

Vowel Harmony is Local

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Introduction

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- ▶ A unified theory of surface markedness constraints captures a variety of vowel harmony patterns
- ▶ Vowel harmony analysed as a phonotactic constraint rather than a transformation from an underlying form into the surface form (Goldsmith, 1976; Clements, 1976; a.o.)
- ▶ Transparent vowels don't rely on underspecification

Locality

- ▶ Autosegmental surface representations of vowel harmony patterns need two relations between elements: association (|) and adjacency (\rightarrow)

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- ▶ Attested patterns are captured by static surface well-formedness constraints: forbidden substructure constraints (FSCs) (Jardine 2016, 2017)

Autosegmental Representations (ARs)

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(3)

± high

|

V

|

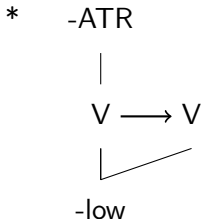
± back

Representational Assumptions

Full Specification (FS):

- ▶ each featural element must be associated to at least one vowel

(4) Violates FS

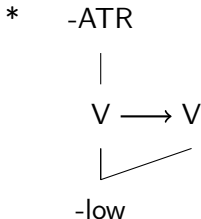


Representational Assumptions

Full Specification (FS):

- ▶ each featural element must be associated to at least one vowel
- ▶ each vowel must be associated to at least one element on each feature tier

(5) Violates FS

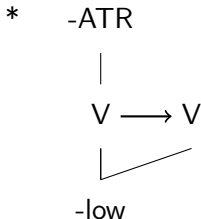


Representational Assumptions

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(6) Violates FS



- ▶ consonants are not associated to vowel features

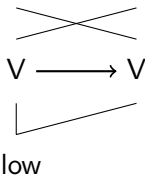
Representational Assumptions

No Crossing Constraint (NCC):

- ▶ association lines between the segmental tier and a feature tier never cross

(7) Violates NCC

* +ATR → -ATR

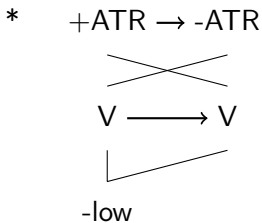


Representational Assumptions

No Crossing Constraint (NCC):

- ▶ association lines between the segmental tier and a feature tier never cross

(8) Violates NCC



- ▶ FS and NCC prevent gapped structures (Archangeli & Pulleyblank, 1994; Ringen & Vago, 1998)

Representational Assumptions

Obligatory Contour Principle (OCP):

- ▶ adjacent featural elements must be distinct

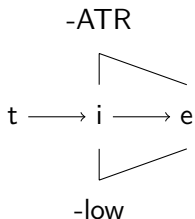
(9) Violates OCP

$$\begin{array}{ccc} * & -\text{ATR} \longrightarrow & -\text{ATR} \\ & | & | \\ & \text{V} \longrightarrow & \text{V} \\ & | & | \\ & -\text{low} \longrightarrow & -\text{low} \end{array}$$

Representational Assumptions

- ▶ A well-formed AR obeys FS, the NCC, and the OCP

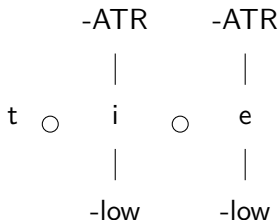
(10)



Concatenation

- ▶ NCC and OCP derived by concatenation operation (\circ) (Jardine & Heinz, 2015)
 - ▶ Concatenation merges autosegmental graph primitives, like (1)

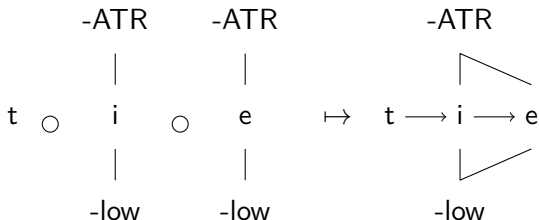
(11) Concatenation of adjacent autosegmental graph primitives



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Terminology

- ▶ Assimilation: vowels have the same feature

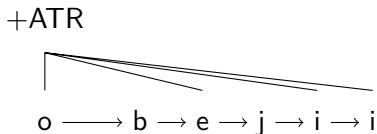
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(15) Spreading



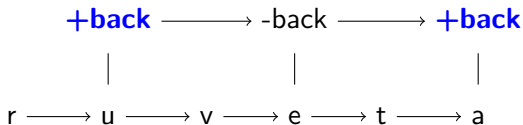
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(17) Agreement



Forbidden Substructure Grammar

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- ▶ Forbidden substructure grammar generates a set of well-formed structures and rules out ill formed substructures, r_1 through r_n

(20) Forbidden substructure grammar (Jardine, 2017)

$$\neg r_1 \wedge \neg r_2 \wedge \neg r_3 \wedge \dots \wedge \neg r_n$$

Forbidden Substructure Constraints (FSCs)

- ▶ Phonotactic restriction that combines the OT (Prince & Smolensky, 1993, 2004) representation of surface markedness (*) with forbidden substructures, like r_1

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- ▶ FSCs can define locality because they refer to elements in a structure connected by an ordering or association relation

Neutral Vowels

Blocking Vowels: Akan

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- ▶ If a word contains a sequence of -low vowels they will be associated to a single ATR feature (Clements, 1976)

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Blocking Vowels: Akan

Table 1: Akan Vowels

	+ATR	-ATR
-low	i	ɪ
	u	ʊ
	e	ɛ
	o	ɔ
+low	ɜ	a

- ▶ -low vowels in sequence are associated to a single ATR feature:
[obejii] 'he came and removed it'

Blocking Vowels: Akan

Table 1: Akan Vowels

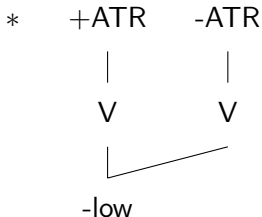
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- ▶ -low vowels on either side of a +low vowel can be associated to different ATR features: [pɪɾɜko] 'pig'

Blocking Vowels: Akan

- ▶ Akan ATR harmony pattern captured by a single FSC
 - ▶ forbids two adjacent vowels associated to a single -low feature from being associated to different ATR features

(21)

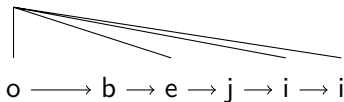


Blocking Vowels: Akan

- ▶ Akan FSC in (21) allows grammatical spreading AR

(22) [obejii] 'he came and removed it'

+ATR

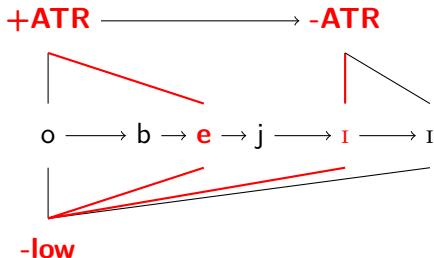


-low

Blocking Vowels: Akan

- ▶ and (21) rules out an ungrammatical disharmonic AR because it contains the forbidden substructure

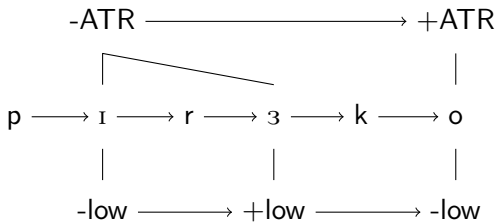
(23) Ungrammatical AR



Blocking Vowels: Akan

- ▶ The same FSC in (21) also allows a grammatical disharmonic AR with a +low vowel

(24) [pɪrɜko] 'pig'



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Spreading ARs. . .

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- ▶ consist of an unbounded span of contiguous vowels associated to a single ATR feature node
- ▶ OR when two different ATR features are present, the features are adjacent to each other regardless of how many vowels are associated to each
- ▶ the FSC posited in (21) captures the Akan ATR harmony pattern for words with and without blocking +low vowels

Transparent Vowels: Finnish

Finnish Back harmony:

- ▶ Harmonizing vowels in a root are associated to a single back feature

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- ▶ Harmony appears to skip over [-back, -round, -low] vowels

Transparent Vowels: Finnish

Table 2: Finnish Vowels

	-round	+round		
-low	i, iː	y, yː	u, uː	
	e, eː	ø, øː	o, oː	
+low		æ, æː	ɑ, ɑː	-round
	-back		+back	

- Default -back suffix vowel: [tienæ] 'road'

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- ▶ Two harmonizing vowels in sequence are associated to a single back feature: [poutɑ] 'fine weather'

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- ▶ Default -back suffix vowel: [tienæ] ‘road’
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- ▶ Harmonizing vowels on either side of a transparent vowel are associated to the same back feature: [ruvetɑ] ‘start’

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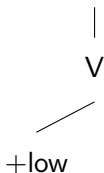
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- ▶ The transparent vowel is associated to a different back feature **on the same tier**

Transparent Vowels: Finnish

- Set of Finnish FSCs forbid +round or +low vowels from being associated to a -back feature that succeeds a +back feature

(25) Finnish FSCs

(a) * +back \rightarrow -back



(b) * +back \rightarrow -back

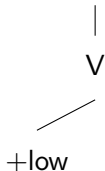


Transparent Vowels: Finnish

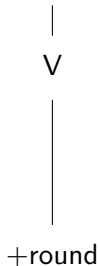
- ▶ and +round or +low vowels from being associated to a -back feature that precedes a +back feature

(26) Finnish FSCs

(a) * -back \rightarrow +back



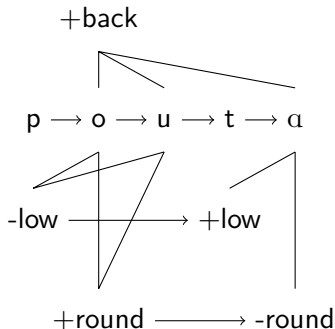
(b) * -back \rightarrow +back



Transparent Vowels: Finnish

- ▶ A fully harmonic word does not violate any Finnish FSCs

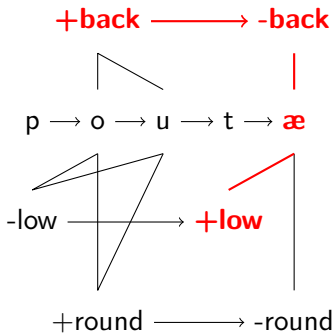
(27) [poutɑ] ‘fine weather’



Transparent Vowels: Finnish

- ▶ A disharmonic word is ungrammatical because it contains the forbidden structure of (25a)

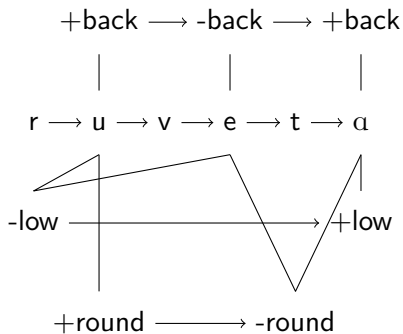
(28) Ungrammatical disharmonic word



Transparent Vowels: Finnish

- ▶ Transparent vowels [i, iː, e, eː] *do not require underspecification*

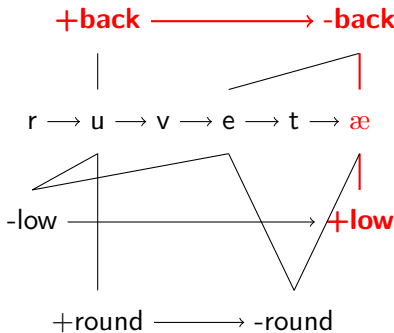
(29) [ruvetɑ] 'start'



Transparent Vowels: Finnish

- ▶ A disharmonic word with a transparent vowel is ungrammatical because it contains the forbidden structure of (25a)

(30) Ungrammatical word with transparent vowel



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Agreement ARs...

- ▶ consist of multiple iterations of the same feature, with a different intervening feature on the same tier

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- ▶ result from adjacency between assimilating and intervening features

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Agreement ARs...

- ▶ consist of multiple iterations of the same feature, with a different intervening feature on the same tier
- ▶ result from adjacency between assimilating and intervening features
- ▶ The FSCs posited in (25) and (26) capture the Finnish back harmony pattern for words with and without transparent vowels

Discussion

- ▶ Well-formed surface ARs of vowel harmony are local
- ▶ Autosegmental representations of vowel harmony utilize adjacency and association relations
- ▶ FSCs capture attested vowel harmony patterns that use neutral vowels: Akan, Finnish
- ▶ Transparent vowels do not require underspecification

Discussion

- ▶ FSCs can capture morphologically-conditioned harmony: morpheme boundaries on feature tiers in Turkish
- ▶ FSCs over multi-tiered ARs can also capture an unattested pattern: sour grapes

Future Work

- ▶ Are multi-tiered ARs too powerful?

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- ▶ Can multi-tiered ARs be restricted further to exclude unattested patterns?

References

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