

Advanced Phonological Theory B – Lecture 1: Intro to Feature Geometry

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Goals of segmental phonology

- To account for possible (synchronic) segmental processes
- (For some) to account for the (broad) typological frequency of processes (e.g., [Clements 1985](#))
- To account for possible segment inventories
- (For some) to account for the (broad) typological frequency of specific types of inventories

Goals of segmental phonology

- To many phonologists, to account for something means two things:
 1. to accurately represent it
 2. the ability to predict (some) of its properties on the basis of propositions that are independently known to be true

Synchronic processes

- Place assimilation affects the place of articulation of preconsonantal (non-fricative) alveolars in English:

/ɔl/ + /ðeɪ/	[ɔ:lðeɪ]	'all there'
/ɪn/ + /θɜ:sk/	[ɪnθɜ:sk]	'in Thirsk'
/ɪn/ + /dʌblɪn/	[ɪndʌblɪn]	'in Dublin'
/ɔl/ + /twenti/	[ɔ:ltwenti]	'all twenty'
/gɛt/ + /rɛst/	[gɛtrɛst]	'get rest'
/ɪn/ + /rɔ:m/	[ɪnrɔ:m]	'in Rome'

Synchronic processes

- Hindi nasal place assimilation (data from [Gussenhoven & Jacobs 1998](#)):

/sam/ + /a:ka:r/ [sama:ka:r] ‘homophonous’

/sam/ + /ki:rṭan/ [saŋki:rṭan] ‘collective
devotional
singing’

/sam/ + /to:l/ [saṅto:l] ‘equilibrium’

/sam/ + /calan/ [saŋcalan] ‘movement’

/sam/ + /na:d/ [sanna:d] ‘consonance’

Synchronic processes

- Eastern Cheremis color harmony (data from [Odden 1991](#)):

[surt-šo]	‘his house’
[boz-šo]	‘his wagon’
[kornə-žo]	‘his way’
[kit-še]	‘his hand’
[bokten-že]	‘beside it’
[šužar-že]	‘his sister’
[üp-šö]	‘his hair’
[šör-žö]	‘its milk’
[pörtəštə-žö]	‘in his house’

Synchronic processes

- Turkish vowel harmony:

Stem	Acc.Sg.	Gen.Sg.	Nom.Pl.	
[ip]	[ip-i]	[ip-in]	[ip-ler]	'rope'
[kız]	[kız-ı]	[kız-ın]	[kız-lar]	'girl'
[yüz]	[yüz-ü]	[yüz-ün]	[yüz-ler]	'face'
[pul]	[pulu]	[pul-un]	[pul-lar]	'stamp'
[el]	[el-i]	[el-in]	[el-ler]	'hand'
[sap]	[sap-ı]	[sap-ın]	[sap-lar]	'stalk'
[köy]	[köy-ü]	[köy-ün]	[köy-ler]	'village'
[son]	[son-u]	[son-un]	[son-lar]	'end'

Traditional tools

- Traditional (SPE-style) linear segmental representation uses feature matrices
- ... comprising a bundle of feature-value pairs corresponding to every segment
- Features are drawn from universal set with 20-odd members
- Features are (minimally) binary
- Full specification: all (contrastive) features are specified for every sound

Traditional tools: problems

- (minor) contour sounds and complex sounds are difficult to represent using (single) feature bundles
- No means to capture **feature class behaviour**: unattested rules are as easy to state as possible (and frequent) ones
- In some cases, it's hard to capture crosslinguistic similarities in a simple fashion: no formal way of saying '**nasals are homorganic with a following consonant**'
- Ditto for inventories

Traditional tools: problems

- A possible and frequent rule:

$$\begin{array}{c} \text{C} \\ \left[\begin{array}{c} \text{-continuant} \\ \text{+coronal} \end{array} \right] \end{array} \rightarrow \begin{array}{c} \left[\begin{array}{c} \alpha \text{anterior} \\ \beta \text{coronal} \\ \gamma \text{distributed} \end{array} \right] \end{array} / \text{---} \begin{array}{c} \text{C} \\ \left[\begin{array}{c} \alpha \text{anterior} \\ \beta \text{coronal} \\ \gamma \text{distributed} \end{array} \right] \end{array}$$

- An unattested rule of the same complexity:

$$\begin{array}{c} \text{C} \\ \left[\begin{array}{c} \text{-sonorant} \\ \text{+coronal} \end{array} \right] \end{array} \rightarrow \begin{array}{c} \left[\begin{array}{c} \alpha \text{anterior} \\ \beta \text{voice} \\ \gamma \text{stident} \end{array} \right] \end{array} / \text{---} \begin{array}{c} \text{C} \\ \left[\begin{array}{c} \alpha \text{anterior} \\ \beta \text{coronal} \\ \gamma \text{distributed} \end{array} \right] \end{array}$$

Traditional tools: problems

- A possible rule (Cheremis color harmony):

$$V \rightarrow \begin{bmatrix} \alpha_{\text{back}} \\ \beta_{\text{round}} \end{bmatrix} / \begin{bmatrix} V \\ \alpha_{\text{back}} \\ \beta_{\text{round}} \end{bmatrix} C_0 \text{---}$$

- An unattested rule of the same complexity:

$$V \rightarrow \begin{bmatrix} \alpha_{\text{high}} \\ \beta_{\text{round}} \end{bmatrix} / \begin{bmatrix} V \\ \alpha_{\text{high}} \\ \beta_{\text{round}} \end{bmatrix} C_0 \text{---}$$

Formalising feature classes

- A solution to this problem is to grant formal status to sets of features that pattern together on a regular basis
- The most common way to implement this strategy is to define submatrices or constituents within feature bundles
- ...and to stipulate that only those sets of features that correspond to a submatrix/constituent may pattern together in rules

Formalising feature classes

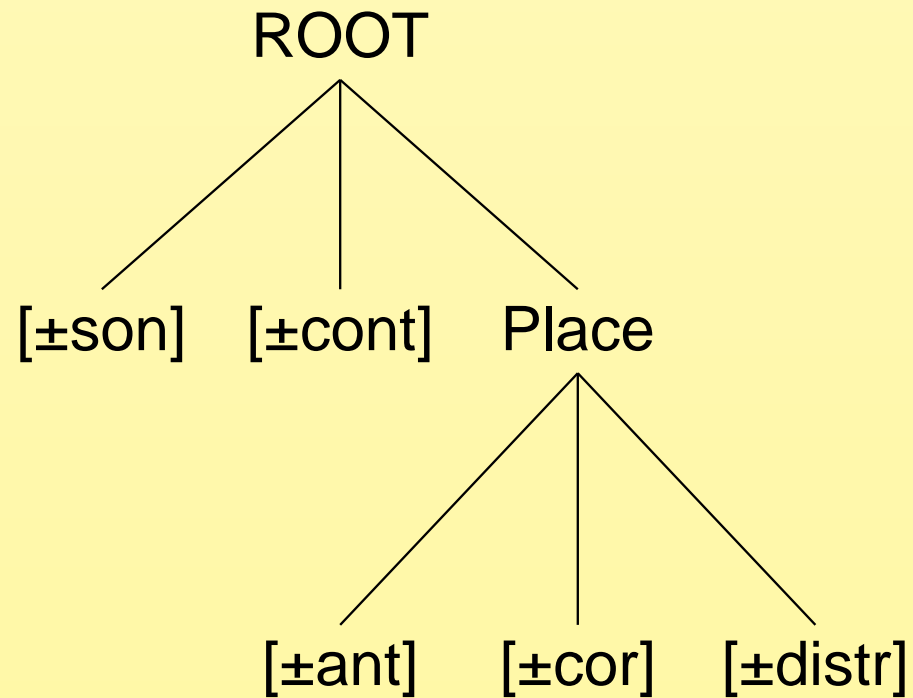
- Place features bundled together in a submatrix:

$$\begin{bmatrix} \pm\text{son} \\ \pm\text{cont} \\ \begin{bmatrix} \pm\text{ant} \\ \pm\text{cor} \\ \pm\text{distr} \end{bmatrix} \end{bmatrix}$$

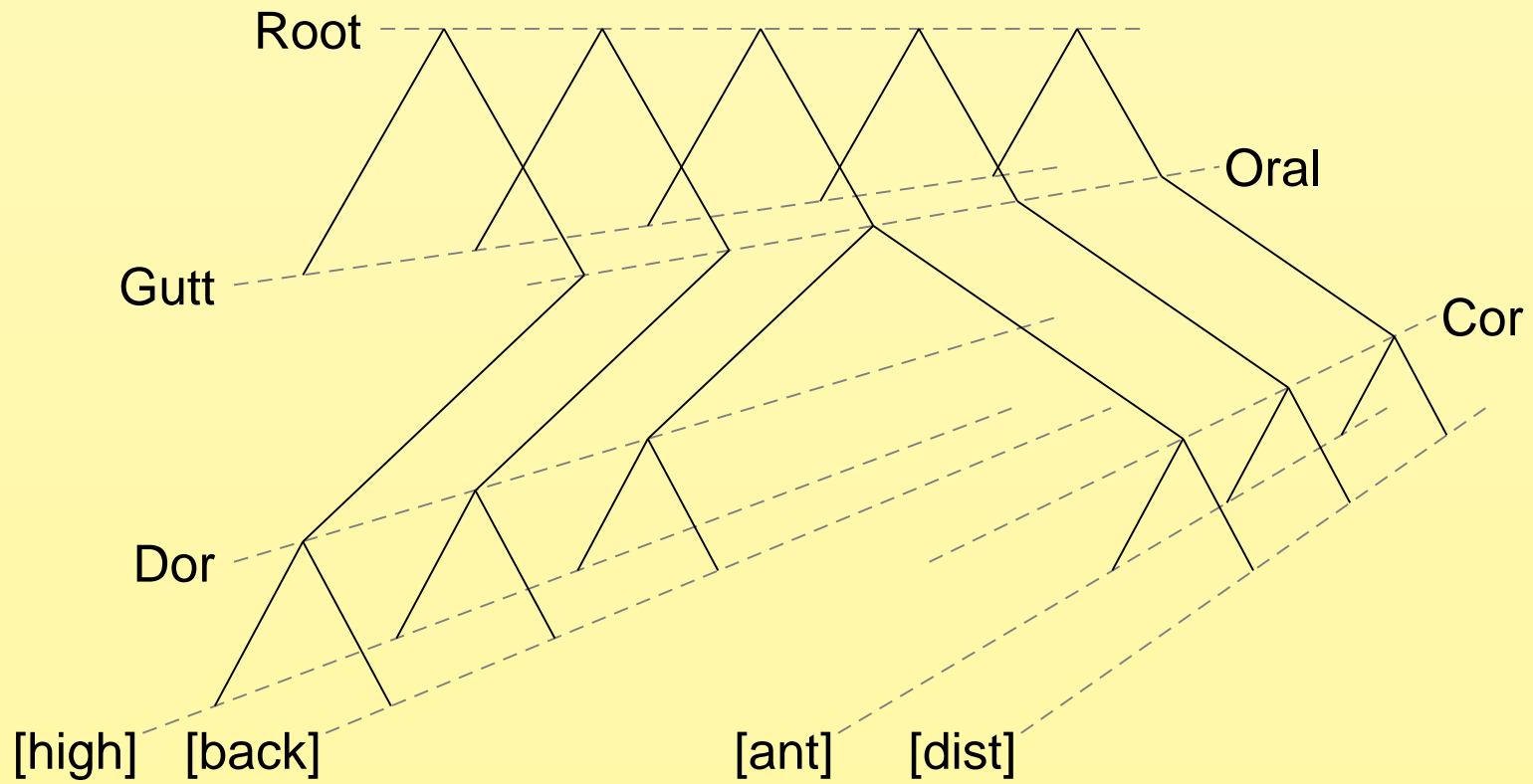
Feature Geometry

- Feature Geometry (Clements 1985; Sagey 1986; McCarthy 1988; Clements & Hume 1995 among others) employs feature trees or geometries to represent privileged feature classes
- Non-terminal nodes represent feature classes; terminal nodes represent more specific phonetic content
- The association lines connecting nodes represent phonological dependency and (in the phonetic realm) temporal overlap

Feature Geometry

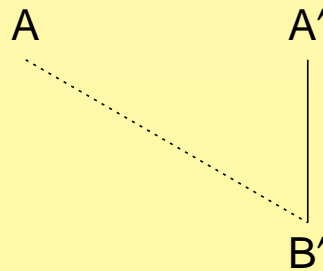


Feature Geometry



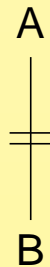
The formalisation of assimilation rules

- Assimilation (and harmony) are expressed as the association or **spreading** of subordinate nodes to dominant nodes of the appropriate type:

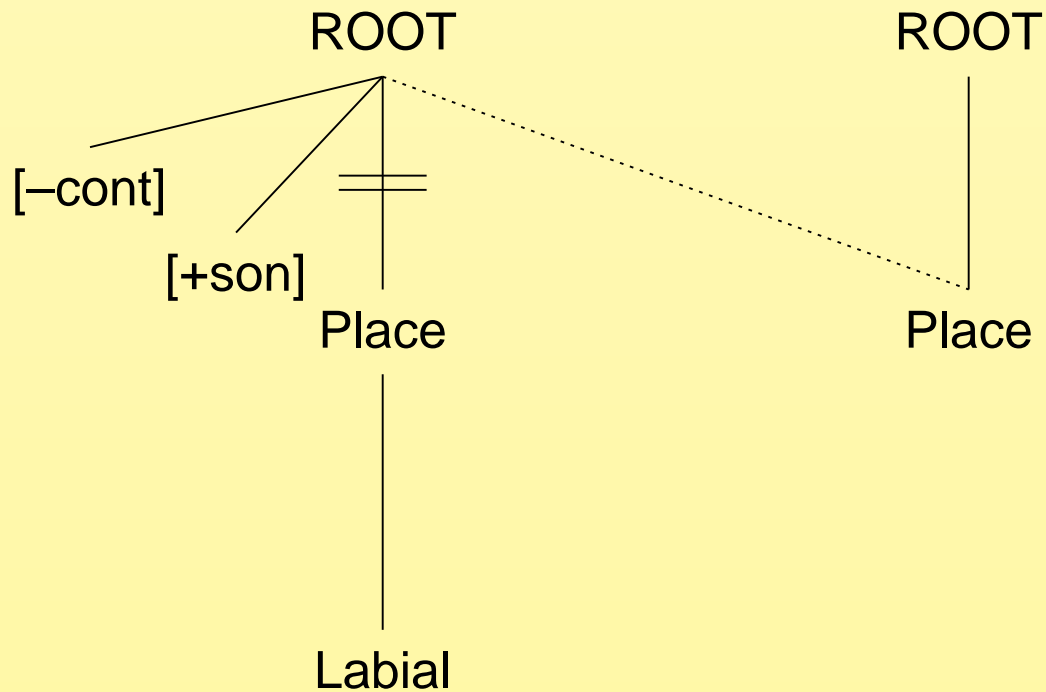


The formalisation of neutralisation rules

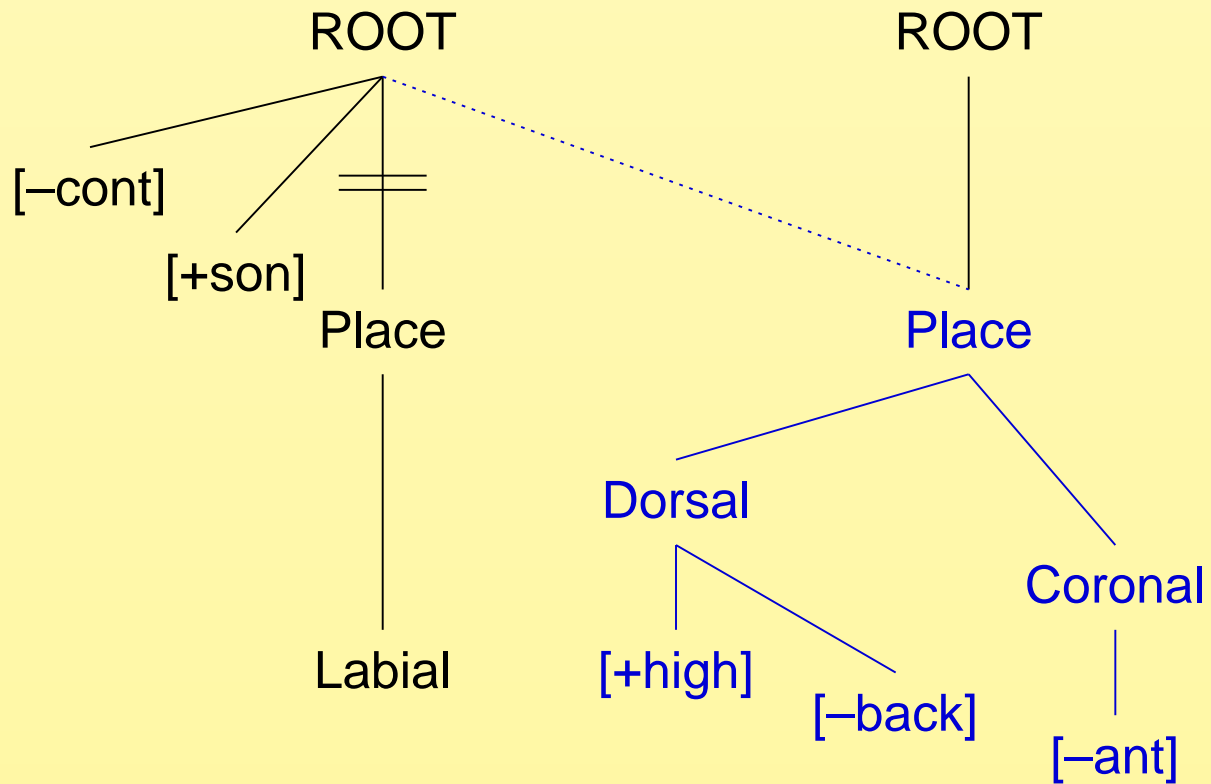
- Neutralisation is expressed as the de-association or **delinking** of subordinate nodes from a dominant node:



Modelling Hindi PA (1)



Modelling Hindi PA (2)



References

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Sagey, E. (1986) The representation of features and relations in non-linear phonology. PhD dissertation, MIT.