

## 1. Introduction

### Coronal Unmarkedness

By various criteria (reviewed in Paradis and Prunet 1991), the [coronal] place of articulation is unmarked relative to other places of articulation. E.g. [coronal] epenthesis, in Axininca Campa:

/i-N-koma-ako-aa-i-ro/      ij.ko.ma.ta.ko.taa.ti.ro      'he will paddle for it again'

### Coronal Underspecification

A particular **theory** of coronal unmarkedness, coronal underspecification, holds that coronals are literally structurally simpler than other consonants because they lack a specification for place of articulation (Kiparsky 1985, Broselow 1985, Avery and Rice 1989, Paradis and Prunet 1989ab, 1991, Mester and Itô 1989).

Epenthesis of coronals in Axininca, e.g., follows from syllabification positing the simplest possible structure — empty Onset node or bare C. Spell-out of [coronal] is by default.

### (Un)markedness in Optimality Theory

OT gives a different, non-representational sense to the notion “(un)marked” (Prince and Smolensky 1993, Smolensky 1993):

- Forms are marked with respect to some constraint **C** if they violate it.
- Only the unmarked structure wrt **C** will be found in some language if **C** is sufficiently high-ranking — specifically, if **C** dominates all constraints that require *faithful parsing* of input.

More broadly, cf. Itô, Mester, and Padgett's (1993) results concerning (under)specification of non-contrastive features in OT.

### Example: Coronal Epenthesis in OT (McCarthy 1993, Smolensky 1993)

#### (1) Assumptions

- a. Gen is free to posit **any** structure whatsoever, segments as well as prosody. Thus, Gen can supply fully-specified **t** or **k** as well as empty nodes. (Cf. analysis of reduplication in M&P 1993a, feature-addition in I-M-P 1993).
- b. **Consistency of Exponence** (M&P 1993ab)

Gen can't modify the morphological analysis of a form. That is, the segmental and moraic composition of morphemes at UR can't be altered by Gen, though phonological realization of morphemes in words can be.

#### (2) Proposal

“Epenthetic” elements are identified in general not by structural incompleteness (FILL-violation), but by:

MSEG

Every phonological element (segment, feature,  $\mu$ , etc.) belongs to a morpheme.

Under Consistency of Exponence, Gen cannot alter the phonological membership of morphemes; thus, all and only **epenthetic** segments are those that have no morphological sponsorship.

#### (3) Identity of Epenthetic Consonant

- MSEG eliminates the need for a purely structural means of identifying epenthetic segments, so epenthetic segments can be more than just empty nodes, and their quality is more than just a matter of default rules that are outside the system of constraints. Specifically, since epenthetic segments have featural substance, we can and must relate specification of epenthetic segments to universal constraints on segmental well-formedness.

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<sup>1</sup>Thanks to Junko Itô, Charles Kisseberth, Armin Mester, Jaye Padgett, and Alan Prince for comments on this and related work. Thanks to Paul Kiparsky, Harry van der Hulst, and Lisa Selkirk for trying to persuade me, in the face of obstinate opposition, to take a similar line during the 1991 UCSC features workshop.

•Need to derive at least the following elementary typology:

- Rt                    The Place-less Root node, realized by *ʔ*.
- (Rt, Cor)            The epenthetic coronal, typically *t* (Axininca), also *n* (Tunica, Gokana) or *r* (Japanese?, Fula). (exx. from Paradis and Prunet 1991)
- \*(Rt, Lab)           An impossible, unattested epenthetic consonant.
- \*(Rt, Dors)          Ditto.

(4) The Constraints

•FILL-PL (P&S 1993:181) ≡ SEGHEAD (I&M 1993:12)

Every Root node dominates a place feature.

•PL/COR > PL/-COR “coronal place is preferred to non-coronal place” — Universal coronal unmarkedness in P&S (1993:181); hence the universal ranking relation:                    \*PL/-COR > \*PL/COR

Explanation: PL/COR > PL/-COR is a *Universal Harmony Scale*. Like the sonority scale, it expresses a universal ordering of phonological elements. Universal Harmony Scales convert to universal constraint rankings by a kind of contraposition (see P&S 1993:137). “Coronal unmarkedness in general means that to specify PL as coronal is the least offensive violation. The constraint \*PL/LAB is violated whenever Lab is associated to a PL node; this constraint universally dominates the corresponding constraint \*PL/COR because Lab is a less well-formed place than Cor.” (P&S 1993)

Elaboration: It seems clear that coronal unmarkedness pertains only to *primary* coronal specifications in *consonants*. I know of no good evidence for a comparable bias in secondary place in consonants or primary place in vowels. (In the structural terms of Clements 1991, coronal unmarkedness is a property of C-Place only, and ought to be expressed as \*C-PL/-COR > \*C-PL/COR.)

Reassurance: \*PL/-COR > \*PL/COR will not automatically lead to the **replacement** of underlying /p/ by /t/, since that’s a matter of faithfulness. But in Gen-supplied (epenthetic) structure, where faithful parsing of underlying features is not an issue, this hierarchy can have visible effects — a species of emergence of the unmarked.

(5) The Two Licit Types of Epenthetic Consonants

Assume for this case: a situation where ONSET > MSEG, compelling overparsing. The tableaux below address the issue of the *identity* of the MSEG-violating segment.

a. Epenthesis of bare Root node: \*PL/-COR > \*PL/COR > SEGHEAD

Candidates	*PL/-COR	*PL/COR	SEGHEAD
a.  Rt			*
b. (Rt, -Cor)	* !		
c. (Rt, Cor)		* !	

b. Epenthesis of coronal consonant: SEGHEAD, \*PL/-COR > \*PL/COR

Candidates	SEGHEAD	*PL/-COR	*PL/COR
a.  (Rt, Cor)			*
b. Rt	* !		
c. (Rt, -Cor)		* !	

(6) Impossibility of Labial/Dorsal Epenthesis

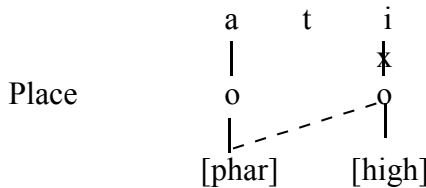
For epenthetic /p/ or /k/ to be optimal, the grammar must contain the constraint hierarchy SEGHEAD, \*PL/COR > \*PL/LAB. But this contravenes coronal unmarkedness, expressed as the universal ranking \*PL/-COR > \*PL/COR.

## Summary

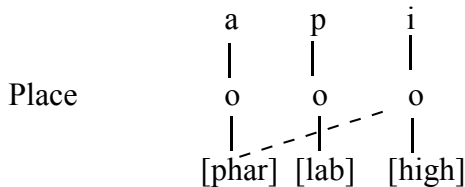
- OT provides a conception of markedness that is **not** representationally based, and hence does not rely on underspecification. Instead, it's based on a universal constraint hierarchy, \*PL/-COR > \*PL/COR.
- This provides a straightforward account of the unmarked status of coronals as evidenced in epenthesis.
- Smolensky (1993) also addresses most other types of evidence for coronal unmarkedness in these terms.
- Mohan (1993) and McCarthy & Taub (1993) note many problems with the representational (=underspecification) theory of coronal unmarkedness, and other aspects of underspecification theory are called into serious question by the results of Itô, Mester, and Padgett (1993).

## Coronal Transparency

But one important argument for coronal underspecification remains: coronal transparency (Paradis and Prunet 1989ab, 1991). There appear to be cases where vowel-vowel assimilation can proceed unimpeded across a coronal consonant (hypothetical /ati/ → ata) but is blocked by labials or dorsals (/api/ → api). In underspecificational terms, this means that coronals lack place, and so are transparent to Place-spreading from adjoining vowels:



But intervening labials or velars are fully specified for place, and so block Place-spreading from adjoining vowels:



This looks like a case where **only** a representational (=underspecificational) account will do, since the analysis depends on the literal presence/absence of place specification. Does this doom the theory of coronal unmarkedness based on \*PL/-COR > \*PL/COR?

## Goal of this Talk

- To show that the OT conception of coronal unmarkedness, based on \*PL/-COR > \*PL/COR, accounts for coronal transparency phenomena too. This will emerge from examining a case of coronal transparency in Bedouin Arabic that's significantly richer (and therefore more revealing) than others in the literature.
- Foreshadowing the analysis: Coronal transparency isn't transparency at all, but **participation** of coronals in V-V assimilation. Participation of **only** coronals follows from coronal unmarkedness, specifically from the joining of the two universal harmony scales, [coronal] > [-coronal] and Simplex > Complex (giving priority to the latter).

## Data

Data come from the Najdi dialect of Bedouin Arabic, as described by Abboud, Peter (1979) "The Verb in Northern Najdi Arabic," *BSOAS* 42, 467-499. Facts are somewhat more complex in the Hijazi dialect of Al-Mozainy (1981). A quite different analysis of some of this material can be found in McCarthy (1993), which also deals with additional alternations and patterns not treated here. Compare also the interesting proposals for raising/syncope interaction by Wada (1993).

## 2. The Main Alternations: Raising and Syncope

### Descriptive Generalization

In non-final open syllables, short /i/ → Ø and short /a/ → i.

#### (7) Syncope of High Vowels

/ʃarif+at/	ʃarf <u>a</u> t	‘she knew’	cf. ʃarif, ʃarifna ‘he/we knew’
/kitil/	kt <u>i</u> l	‘he was killed’	
/kitil+at/	kit <u>i</u> l <u>a</u> t	‘she was killed’	
/kitil+na/	kt <u>i</u> l <u>n</u> a	‘we were killed’	
/yaskin+uun/	yask <u>i</u> nuun	‘they (m.) dwell’	cf. yaskin ‘he dwells’
/yaskin+in/	yask <u>i</u> ni <u>n</u>	‘they (f.) dwell’	

The contrast between short /i/ and short /u/ is marginal in this language. In any case, short /u/s behave just like short /i/, so the generalization holds of all [high] vowels.

#### (8) Raising of Pharyngeal (i.e., low) Vowel

/katab/	k <u>i</u> t <u>a</u> b	‘he wrote’	
/katab+at/	kt <u>i</u> bat	‘she wrote’	
/nataf+aw/	nt <u>i</u> faw	‘they (m.) pulled feather’	
/samiʃ/	s <u>i</u> miʃ	‘he heard’ (cf. samʃat ‘she heard’)	
/rafaagah/	r <u>i</u> faagah	‘companions’	
/galam+ih/	gl <u>i</u> mih	‘his pen’	
/daftar+ih/	daft <u>i</u> rih	‘his notebook’ (cf. daftarna ‘our notebook’)	
/jamal+uh/	jm <u>i</u> luh	‘his camel’	

The output high vowel, double-underscored, is *i*, *u*, or *ɨ* depending on consonantal context. The UR’s are justified at length in Al-Mozainy (1981), based on conventional morphophonemic evidence, secret languages, experiments, spelling data.

### Some Assumptions (not necessarily in this form, but needed to get analysis off ground)

- Limitation of raising and syncope to **non-final** syllables is an Alignment effect (McCarthy 1993).
- Raising and syncope alternations are by some means limited to would-be light syllables (so long vowels or short vowels in closed syllables are faithfully parsed). Again, see McCarthy (1993) for one proposal.
- It will be useful make a distinction between two relations obtaining between a feature F and a segment S (or between a segment S and a prosodic constituent P):

**Sponsorship:** S sponsors F iff F is associated with S in input.

**Parsing:** S parses F iff F is associated with S in output.

The sponsorship relation is essentially identical to what MSEG and Consistency of Exponence refer to.

- Details of feature geometry etc. are intentionally eschewed. The results reported below seem compatible with various proposed elaborations of structure, but don’t seem to require any of them.

### Analysis

#### (9) PARSE-V<sub>[PHAR]</sub>

A [phar]-sponsoring vowel must be parsed (i.e., must be syllabified).

#### (10) PARSE-V<sub>[HI]</sub>

A [high]-sponsoring vowel must be parsed.

#### (11) \*[PHAR]

Any (parsed) specification of [phar] is prohibited. (cf. \*PL/[COR] etc. above)

## (12) \*[HI]

Any (parsed) specification of [high] is prohibited.

Remark: The featural constraints \*[PHAR] and \*[HI] properly pertain only to vocalic feature specifications, as does the ranking between them, justified below, \*[PHAR] > \*[HI]. Though [hi] is the default in vowels, it plays no discernible role in the consonant system.

(13) Ranking: \*[HI] > PARSE-V<sub>[HI]</sub>, from /kitil/

Input /i/ can remain unparsed in the output, sparing a high vowel.

Candidates	*[HI]	PARSE-V <sub>[HI]</sub>
a. $\Rightarrow$ k<i>til	*	*
b. kitil	** !	

As noted above (see “Assumptions”) closed syllables aren’t involved in the syncope or raising alternations.

## (14) Ranking: \*[PHAR] &gt; \*[HI], from /katab/

*i* is the default, relative to *a*. By unfaithful parsing, input /a/ is replaced by *i*.

Candidates	*[PHAR]	*[HI]
a. $\Rightarrow$ kitab	*	*
b. katab	** !	

(15) Ranking: PARSE-V<sub>[PHAR]</sub> > \*[HI], from /katab/

An underlying pharyngeal vowel must be parsed (can’t be dropped entirely), even though it is parsed as *i*. (In language as a whole, there are prosodic conditions leading to non-parsing of /a/ — see McCarthy 1993).

Candidates	PARSE-V <sub>[PHAR]</sub>	*[HI]
a. $\Rightarrow$ kitab		*
b. k<a>tab	* !	


## (16) Ranking Summary

PARSE-V<sub>[PHAR]</sub>, \*[PHAR] > \*[HI] > PARSE-V<sub>[HI]</sub>

i. /katab/ → kitab

Candidates	PARSE-V <sub>[PHAR]</sub>	*[PHAR]	*[HI]	PARSE-V <sub>[HI]</sub>
a. $\Rightarrow$ kitab		*	*	
b. katab		** !		
c. k<a>tab	* !	*		

b. /kitil/ → *ktil*

Candidates	PARSE-V <sub>[PHAR]</sub>	*[PHAR]	*[HI]	PARSE-V <sub>[HI]</sub>
a.  k(i)til			*	*
b. kitil			** !	
c. katil		* !	*	

### 3. No Raising After Guttural Consonant

(17) Data

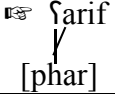
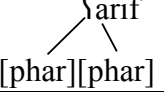
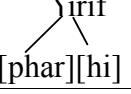

ḫadaṣ	‘he deceived’	ḫasir	‘he lost’
ḅadar	‘he betrayed’	ḅariġ	‘he drowned’
ḥasab	‘he counted’	ḥalif	‘he swore’
ṣabad	‘he worshiped’	ṣarif	‘he knew’
hajar	‘he abandoned’	halić	‘he perished’

#### Assumptions

- Gutturals are primary [phar] consonants (McCarthy 1991 etc.), leading to many phonological associations between gutturals and the [phar] vowel *a*.
- When nearby segments have identical feature specifications, Gen emits candidates with and without these specifications fused into linked structures. This Gen-mediated equivalent of “OCP Fusion” avoids issue of PARSE violation in the creation of linked representations. (See M&P 1993a: Appendix for this proposal and evidence. As Janet Pierrehumbert has pointed out, this follows if features are regarded as attributes of segments, not as objects contained in segments.)

#### Analysis

(18) /ṣarif/ → *ṣarif*

Candidates	PARSE-V <sub>[PHAR]</sub>	*[PHAR]	*[HI]	PARSE-V <sub>[HI]</sub>
a. 		*	*	
b. 		** !	*	
c. 		*	** !	
d. 	* !	*	*	

#### Remarks:

- Non-raising of /a/, with a shared [phar] structure, spares violations of \*[HI] or \*[PHAR]. With constraints like these, which militate **against** featural specifications, the linked structure must always win.
- Shared structure between *a* and the guttural ṣ doesn’t actually change the guttural, since gutturals, as primary [phar] consonants, have inherent [phar] place. (See Ni Chiosain and Padgett 1993)
- There’s no role for the Linking Condition here; rather, it’s the fact that [phar] is present anyway, in the preceding consonant, that allows a [phar] vowel.
- This approach, though it takes slightly different form, was inspired by Itô and Mester’s (1993) idea of “CV-Linkage”; see also Itô, Mester, and Padgett (1993) on linkage and licensing; both on alternatives to the Linking Condition.

#### 4. No Raising Before Guttural + a

(19) Data: /aGa/

/daχal/	daχal	‘he entered’
/šaʕal/	šaʕal	‘he worked’
/šaħað/	šaħað	‘he begged’
/daʕas/	daʕas	‘he trampled’
/dahan/	dahan	‘he painted’
/saʔal/	saʔal	‘he asked’
/χadaʕah/	χadaʕah	‘he deceived her’

#### Analysis

(20) /dahan/ → dahan

Candidates	PARSE-V <sub>[PHAR]</sub>	*[PHAR]	*[HI]	PARSE-V <sub>[HI]</sub>
a.  dahan [phar]		*	*	
b.  dahan [phar][phar][phar]		*** !	*	
c.  dihan [phar]		*	** !	
d.  d(a)han [phar]	* !	*	*	

Remark:

- This is almost exactly parallel to the analysis of /ʕarif/ → ʕarif above.

#### 5 Coronal ‘Transparency’: No Raising Before Coronal + a

Input /a/ is realized as *i* before *Ca*, where *C* ≠ guttural

(21) Data: /aCa/ → *i*Ca

/sakan/	sikan	‘he dwelled’
/nafax/	nifax	‘he blew’
/najah/	nijah	‘he succeeded’
/gaTaʕ/	giTaʕ	‘he cut’
/kasar/	kisar	‘he broke’
/taga:samaw/	tiga:simaw	‘they shared’

But not when C= coronal sonorant

(22) Data: /aNa/ → *a*Na

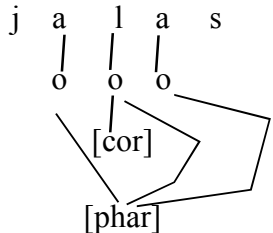
/jalas/	jalas	‘he sat’
/šanag/	šanag	‘he beheaded’
/jaraf/	jaraf	‘he washed away’
/bagarak/	bgarak	‘your (m.s.) cattle’

(23) Compare: /aNi/, where /i/ stands for any high vowel

/šarib/	širib	‘he drank’
/migtani/	migtini	‘purchasing (m.s.)’
/tistaridd/	tistiridd	‘she gets something back’
/kataluh	ktiluh	‘he killed him’
/bagari/	bgiri	‘my cattle’

### Analytic Strategy

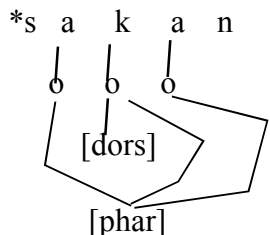
•In e.g. *jalas* [phar] is shared across *ala*, comparable to guttural-medial forms like *dahan*:



This is the seeming coronal transparency effect.

•In e.g. *sirib* (from /šarib/) there is no second instance of [phar] to be shared.

•In e.g. *sikan* (from /sakan/) the medial *k* can't participate in linkage of [phar]. Thus, the following structure is non-optimal



•The impossibility of [dors, phar] complex segments, versus the optimality of [cor, phar] complex segments in *a\_\_a* context, follows from coronal unmarkedness, as shown below.

### Analysis

(24) Coronal Unmarkedness and Segmental Complexity in Prince and Smolensky (1993) (slightly revised)

•Recall the universal harmony scale responsible for coronal unmarkedness:

$$PL/[cor] > PL/[-cor]$$

As noted above, I assume that this pertains only to primary place specifications in consonants (to be singled out structurally, relationally, or by some other means).

•Another scale, of direct relevance here, is one that militates against structural elaboration of all kinds.

Relativized to Place features, it is:

$$\text{Simplex Segment} > \text{Complex Segment}$$

•Combining these two scales, giving priority to the latter, yields:

$$[cor] > [-cor] > [cor, X] > [-cor, X]$$

Where “cor” and “-cor” stand for primary place specifications and “X” stands for any secondary place specification.

•This scale converts (by quasi-contraposition) to the following constraint hierarchy:

$$*PL/[-COR, X] > *PL/[COR, X] > *PL/[-COR] > *PL/[COR]$$

(25) Coronal Unmarkedness and Coronal ‘Transparency’

•Linked structure in e.g. *jalas* above violates \*PL/[COR, X]. But it spares violation of \*[HI] in the competing candidate \**jilas*. This shows that \*[HI] > \*PL/[COR, X]:

		*[HI]	*PL/[COR, X]
a.			*
b.		* !	

•But linked structure in e.g. \**sakan* (vs. actual *sikan*) violates \*PL/[-COR, X]. This shows that \*PL/[-COR, X] > \*[HI]:

		*PL/[-COR, X]	*[HI]
a.			*
b.		* !	

•Thus, the full hierarchy of constraints directly relevant to the analysis is:

$$\text{PARSE-V}_{[\text{PHAR}]}, *[\text{PHAR}], *PL/[-\text{COR}, X] > *[\text{HI}] > *PL/[\text{COR}, X], \text{PARSE-V}_{[\text{HI}]}$$

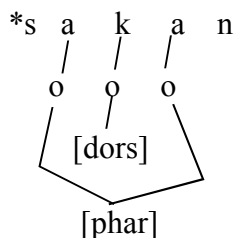
Discussion

- Coronals aren't literally **transparent** to assimilation; on the contrary, they participate fully in it, becoming [phar] like the adjoining vowels.
- The crucial move in explaining why *only* coronals behave this way is the separation and ranking of the two constraints \*PL/[-COR, X] and \*PL/[COR, X]. This follows directly from coronal unmarkedness, conceived of in terms of a substantive hierarchy (rather than underspecification) within OT.
- Because these two constraints are separate, grammars have the option of interpolating other constraints between them. In the case at hand, \*[HI] is the constraint in the middle. Thus, we get linkage where the intervening consonant is a coronal, raising where the intervening consonant is a non-coronal.
- What about intervening gutturals, like *dahan*? Since a guttural is **inherently** [phar] linkage of a guttural with /a/ doesn't change the complexity of the guttural. (Cf. Ni Chiosain and Padgett 1993 on inherent V-place.)

**6. Residual Matters, Informally Addressed**

Locality

What rules out the following, in which linkage is achieved by skipping over the intervening non-coronal?



This submits to a straightforward application of locality considerations. Specifically, along the lines of Kiparsky (1982), Levergood (1984), Archangeli and Pulleyblank (1992), a configuration in which [phar] is linked to non-contiguous string of segments is excluded. Rankable constraints are presumably involved; substantive properties of features are also relevant (witness [nasal], almost always strictly local).

## Sonorance

Why are only coronal **sonorants** implicated in linkage? What rules out *\*kasar* (for *kisar*), with [phar] associated to *asa*?

One possible answer: similar things assimilate (Guile, CLS 8). That is, the elements sharing a single [phar] specification must be like one another in that all are [sonorant] Itô and Mester (1993 class lectures) have made proposals along these lines. More broadly, this can be connected with role of stricture in assimilation, explored by Padgett (1991) and Selkirk (1991).

Another possible answer: coronal obstruents are already complex, and linking [phar] to them would make them doubly complex. Lehn (1967: 129) notes that *l*, *r*, and *n* in Bedouin Arabic are “the three apicals showing no dental vs. alveolar contrast”. If representing non-apicals or even apicals with a dental/alveolar contrast requires secondary features, then it follows that the sonorants are the only simplex coronals. Then only coronal sonorants can assume [phar] without becoming doubly complex — a worse violation of Simplex > Complex.

## CV and VCV vs. V.C Linkage

Linkage of heterosyllabic *a.G* is impossible, except in concert with *aGa* linkage. This is shown by raising in /aGi/:

/ʔigTaʕi/	ʔigTiʕi	‘cut! (f.s.)’	/ʔigTaʕu/	ʔigTiʕu	‘cut! (m.pl.)’
/χadaʕuh/	χdiʕuh	‘he deceived him’			

This is presumably a domain effect. Linked [phar] is possible in *Ga* (tautosyllabic, CV linkage) and *aGa* (heterosyllabic, head-to-head linkage — cf. Archangeli and Pulleyblank 1992), but not in *a.G* (heterosyllabic, head-to-dependent linkage). Interestingly, in the Cyrenaican Jebel dialect described by Mitchell 1960, only tautosyllabic *Ga* linkage is possible.

## Structure-Preservation or Not?

If [cor, phar] is a licit structure, why are there no [cor, phar] phonemes with free distribution?

Answer rests on distinction between sponsorship and parsing. Has implications for inventory theory in OT that might be problematic, but this margin is too small to contain the discussion.

## Directional Asymmetry

Input /a/ is realized as output *i* when **preceded** by *a* across a coronal sonorant. For prosodic reasons (see McCarthy 1993) this can occur only when the preceding *a* is long: *yfaalijoon*, *mfaalijat*. Why no linkage here? I don’t know yet, though I’ve got some ideas.

## **7. Conclusion**

- Coronal transparency is an effect of coronal **markedness**, but it needn’t (shouldn’t?) be analyzed by coronal underspecification.
- It’s not actual transparency at all, but literal participation by coronals in the alternation.
- Only coronals can participate because of coronal unmarkedness, which reduces to the universal constraint hierarchy \*PL/[–COR] > \*PL/[COR].