Class 9
Assimilation 4: Feature Geometry

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Feature geometric rules: Arabic

Arabic definite article

[ʔil-] elsewhere

Indef.	Def.	Gloss
hawa	**ʔil-**hawa	‘air’
baːred	**ʔil-**baːred	‘cold’
ʔadham	**ʔil-**ʔadham	‘black’
madine	**ʔil-**madine	‘city’
ʕaːde	**ʔil-**ʕaːde	‘custom’
ħaːra	**ʔil-**ħaːra	‘quarter’
waħʃ	**ʔil-**waħʃ	‘beast’
yaʔs	**ʔil-**yaʔs	‘despair’
kalb	**ʔil-**kalb	‘dog’
xadd	**ʔil-**xadd	‘cheek’
fayy	**ʔil-**fayy	‘shadow’
ɣada	**ʔil-**ɣada	‘lunch’
life	**ʔil-**life	‘loofah’

[ʔiC$_\alpha$-] / __C$_{\alpha\,[\text{coronal}]}$

Indef.	Def.	Gloss
taːlet	**ʔit-**taːlet	‘third’
taxt	**ʔit-**taxt	‘bed’
raʔbe	**ʔir-**raʔbe	‘neck’
nəde	**ʔin-**nəde	‘dew’
difaːʕ	**ʔid-**difaːʕ	‘defense’
smike	**ʔis-**smike	‘thick’
ʃoːraba	**ʔiʃ-**ʃoːraba	‘soup’
ʒamil	**ʔiʒ-**ʒamil	‘pretty’
zaki	**ʔiz-**zaki	‘bright’
tˤaːleb	**ʔitˤ-**tˤaːleb	‘student’
zˤaːbet	**ʔizˤ-**zˤaːbet	‘officer’
dˤahuːk	**ʔidˤ-**dˤahuːk	‘jolly’
sˤaff	**ʔisˤ-**sˤaff	‘row’

Feature geometric rules: Arabic

Arabic definite article: writing the rule

⋆ **What should our rule look like?**

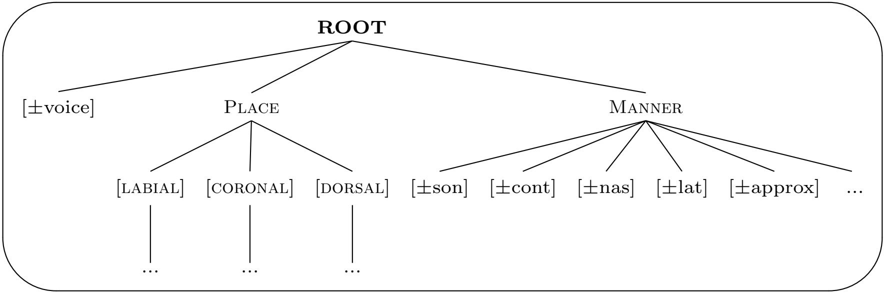
- /l/ completely assimilates to the following consonant if that consonant is coronal.

(1) /ᴄᴏʀ,+son,+lat/ → [αson,βvoice,γant,...] / _ [ᴄᴏʀ,αson,βvoice,γant,...]

- We need a better way to do **total assimilation**.
  → We need to add a **root node**, that dominates *all the features*.

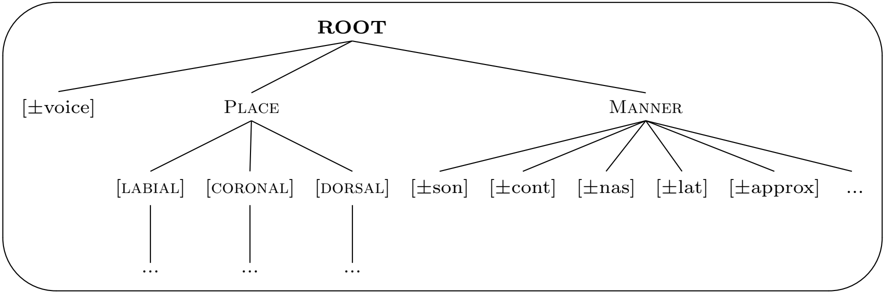
Feature geometric rules: Arabic

Root nodes


ROOT
[±voice]
Place
Manner
[labial]
[coronal]
[dorsal]
[±son]
[±cont]
[±nas]
[±lat]
[±approx]
...
...
...
...

Feature geometric rules: Arabic

Root nodes


ROOT
[±voice]
PLACE
MANNER
[LABIAL]
[CORONAL]
[DORSAL]
[±son]
[±cont]
[±nas]
[±lat]
[±approx]
…
…
…
…

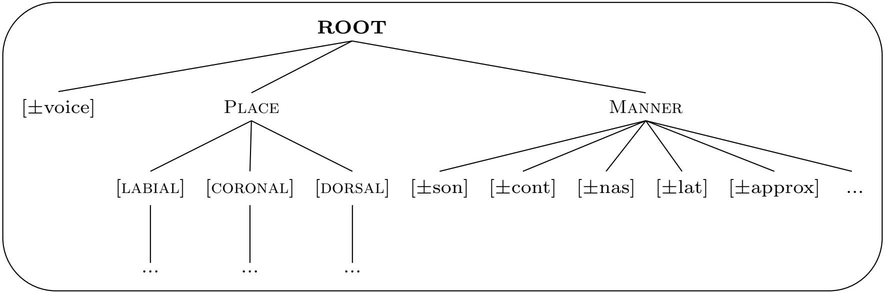
- We could now re-write our rule to assimilate the root node:

(2) /COR,+son,+lat/ → [αROOT] / _[COR,αROOT]

∗ CORONAL is contained under the ROOT, so it is at least odd to have it co-exist with ROOT in a single rule.

Feature geometric rules: Arabic

Root nodes


ROOT
[±voice]
PLACE
MANNER
[LABIAL]
[CORONAL]
[DORSAL]
[±son]
[±cont]
[±nas]
[±lat]
[±approx]
...
...
...
...

- We could now re-write our rule to assimilate the root node:

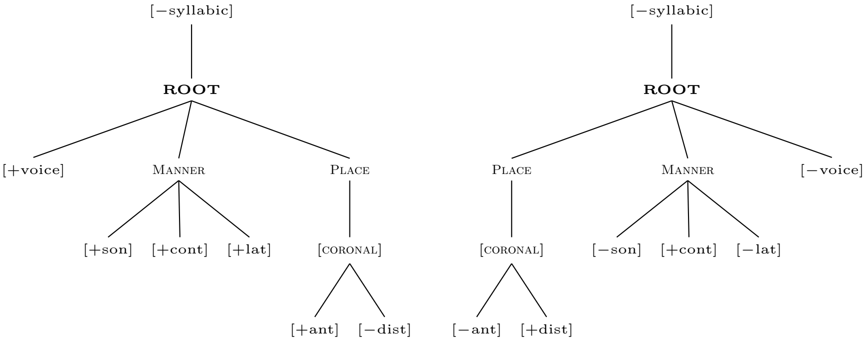
(2) /COR,+son,+lat/ → [αROOT] / _[COR,αROOT]

∗ CORONAL is contained under the ROOT, so it is at least odd to have it co-exist with ROOT in a single rule. **Can you imagine a solution?**

Feature geometric rules: Arabic

Feature geometric representations

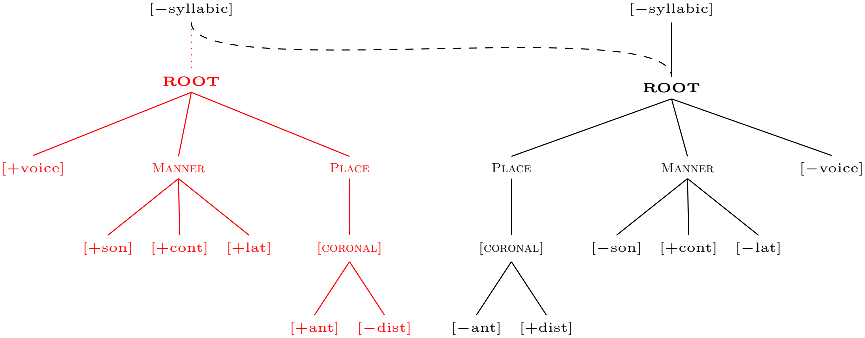
- Here are the feature geometric representations of /l/ and /ʃ/:


[−syllabic]
ROOT
[+voice]
Manner
Place
[+son]
[+cont]
[+lat]
[coronal]
[+ant]
[−dist]
[−syllabic]
ROOT
Place
Manner
[−voice]
[coronal]
[−son]
[+cont]
[−lat]
[−ant]
[+dist]

Feature geometric rules: Arabic

Linking and delinking

- We can capture total assimilation by **delinking** the /l/ from its root node, and **linking** it to the root node of the following consonant (/ʃ/):

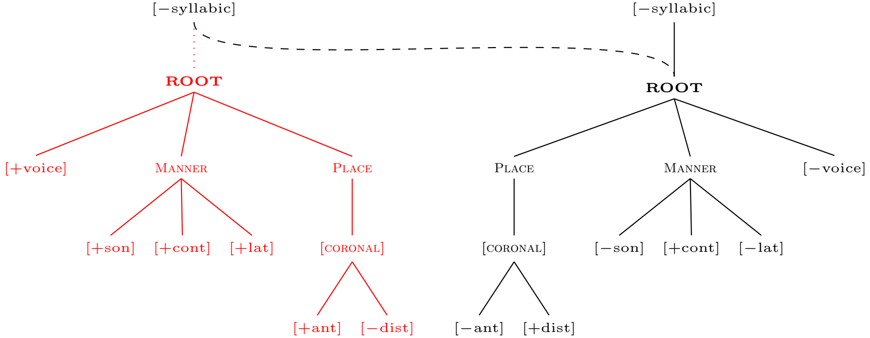

[−syllabic]
ROOT
[+voice]
Manner
Place
[+son]
[+cont]
[+lat]
[coronal]
[+ant]
[−dist]
[−syllabic]
ROOT
Place
Manner
[−voice]
[coronal]
[−son]
[+cont]
[−lat]
[−ant]
[+dist]

- The delinked features disappear (“delete”).

Feature geometric rules: Arabic

Linking and delinking

- We can capture total assimilation by **delinking** the /l/ from its root node, and **linking** it to the root node of the following consonant (/ʃ/):

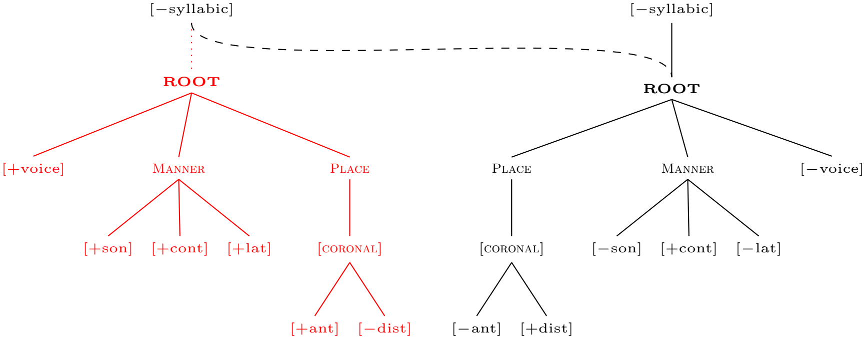

[−syllabic]
ROOT
[+voice]
Manner
Place
[+son]
[+cont]
[+lat]
[coronal]
[+ant]
[−dist]
[−syllabic]
ROOT
Place
Manner
[−voice]
[coronal]
[−son]
[+cont]
[−lat]
[−ant]
[+dist]

- This results in a **geminate** (doubled) consonant: two consonant slots linked to a single root node.

Feature geometric rules: Arabic

The rule for Arabic

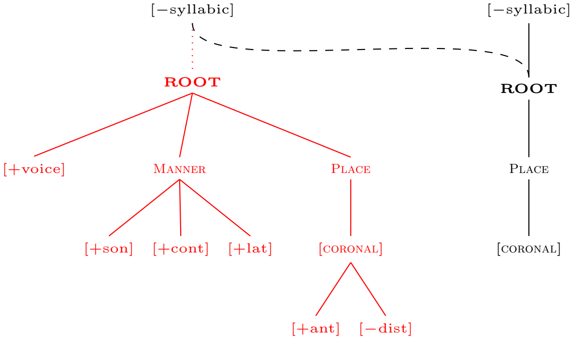
⋆ **What parts of this geometry do we need to include in the rule?**


[−syllabic]
ROOT
[+voice]
Manner
Place
[+son]
[+cont]
[+lat]
[coronal]
[+ant]
[−dist]
[−syllabic]
ROOT
Place
Manner
[−voice]
[coronal]
[−son]
[+cont]
[−lat]
[−ant]
[+dist]

Feature geometric rules: Arabic

The rule for Arabic

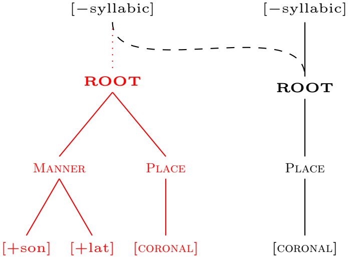
- The context of the rule is that it applies to all coronals, so that's the only part of the environment we need to specify:


[−syllabic]
ROOT
[+voice]
Manner
Place
[+son]
[+cont]
[+lat]
[coronal]
[+ant]
[−dist]
[−syllabic]
ROOT
Place
[coronal]

Feature geometric rules: Arabic

The rule for Arabic

- We can also safely get rid of a number of features of the /l/, because they are not necessary to pick out the natural class of {l} in the language:

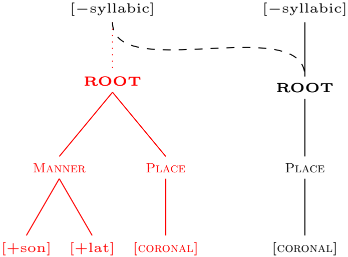

[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
Place
Place
[+son]
[+lat]
[coronal]
[coronal]

- [+voice] is not necessary because there are no voiceless sonorants.
- The minor coronal features are not necessary because there's only one coronal lateral sonorant.
- etc...

Feature geometric rules: Arabic

The rule for Arabic

- We can also safely get rid of a number of features of the /l/, because they are not necessary to pick out the natural class of {l} in the language:

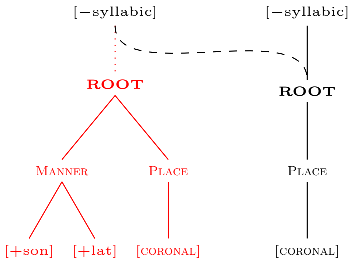

[−syllabic]
[−syllabic]
ROOT
ROOT
MANNER
PLACE
PLACE
[+son]
[+lat]
[CORONAL]
[CORONAL]

- Technically, we could get rid of everything but [+lateral], because /l/ is the only lateral in the language.
- However, this would miss the connection between /l/ being coronal and the context requiring CORONAL.

Feature geometric rules: Arabic

The rule for Arabic

- This is actually the format for writing feature geometric rules.


[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
Place
Place
[+son]
[+lat]
[coronal]
[coronal]

- We would describe this as:

(3) *The coronal lateral sonorant delinks its root node and links to the root node of a following coronal consonant.*

Multiple feature geometric rules: Bukusu

Nasal place assimilation in Bukusu again

- Last time, we used [αPLACE] for Bukusu nasal place assimilation:

IMPERATIVE	1SG PRES.
ʧa	**ɲ-ʤ**a
ʧe**x**a	**ɲ-ʤ**e**x**a
ʧu**ʧ**uː**ŋg**a	**ɲ-ʤ**u**ʧ**uː**ŋg**a
talaː**nd**a	**n-d**alaː**nd**a
teː**x**a	**n-d**eː**x**a
tiːra	**n-d**iːra
piːma	**m-b**iːma
pa**k**ala	**m-b**a**k**ala
ke**t**ulula	**ŋ-g**e**t**ulula
kona	**ŋ-g**ona
kula	**ŋ-g**ula
kwa	**ŋ-g**wa

(4) /+nasal/ → [αPLACE] / _[αPLACE,−son]

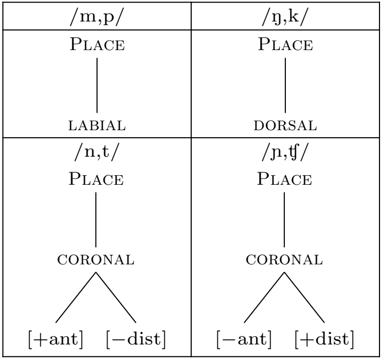
Multiple feature geometric rules: Bukusu

Nasal place assimilation in Bukusu again

⋆ **How would we write the rule in geometric terms?**

IMPERATIVE	1SG PRES.
ʧa	ɲ-ʤa
ʧexa	ɲ-ʤexa
ʧuʧuːŋga	ɲ-ʤuʧuːŋga
talaːnda	n-dalaːnda
teːxa	n-deːxa
tiːra	n-diːra
piːma	m-biːma
pakala	m-bakala
ketulula	ŋ-getulula
kona	ŋ-gona
kula	ŋ-gula
kwa	ŋ-gwa

(4) $/{+}\text{nasal}/ \rightarrow [\alpha\text{PLACE}] \ / \ \_[\alpha\text{PLACE}, -\text{son}]$



/m,p/
PLACE
LABIAL

/ŋ,k/
PLACE
DORSAL

/n,t/
PLACE
CORONAL
[+ant] [−dist]

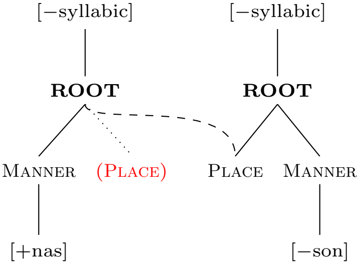
/ɲ,ʧ/
PLACE
CORONAL
[−ant] [+dist]

Multiple feature geometric rules: Bukusu

Nasal place assimilation in Bukusu using feature geometric rules

⋆ **How would we write the rule in geometric terms?**

(5) *A nasal (of whatever place delinks its place node and) links to the place node of a following obstruent.*


[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
(Place)
Place
Manner
[+nas]
[−son]

Multiple feature geometric rules: Bukusu

Postnasal voicing in Bukusu again

⋆ **And how would we re-write the postnasal voicing rule?**

Imperative	1sg pres.
tʃa	ɲ-dʒa
tʃexa	ɲ-dʒexa
tʃutʃuːŋga	ɲ-dʒutʃuːŋga
talaːnda	n-dalaːnda
teːxa	n-deːxa
tiːra	n-diːra
piːma	m-biːma
pakala	m-bakala
ketulula	ŋ-getulula
kona	ŋ-gona
kula	ŋ-gula
kwa	ŋ-gwa

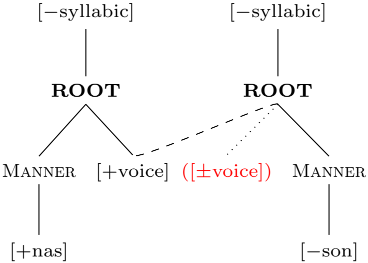
(6) /−voice,−son/ → [+voice] / [+nasal]_

Multiple feature geometric rules: Bukusu

Postnasal voicing in Bukusu using feature geometric rules

⋆ **And how would we re-write the postnasal voicing rule?**

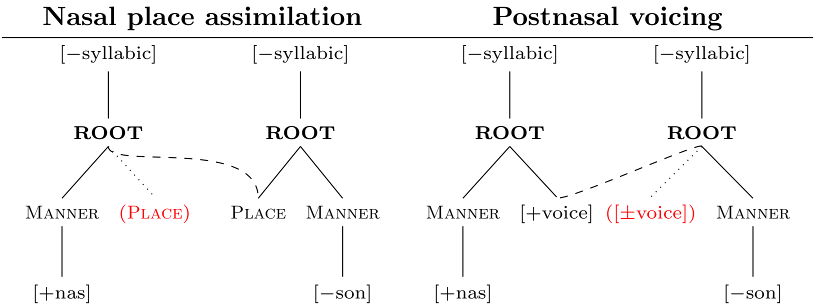
(7) *An obstruent delinks its voicing feature and links to the voicing feature of a preceding nasal.*


[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
[+voice]
([±voice])
Manner
[+nas]
[−son]

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

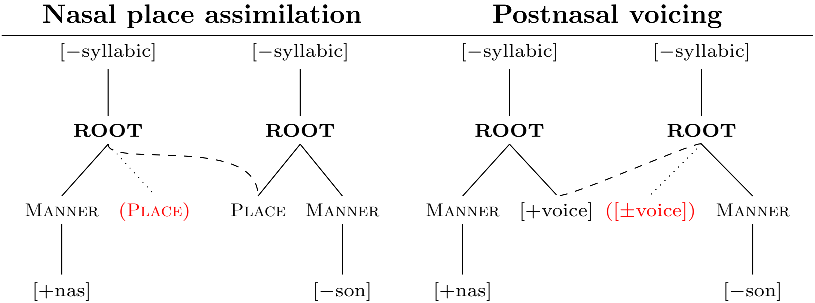
- ⋆ Looking at our two feature geometric rules in Bukusu, **does it look like the two are related?**


Nasal place assimilation
Postnasal voicing
[−syllabic]
[−syllabic]
[−syllabic]
[−syllabic]
ROOT
ROOT
ROOT
ROOT
MANNER
(PLACE)
PLACE
MANNER
MANNER
[+voice]
([±voice])
MANNER
[+nas]
[−son]
[+nas]
[−son]

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

⋆ Looking at our two feature geometric rules in Bukusu, **does it look like the two are related?**

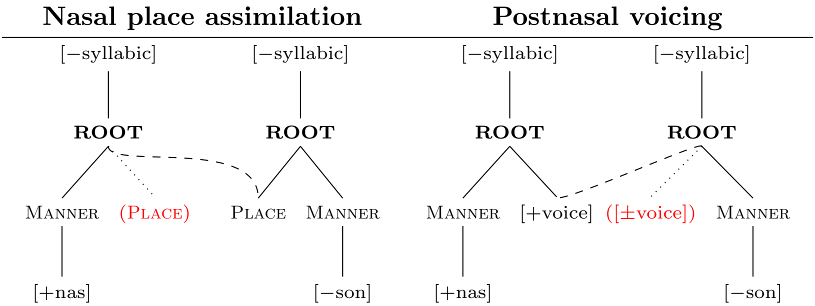

Nasal place assimilation
Postnasal voicing
[−syllabic]
[−syllabic]
[−syllabic]
[−syllabic]
ROOT
ROOT
ROOT
ROOT
Manner
(Place)
Place
Manner
Manner
[+voice]
([±voice])
Manner
[+nas]
[−son]
[+nas]
[−son]

- Both involve the sequence *nasal-obstruent*.
- We see assimilation going in **both directions**.

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

- It's easier to see in this format than with the regular rules.


Nasal place assimilation
Postnasal voicing
[−syllabic]
[−syllabic]
[−syllabic]
[−syllabic]
ROOT
ROOT
ROOT
ROOT
MANNER
(PLACE)
PLACE
MANNER
MANNER
[+voice]
([±voice])
MANNER
[+nas]
[−son]
[+nas]
[−son]

(4) $/{+}\text{nasal}/ \rightarrow [\alpha\text{PLACE}]\ /\ \_[\alpha\text{PLACE}, {-}\text{son}]$

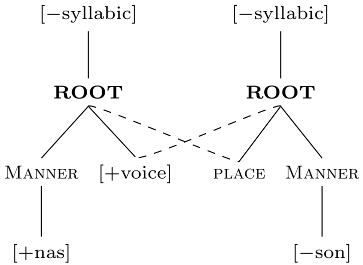
(6) $/{-}\text{voice}, {-}\text{son}/ \rightarrow [+\text{voice}]\ /\ [+\text{nasal}]\_$

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

- If we really wanted to, we could even combine the two rules:

Nasal place assimilation & Postnasal voicing



[−syllabic] [−syllabic]

ROOT **ROOT**

MANNER [+voice] PLACE MANNER

[+nas] [−son]

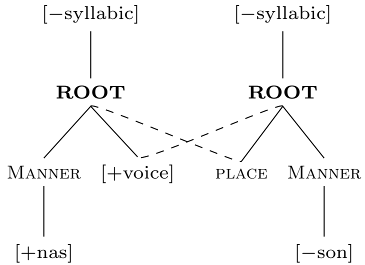
(4) /+nasal/ → [αPLACE] / _[αPLACE,−son] (6) /−voice,−son/ → [+voice] / [+nasal]_

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

- If we really wanted to, we could even combine the two rules:

Nasal place assimilation & Postnasal voicing


[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
[+voice]
PLACE
Manner
[+nas]
[−son]

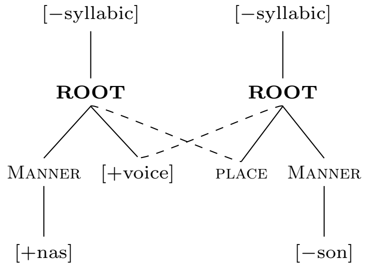
→ This is **mutual assimilation**: both sounds are becoming more similar to the other.

Multiple feature geometric rules: Bukusu

Feature geometric rules in Bukusu

- If we really wanted to, we could even combine the two rules:

Nasal place assimilation & Postnasal voicing


[−syllabic]
[−syllabic]
ROOT
ROOT
Manner
[+voice]
place
Manner
[+nas]
[−son]

∗ But it's not total assimilation, because the manner features remain distinct.

Consonant-vowel interactions: Japanese

Some of our Japanese data

- Here's the data involving [s,ʃ,t,ʧ]:

[kesa]	'this morning'	[aʃita]	'tomorrow'
[osoi]	'slow, late'	[ʃimasu]	'(I will) do (it)'
[kusaru]	'to rot'	[muʃi]	'insect'
[ase]	'sweat'	[miso]	'soy bean paste'
[tatari]	'curse'	[ʧikaku]	'near'
[ita]	'board'	[keʧi]	'stingy'
[satori]	'realization'	[otoko]	'man'
[moʧi]	'rice cake'	[uʧi]	'house'
[toʃi]	'year'		

- Here's how we captured it in rule form:

(8) a. /s,t/ → [ʃ,ʧ] / _i
b. [−voi,COR,−son,+ant,−dist] → [−ant,+dist] / _[+syll,+high,−back]

Consonant-vowel interactions: Japanese

The rest of our Japanese data

- And here's the data involving [h,ɸ,ç]:

[joho]	'forecast'	[toɸu]	'tofu'
[ɸuku]	'clothes'	[hoʃi]	'star'
[çito]	'person'	[koçi]	'coffee'
[heɴ]	'strange'	[hako]	'box'
[tehoɴ]	'model'	[ɸukai]	'deep'
[saiɸu]	'wallet'	[kuçi]	'waste'
[ʃihai]	'control'	[eɸu]	'letter F'
[kiçiɴ]	'grace'		

- Here's how we captured it in rule form:

(9) a. /h/ → [ɸ] / _u, /h/ → [ç] / _i
b. [−voi,GLOT,−son,+cont] → [bilabial] / _[+syll,+high,+back]
→ [palatal] / _[+syll,+high,−back]

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) [−voi,−son,COR] → [post-alveolar] / _[+syll,+high,−back]

(9) [−voi,−son,GLOT,+cont] → [palatal] / _[+syll,+high,−back]
→ [bilabial] / _[+syll,+high,+back]

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) [−voi,−son,COR] → [post-alveolar] / _[**+syll,+high**,−back]

(9) [−voi,−son,GLOT,+cont] → [palatal] / _[**+syll,+high**,−back]
→ [bilabial] / _[**+syll,+high**,+back]

- All of them are triggered by a following **high vowel**.

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) $[\mathbf{-voi,-son},\textsc{cor}] \rightarrow [\text{post-alveolar}]\ /\ \_[\mathbf{+syll,+high},-\text{back}]$

(9) $[\mathbf{-voi,-son},\textsc{glot},+\text{cont}] \rightarrow [\text{palatal}]\ /\ \_[\mathbf{+syll,+high},-\text{back}]$
$\rightarrow [\text{bilabial}]\ /\ \_[\mathbf{+syll,+high},+\text{back}]$

- All of them are triggered by a following **high vowel**.
- All of them target a **voiceless obstruent**.

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) [**−voi,−son**,COR] → [**post-alveolar**] / _[**+syll,+high**,−back]

(9) [**−voi,−son**,GLOT,+cont] → [**palatal**] / _[**+syll,+high**,−back]
→ [**bilabial**] / _[**+syll,+high**,+back]

- All of them are triggered by a following **high vowel**.
- All of them target a **voiceless obstruent**.
- All of them change **place** features.

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) [**−voi,−son**,COR] → [**post-alveolar**] / _[**+syll,+high**,−back]

(9) [**−voi,−son**,GLOT,+cont] → [**palatal**] / _[**+syll,+high**,−back]
→ [**bilabial**] / _[**+syll,+high**,+back]

- All of them are triggered by a following **high vowel**.
- All of them target a **voiceless obstruent**.
- All of them change **place** features.
- And Japanese doesn't have a glottal stop, so we don't lose anything by removing [+cont] from (9).

Consonant-vowel interactions: Japanese

Generalizing over the rules

- Now let me rearrange some of the features and put them side by side:

(8) [**−voi,−son**,COR] → [**post-alveolar**] / _[**+syll,+high**,−back]

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Consonant-vowel interactions: Japanese

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→ If we put aside the /h/ → [ɸ] rule for now, we now see very clear parallelism between the other two processes.

Consonant-vowel interactions: Japanese

Palatalization in Japanese

- These rules are both instantiations of the very common process known as **palatalization**, where high and/or front vowels trigger a change of place of articulation of a neighboring consonant towards the palatal region.

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Consonant-vowel interactions: Japanese

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⋆ A question we can now ask and try to answer: **why does /h/ palatalize to a palatal but /s,t/ palatalize to post-alveolars?**

Consonant-vowel interactions: Japanese

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⋆ A question we can now ask and try to answer: **why does /h/ palatalize to a palatal but /s,t/ palatalize to post-alveolars?**

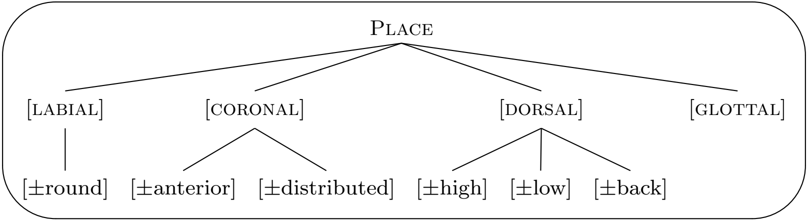
→ Answer: because of the interaction between palatalization and the underlying place features.

  - ○ But we need to look at the feature geometry of place again.

Consonant-vowel interactions: Japanese

Feature geometry of place revisited

- Here's our feature geometry of place again (now including GLOTTAL).


PLACE
[LABIAL]
[CORONAL]
[DORSAL]
[GLOTTAL]
[±round]
[±anterior]
[±distributed]
[±high]
[±low]
[±back]

Consonant-vowel interactions: Japanese

Feature geometry of place revisited

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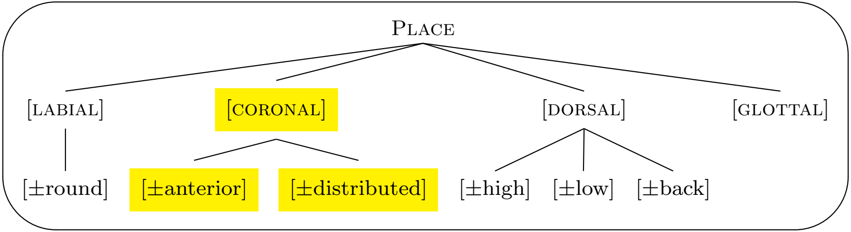
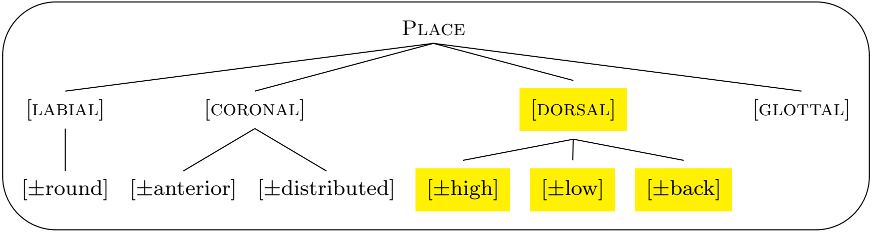

PLACE
[LABIAL]
[CORONAL]
[DORSAL]
[GLOTTAL]
[±round]
[±anterior]
[±distributed]
[±high]
[±low]
[±back]

- When we talked about it last time, we focused on the minor place features of CORONAL.

Consonant-vowel interactions: Japanese

Feature geometry of place revisited

- Here's our feature geometry of place again (now including GLOTTAL).

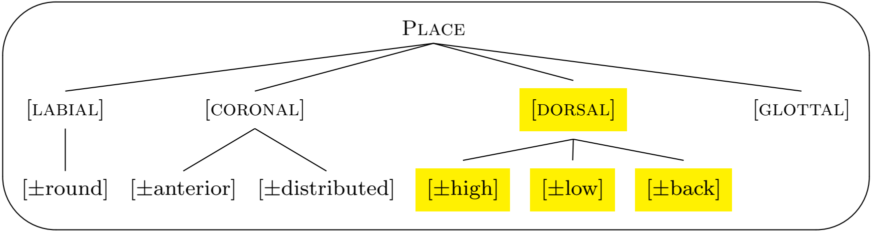

PLACE
[LABIAL]
[CORONAL]
[DORSAL]
[GLOTTAL]
[±round]
[±anterior]
[±distributed]
[±high]
[±low]
[±back]

- When we talked about it last time, we focused on the minor place features of CORONAL.
- But now let's focus on the minor place features of DORSAL.

Consonant-vowel interactions: Japanese

Feature geometry of place revisited

- Here's our feature geometry of place again (now including GLOTTAL).

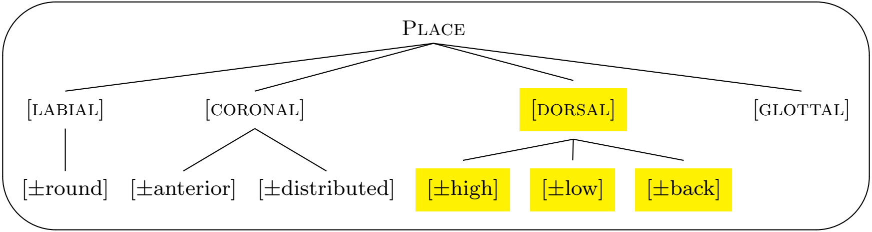

PLACE
[LABIAL]
[CORONAL]
[DORSAL]
[GLOTTAL]
[±round]
[±anterior]
[±distributed]
[±high]
[±low]
[±back]

⋆ **Do these features look familiar?**

Consonant-vowel interactions: Japanese

Feature geometry of place revisited

- Here's our feature geometry of place again (now including GLOTTAL).


PLACE
[LABIAL]
[CORONAL]
[DORSAL]
[GLOTTAL]
[±round]
[±anterior]
[±distributed]
[±high]
[±low]
[±back]

→ **These are vowel features!**

  - This makes sense articulatorily, because the part of the tongue that's used to make vowel articulations is the tongue body, i.e. the dorsum.
  - The movements the tongue makes to make vowels are very similar to the movements it needs to make in order to distinguish different minor places in the rear of the vocal tract.

Consonant-vowel interactions: Japanese

Minor dorsal places

	Velar [k,g,x,ɣ]	**Uvular** [q,ɢ,χ,ʁ]	**Pharyngeal** [ħ,ʕ]
[±high]	+	–	–
[±low]	–	–	+

- The 3-way height distinction in vowels maps onto a 3-way dorsal place distinction:
  - Velar = [+high,–low] (= high)
  - Uvular = [–high,–low] (= mid)
  - Pharyngeal = [–high,+low] (= low)

Consonant-vowel interactions: Japanese

Minor dorsal places

	Velar [k,g,x,ɣ]	**Uvular** [q,ɢ,χ,ʁ]	**Pharyngeal** [ħ,ʕ]
[±high]	+	–	–
[±low]	–	–	+

- ⋆ So why do we need / what do we do with [±back]?

Consonant-vowel interactions: Japanese

Minor dorsal places

	Palatal	**Velar**	**Uvular**	**Pharyngeal**
	[c,ɟ,ç,ʝ]	[k,g,x,ɣ]	[q,ɢ,χ,ʁ]	[ħ,ʕ]
[±high]	+	+	−	−
[±low]	−	−	−	+
[±back]	−	+	+	+

→ Palatal is [+high,−low,−**back**] (= high front)

- All the other dorsal places are [+back]

Consonant-vowel interactions: Japanese

Minor dorsal places

	Palatal [c,ɟ,ç,ʝ]	**Velar** [k,g,x,ɣ]	**Uvular** [q,ɢ,χ,ʁ]	**Pharyngeal** [ħ,ʕ]
[±high]	+	+	−	−
[±low]	−	−	−	+
[±back]	−	+	+	+

→ Palatal is [+high,−low,−**back**] (= high front)

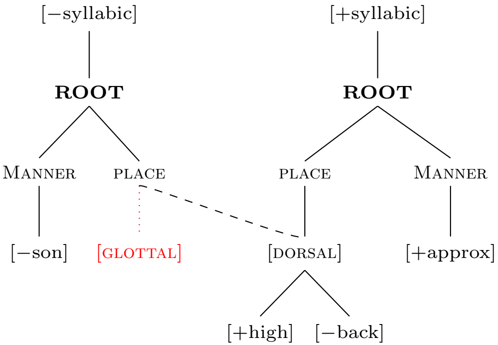
- All the other dorsal places are [+back]

⋆ **So how do we leverage this treatment of palatal in our analysis of /h/ → [ç] in Japanese?**

Consonant-vowel interactions: Japanese

Palatalization and feature geometry

(10) *The glottal fricative de-links its glottal feature and links to the* DORSAL *node of a following high front vowel.*


[−syllabic]
ROOT
MANNER
PLACE
[−son]
[GLOTTAL]
[+syllabic]
ROOT
PLACE
MANNER
[DORSAL]
[+approx]
[+high]
[−back]

Consonant-vowel interactions: Japanese

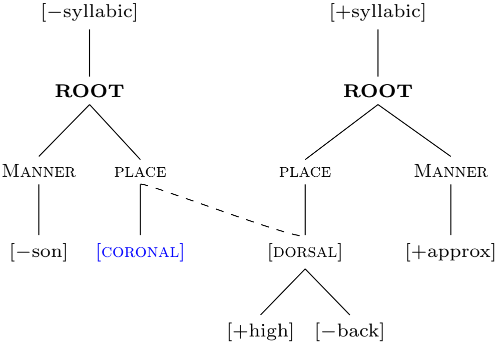
Palatalization and feature geometry

- ⋆ **So then what’s going on with /s,t/ → [ʃ,ʧ] in Japanese?**

Consonant-vowel interactions: Japanese

Palatalization and feature geometry

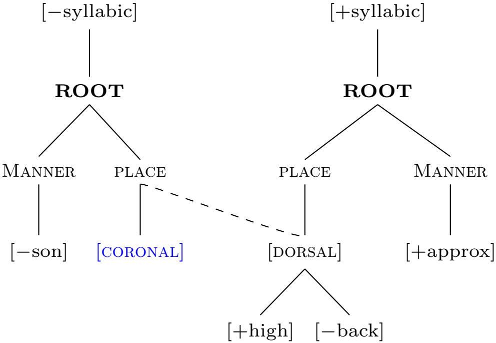
(11) *A coronal obstruent links to the* DORSAL *node of a following high front vowel.*


[−syllabic]
ROOT
MANNER
PLACE
[−son]
[CORONAL]
[+syllabic]
ROOT
PLACE
MANNER
[DORSAL]
[+approx]
[+high]
[−back]

Consonant-vowel interactions: Japanese

Palatalization and feature geometry

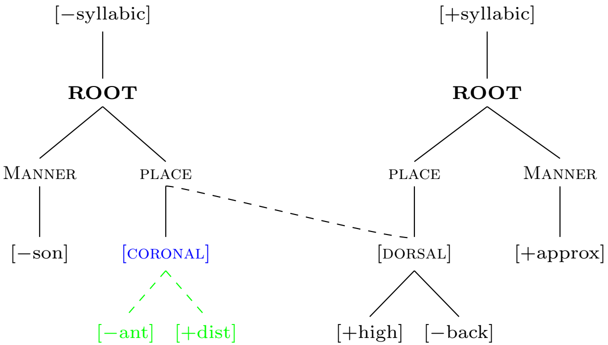
⋆ **How does this jive with identifying post-alveolar as [−ant,+dist]?**


[−syllabic]
ROOT
MANNER
PLACE
[−son]
[CORONAL]
[+syllabic]
ROOT
PLACE
MANNER
[DORSAL]
[+approx]
[+high]
[−back]

Consonant-vowel interactions: Japanese

Palatalization and feature geometry

(11) *A coronal obstruent links to the* DORSAL *node of a following high front vowel*, **and [−ant,+dist] are inserted** (because those are the only values compatible with [+high,−back]).


[−syllabic]
ROOT
Manner
PLACE
[−son]
[CORONAL]
[−ant]
[+dist]
[+syllabic]
ROOT
PLACE
Manner
[DORSAL]
[+approx]
[+high]
[−back]

Consonant-vowel interactions: Japanese

Understanding the rule

- With a few further assumptions, we can understand the two processes as being driven by the same rule:

Consonant-vowel interactions: Japanese

Understanding the rule

- With a few further assumptions, we can understand the two processes as being driven by the same rule:

    1. GLOTTAL is essentially the *absence of place* (where place means 'oral constriction'), so we don't need to mention the de-linking of GLOTTAL.

    2. The insertion of [−ant,+dist] is effectuated by a separate rule.

Consonant-vowel interactions: Japanese

Understanding the rule

- With a few further assumptions, we can understand the two processes as being driven by the same rule:

   3. We need to characterize the linking rule as applying to all voiceless obstruents that aren't underlyingly LABIAL or DORSAL.

Consonant-vowel interactions: Japanese

Understanding the rule

- With a few further assumptions, we can understand the two processes as being driven by the same rule:

  3. We need to characterize the linking rule as applying to all voiceless obstruents that aren't underlyingly LABIAL or DORSAL.

- We could do this by having the rule apply only to [−LABIAL,−DORSAL] consonants.
  - But this requires binary major place features, and doesn't end up simplifying our rule a whole lot.

Consonant-vowel interactions: Japanese

Understanding the rule

- With a few further assumptions, we can understand the two processes as being driven by the same rule:

  3. We need to characterize the linking rule as applying to all voiceless obstruents that aren't underlyingly LABIAL or DORSAL.

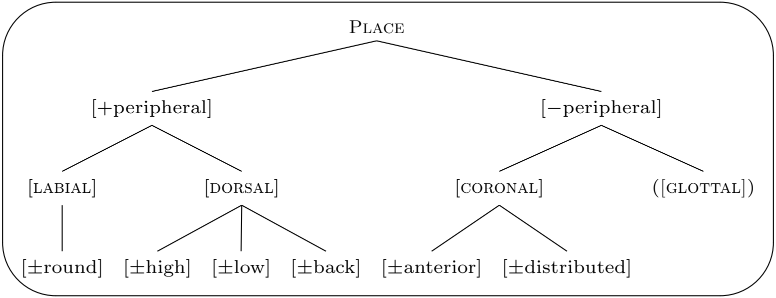
- We could do this by having the rule apply only to [−LABIAL,−DORSAL] consonants.
  - But this requires binary major place features, and doesn't end up simplifying our rule a whole lot.

- An alternative is to introduce a new feature: [±**peripheral**].

Consonant-vowel interactions: Japanese

[±peripheral] and the geometry of place

- [+peripheral] = front and back parts of the vocal tract (LABIAL & DORSAL)
- [−peripheral] = middle part of the vocal tract (CORONAL)



PLACE

[+peripheral] [−peripheral]

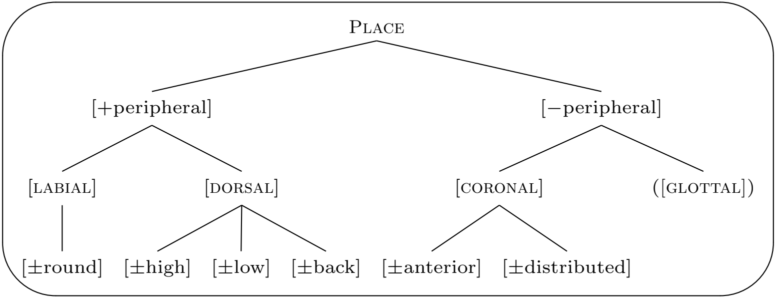
[LABIAL] [DORSAL] [CORONAL] ([GLOTTAL])

[±round] [±high] [±low] [±back] [±anterior] [±distributed]

Consonant-vowel interactions: Japanese

[±peripheral] and the geometry of place

- [+peripheral] = front and back parts of the vocal tract (LABIAL & DORSAL)
- [−peripheral] = middle part of the vocal tract (CORONAL)



PLACE

[+peripheral]

[−peripheral]

[LABIAL]

[DORSAL]

[CORONAL]

([GLOTTAL])

[±round]

[±high]

[±low]

[±back]

[±anterior]

[±distributed]

- If we adopt this strategy, we can explain the fact that inter-sonorant voicing in Kipsigis doesn't apply to coronals.

(12) /+peripheral,−voice,−son/ → [+voice] / [+son]_[+son]

Consonant-vowel interactions: Japanese

[±peripheral] and the geometry of place

- All of these issues are still debated among linguists.
- This is a way of trying to understand the problems, but we might not have all the right answers yet.
- We'll eventually consider other ways that we could answer some of these questions without resorting to extra features.