				

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—			
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ			
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—			
	[stiɬ]			

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]			

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt		
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—		
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—		
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]		

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’ /stil/	‘flight’ /flaɪt/	‘blue’ /blu/	‘health’ /hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	hɛɬθ
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	hɛɬθ
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	hɛɬθ
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛl̪θ]

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	hɛɬθ
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛl̪θ]

Even though Velarization and Dentalization both apply to the same underlying form /hɛlθ/, their order of application does not matter.

Allophones of /l/

	‘steel’	‘flight’	‘blue’	‘health’
	/stil/	/flaɪt/	/blu/	/hɛlθ/
/l/ → [l̥] / [voiceless consonant]____ (Devoicing)	—	fl̥aɪt	—	—
/l/ → [ɬ] / ____]$_{\text{coda}}$ (Velarization)	stiɬ	—	—	hɛɬθ
/l/ → [l̪] / ____θ (Dentalization)	—	—	—	hɛl̪θ
	[stiɬ]	[fl̥aɪt]	[blu]	[hɛl̪θ]

Even though Velarization and Dentalization both apply to the same underlying form /hɛlθ/, their order of application does not matter.

This is an example of two rules that don’t interact: Their respective order doesn’t matter!