

# Avoiding Strong-Position Neutralization\*

David Teeple

*University of California, Santa Cruz*

Annual Meeting of the LSA,  
Chicago, Jan. 3-6, 2008

## 1 The problem

### 1.1 What is strong-position neutralization?

- *Strong-position neutralization* (SPN): any pattern in which a contrast is neutralized by positional augmentation constraints in strong positions, but is maintained in weak positions.
- Consider vowel length contrasts. Given the constraints in (1),
  - (1) a. DEP- $\mu/\acute{\sigma}$ : An output mora in a stressed syllable must have an input correspondent (Beckman 1999).
  - b. MAX- $\mu$ : An input mora must have an output correspondent (McCarthy and Prince 1995).
  - c. \*STRESSED/V: A short vowel should not be stressed (Crosswhite 2001).
  - d. \*UNSTRESSED/VV: A long vowel should be stressed (Crosswhite 2001).

factorial typology (Prince and Smolensky 1993/2004) gives four possibilities for positional vowel length contrasts:

- (2) a. Contrast in both strong and weak positions:  
DEP- $\mu/\acute{\sigma}$   $\gg$  \*STR/V; MAX- $\mu$   $\gg$  \*UNSTR/VV
- b. Weak-position neutralization:  
DEP- $\mu/\acute{\sigma}$   $\gg$  \*STR/V; \*UNSTR/VV  $\gg$  MAX- $\mu$
- c. **Strong-position neutralization:**  
\*STR/V  $\gg$  DEP- $\mu/\acute{\sigma}$ ; MAX- $\mu$   $\gg$  \*UNSTR/VV
- d. No contrast:  
\*STR/V  $\gg$  DEP- $\mu/\acute{\sigma}$ ; \*UNSTR/VV  $\gg$  MAX- $\mu$

---

\*Thanks to Armin Mester, Jaye Padgett, Sally Teeple, Jie Zhang, and the audience at the 2007 Mid-America Linguistics Conference at the University of Kansas.

- (2a) Classical Arabic (Brame 1970), Latin (Mester 1994)
  - (2b) Cairene Arabic (Broselow 1976), Anguthimri (Crowley 1981)
  - (2d) Tunisian Arabic (Angoujard 1990), Yupik (Krauss 1975), Icelandic (Árnason 1980)
- (3) Gap in factorial typology: (2c)

	/ka:tíba/ <sub>1</sub>	/ka:tí:ba/ <sub>2</sub>	*STR	DEP-	MAX	*UNSTR
	/katíba/ <sub>3</sub>	/katí:ba/ <sub>4</sub>	/V	$\mu/\acute{\sigma}$	$-\mu$	/VV
☞ Anti-Cairene		.ka:.'ti:ba. <sub>1,2</sub>		*		**
Cairene		.ka.'ti:ba. <sub>3,4</sub>		*		
Cairene	.ka.'ti.ba. <sub>1,3</sub>	.ka.'ti:ba. <sub>2,4</sub>	*!*		*!*	

## 1.2 What do you mean by ‘avoiding’ it?

- I mean it should not be a prediction of the theory. Speakers evidently do avoid SPN, and the model should reflect that.
- Any theory in which augmentation constraints (like \*STR/V) and reduction constraints (like \*UNSTR/VV) are independent, makes this prediction (Kenstowicz 1994; Crosswhite 2001; de Lacy 2002; Smith 2005).
- Further, as long as faithfulness constraints like DEP- $\mu/\acute{\sigma}$  and MAX- $\mu$  are freely rerankable w.r.t. each other, the prediction will remain.

## 2 The solution

- Conflate \*STR/V and \*UNSTR/VV, as in (4). Augmentation and reduction are not independent.

(4)  $\acute{\sigma} \leftrightarrow \text{VV}$ : If and only if a syllable is stressed, its rime has at least the energy of a long vowel.

- Fixed ranking: all positional faithfulness constraints outrank all general faithfulness. E.g., DEP- $\mu/\acute{\sigma} \gggg$  MAX- $\mu$
- Anti-Cairene pattern (5A) is ruled out

(5) SPN impossible

		/ka:tíba/ <sub>1</sub>	/ka:tí:ba/ <sub>2</sub>	1 ó ↔ VV	2 DEP- μ/ó	3 MAX -μ
A	no ranking		.ka.'ti:ba. <sub>1,2</sub> .ka.'ti:ba. <sub>3,4</sub>	**	*	
B	2 ≫ 1 ≫ 3	.ka.'ti.ba. <sub>1,3</sub>	.ka.'ti:ba. <sub>2,4</sub>	**		**
C	1 ≫ 2 ≫ 3		.ka.'ti:ba. <sub>1,2,3,4</sub>		**	**
D	2 ≫ 3 ≫ 1	.ka.'ti.ba. <sub>1</sub> .ka.'ti.ba. <sub>3</sub>	.ka.'ti:ba. <sub>2</sub> .ka.'ti:ba. <sub>4</sub>	*** *		

- This corresponds exactly to the observed range of typological possibilities.

### 3 Isn't there a non-formalist explanation?

- Possible probabilistic explanation: SPN is not impossible, but unlikely, because the phonetic changes that would give rise to it are rare.
- I.e., stressed vowel lengthening is considerably rarer than unstressed vowel reduction, and the latter is likely to occur whether the former does or not.
- Corresponding probabilities: WPN > Full neutralization > Full contrast > SPN
- Such is the approach to typology pursued in OT by Myers (2002) and Barnes (2006); outside OT, by Ohala (1992), McMahon (2000), Blevins (2004).
- Under non-OT emergentist view, a sequence of blind changes should be able to produce results that violate markedness universals, but this doesn't seem to happen (e.g., no languages have final voicing, contra Yu 2004) (Kiparsky 2004; Bermúdez-Otero 2005)
- If the Anti-Cairene grammar is simply unlikely, then a series of blind changes should be able to result in its adoption.

(6) Series of (relatively common) changes leading to Anti-Cairene-style lexicon

a. Full vowel length contrast under primary and secondary stress

pátapàta<sub>1</sub> pátapà:ta<sub>3</sub>  
pá:tapàta<sub>2</sub> pá:tapà:ta<sub>4</sub>

b. Neutralizing lengthening under primary stress only

pá:tapàta<sub>1,2</sub> pá:tapà:ta<sub>3,4</sub>

c. Loss of secondary stress, length contrast only in unstressed syllables

pá:tapapata<sub>1,2</sub> pá:tapap:ta<sub>3,4</sub>

- If the pattern in (6c) cannot be reified by the grammar (i.e., cannot be productive), then the functionalist explanation is insufficient, because it fails to rule SPN out.
- If, however, it can be reified by the grammar, then I might be wrong to pursue a formalist solution.

## 4 Are you sure SPN doesn't occur?

- Fairly sure, yes. While Smith (2005) claims to have identified a few instances, these can all be reanalyzed.

### 4.1 Zabiče Slovene

- Distinction between high and mid short vowels is neutralized in stressed syllables, but retained in unstressed syllables (Rigler (1963:185-186); Crosswhite (2001:47-48); Smith (2005:109-112)). /i/ and /i/ become [e] under stress, and /u/ becomes [o].

(7) The Vowels of Zabiče Slovene (Crosswhite 2001)

Bimoraic Accented			Monomoraic Accented			Unaccented		
i:	ĩ:	u:				i	ĩ	u
ie		uo						
e:		o:	e	ə	o	e	ə	o
ɛ:		ɑ:		a			a	

- Crosswhite's (2001) analysis requires \*STR/X; necessarily distinct from \*UNSTR/X, since conflating the two families would predict height neutralization both in stressed and unstressed syllables (i.e., /í/ → [é] and /ě/ → [ĩ]).

(8) SPN in Zabiče Slovene?

	/í/₁	/ĩ/₂	*STR/i,u	IDENT(hi)	*STR/e,o
	/é/₃	/ě/₄			
☞ A		ĩ₂		*	**
	é₁,₃	ě₄		*	**
B		ĩ₂,₄		*!	**
	é₁,₃				
C	í₁	ĩ₂	*!		*
	é₃	ě₄			

- I believe Crosswhite is wrong set aside the long vowel inventory.
- Assumes that the motivation for the lowering of high vowels is to improve the syntagmatic salience of stressed syllables. Instead, motivation might be the desire to avoid overcrowding the vowel space.
- Consider again the Zabiče Slovene vowel inventory without the divide between bimoraic and monomoraic accented vowels.

(9) The Vowels of Zabiče Slovene, take 2

Accented				Unaccented		
i:		i:	u:	i	i	u
ie	(*i)	(*i)	(*u)	uo		
e:	e	ə	o	o:	e	ə
ɛ:		a	ɑ:		a	

- Even without the short high vowels, the accented vowel space is considerably more crowded than the unaccented vowel space.
- SPACE constraints (Padgett 1997, 2003) punish overcrowding of contrastive elements in perceptual space.

(10)  $\text{SPACE}(\text{V-Dur}) \geq 1/n$ : Segments contrasting in vowel duration should occupy at least  $1/n$ th of the available perceptual space.

- Force behind Zabiče Slovene neutralization could be  $\text{SPACE}(\text{V-dur}) \geq 1$ , which would abolish all vowel duration contrasts if given free rein.
- Contrast between high long and high short vowels shifts to one between high long and mid short; remaining contrasts are more distinct. The contrast between [i:] and [i], based only on a vowel duration contrast, is shifted to one between [i:] and [e], at the cost of the [i] vs. [e] contrast<sup>1</sup>.

(11) Short vowels lose [high] contrast

$\acute{o}$	/i:/ <sub>1</sub>	/i/ <sub>2</sub>	DEP	SPACE	IDENT	$\acute{o} \leftrightarrow$
	/e:/ <sub>3</sub>	/e/ <sub>4</sub>	$-\mu/\acute{o}$	(V-d) $\geq 1$	(hi)	e, o
A	i: <sub>1</sub>	e <sub>2,4</sub>		*	*	
B	i: <sub>1</sub>	i <sub>2,4</sub>		*	*	*!*
C	i: <sub>1</sub>	i <sub>2</sub>		*		*
	e: <sub>3</sub>	e <sub>4</sub>		*!		
D	i: <sub>1,2</sub>		*!			
	e: <sub>3</sub>	e <sub>4</sub>		*		

- Interestingly, /i/ also becomes [e] under stress, rather than [ə], requiring a shift from [+back] to [-back] rather than from [-low] to [+low]. Assumes that [ə] is [+low], following Crosswhite (2001).

<sup>1</sup>The fact that the [e:] vs. [e] contrast is maintained may be due to the greater duration of lower vowels, and hence the greater available perceptual space.

(12) Central high becomes front mid

	$\acute{o}$	/i/ <sub>1</sub>	/i/ <sub>2</sub>	IDENT	IDENT
		/e/ <sub>3</sub>	/ə/ <sub>4</sub>	(lo)/ $\acute{o}$	(bk)/ $\acute{o}$
☞ A	e <sub>1,2,3</sub>	ə <sub>4</sub>			*
B	e <sub>1,3</sub>	ə <sub>2,4</sub>		*!	

- The fact that these height neutralizations do not occur in unstressed syllables is attributable to the fact that the vowel length contrast is unavailable there (itself a weak-position neutralization)
- If I am right, then the neutralization exhibited by Zabiče Slovene will never be found in a language which is in all other ways equivalent but which lacks the bimoraic accented vowel inventory; that is, Alternate Zabiče, illustrated in (13), is not possible.

(13) Alternate Zabiče: Impossible vowel inventory

Accented			Unaccented		
			i	ĩ	u
e	ə	o	e	ə	o
	a			a	

- Crosswhite’s analysis predicts Alternate Zabiče to be possible, since it makes no reference to the bimoraic vowel sub-inventory

## 4.2 Yawelmani Yokuts

- Long high vowels lower to mid, while short vowels can be either high or mid.

(14) The Vowels of Yawelmani Yokuts (Newman 1944)

	I	U
ɛ:	ɛ	ɔ ɔ:
	a	
	a:	

- \*V:<sub>[+hi]</sub>, and variations on it, have been proposed to account for languages like Yawelmani (Newman 1944; Kuroda 1967; Kisseberth 1969; Kenstowicz and Kisseberth 1979; Archangeli 1988; Cole and Kisseberth 1997; Sprouse 1997; McCarthy 1999), Pashto, Gadsup, and Wichita (Donegan 1978:137); all have long mid but no long high.
- Smith (2005) reformulates it as an augmentation constraint, [\*PEAK/HIGHV]/V:; no [+hi] nuclei in “long vowel position”. Claims this “is a legitimate constraint, because it acts to enhance the prominence of the strong position V:” (Smith 2005:140).

- But should we really accept “long vowel” as a position targeted by augmentation constraints? This is only a case of SPN if we do accept it. I do not.
- The feature cooccurrence restriction,  $*V_{[+hi]}$ , is not a positional constraint at all, and achieves the same desired effect.

(15) Not SPN at all

	/i:/ <sub>1</sub>	/i/2	DEP	$*V_{[+hi]}$	FAITH (hi)
	/e:/ <sub>3</sub>	/e/4	-μ		
☞ A		i <sub>2</sub>			*
	e: <sub>1,3</sub>	e <sub>4</sub>			*
B		i <sub>2,4</sub>			*!
	e: <sub>1,3</sub>				*!
C	i: <sub>1</sub>	i <sub>2</sub>		*!	
	e: <sub>3</sub>	e <sub>4</sub>			
D			*!*		**
	e: <sub>1,2,3,4</sub>				

- Feature cooccurrence constraint can correctly derive the facts, hence no reason to consider this SPN

### 4.3 Chamicuro

- SPN in onset position? Glottals may appear in coda position only, while other consonants may appear either in onsets or codas (Smith (2005:140-143), following Parker (1994, 2001)).
- Overwhelming majority of codas are glottals – not really accounted for by either Parker’s or Smith’s analysis; of 700 lexical items counted by Parker, 351 out of the 375 codas contained either glottal stop or [h] (93.6%) (Parker 1994:265). Suggests total neutralization, short of some residual exceptions.
- Moreover, while onset position may generally be a strong position in terms of psycholinguistic prominence, may be a weak position for perceiving contrast between glottal and zero.

- (16) Chamicuro coda glottals (Smith 2005; Parker 1994)
- |    |            |                  |
|----|------------|------------------|
| a. | meʔsa      | ‘sea lion’       |
|    | me:sa      | ‘party’          |
|    | mesa       | ‘table’          |
| b. | itfehki    | ‘it burns’       |
|    | itʔe:ki    | ‘it is abundant’ |
| c. | meʔna      | ‘woodpecker’     |
|    | netna      | ‘how much?’      |
|    | jelna      | ‘man; husband’   |
|    | menu       | ‘tongue’         |
| d. | aʔtikana   | ‘we’             |
|    | ahtini     | ‘path, trail’    |
|    | uanasti    | ‘I look’         |
| e. | saʔpu      | ‘lake’           |
|    | kahpu      | ‘bone’           |
|    | sjekpuʔsle | ‘pot-bellied’    |

- If onsets were absolutely strong, then there should be numerous languages that support a contrast between syllables like [ʔa] and [a]. This contrast is possible in Polynesian languages like Rarotongan, in which for instance *ika* ‘fish’ contrasts with *ʔika* ‘vagina’ (Monty Wilkinson, from a Linguist List discussion, <http://linguistlist.org/issues/2/2-200.html>); but it seems to be rare.
- Most languages with glottal stop seem to epenthesize it in satisfaction of ONSET (Arabic (Brame 1970), Dutch (Booij 1995)), or else show patterns similar to Chamicuro: Chickasaw and Choctaw allow glottal stop only in coda position<sup>2</sup> (Ulrich 1993).
- TENTATIVE CONCLUSION: Onsets are not absolutely strong positions. Absence of a glottal-zero contrast in onset position is weak-position neutralization.

## 5 Conclusion

- Strong-position neutralization is avoided in natural language.
- Formally, this requires two things: (1) conflation of augmentation and reduction constraints; and (2) fixing the ranking of positional faithfulness (as a block) over general faithfulness.
- Apparent exceptions are subject to reanalysis.

<sup>2</sup>According to Ulrich (1993:432), even pre-vocalic glottal stops in Chickasaw are syllabified as codas: [aʔ.a], not \*[a.ʔa]. There is evidence for this claim, involving the failure of a rule of rhythmic lengthening to apply when a preceding syllable is heavy. There are no intervocalic glottal stops in Choctaw. Aside from glottals, both languages evidently allow various other consonants in coda position (Ulrich 1986; Munro and Ulrich 1984).

## References

- Angoujard, Jean-Pierre. 1990. *Metrical Structure of Arabic*. Dordrecht: Foris.
- Archangeli, Diana. 1988. *Underspecification in Yawelmani Phonology and Morphology*. Outstanding Dissertations in Linguistics. New York and London: Garland Press.
- Árnason, Kristján. 1980. *Quantity in Historical Phonology: Icelandic and related cases*. Cambridge: Cambridge University Press.
- Barnes, Jonathan. 2006. *Strength and weakness at the interface: positional neutralization in phonetics and phonology*. Phonology and Phonetics. Berlin and New York: Mouton de Gruyter.
- Beckman, Jill. 1999. *Positional Faithfulness: An Optimality Theoretic Treatment of Phonological Asymmetries*. Outstanding Dissertations in Linguistics. New York and London: Garland Press.
- Bermúdez-Otero, Ricardo. 2005. Phonological change in Optimality Theory. In *Encyclopedia of language and linguistics*, ed. Keith Brown. Oxford: Elsevier, 2nd edition.
- Blevins, Juliette. 2004. *Evolutionary Phonology*. Cambridge: Cambridge University Press.
- Booij, Geert. 1995. *The Phonology of Dutch*. Oxford: Oxford University Press.
- Brame, Michael. 1970. Arabic Phonology: Implications for Phonological Theory and General Semitic. Doctoral Dissertation, MIT.
- Broselow, Ellen. 1976. The phonology of Egyptian Arabic. Doctoral Dissertation, University of Massachusetts, Amherst.
- Cole, Jennifer, and Charles Kisseberth. 1997. Restricting multi-level constraint evaluation: opaque rule interaction in Yawelmani vowel harmony. In *Proceedings of the Arizona Phonology Conference*, ed. K. Suzuki and D. Elzinga.
- Crosswhite, Katherine. 2001. *Vowel Reduction in Optimality Theory*. Outstanding Dissertations in Linguistics. New York: Routledge.
- Crowley, Terry. 1981. The Mpakwithi Dialect of Anguthimri. In *Handbook of Australian Languages*, ed. Robert M.W. Dixon and Barry Blake, volume 2, 146–94. Amsterdam: John Benjamins.
- Donegan, Patricia. 1978. On the Natural Phonology of Vowels. Doctoral Dissertation, The Ohio State University.
- Kenstowicz, Michael. 1994. Sonority-driven stress. ROA #33. Ms., MIT.
- Kenstowicz, Michael, and Charles Kisseberth. 1979. *Generative phonology*. Orlando, FL: Academic Press, Inc.
- Kiparsky, Paul. 2004. Universals constrain change; change results in typological generalizations. URL <http://www.stanford.edu/~kiparsky/Papers/cornell.pdf>, ms., Stanford University.
- Kisseberth, Charles. 1969. On the abstractness of phonology: the evidence from Yawelmani. *Papers in Linguistics* 1:248–282.
- Krauss, Michael. 1975. St. Lawrence Island Eskimo phonology and orthography. *Linguistics* 15:39–72.
- Kuroda, Shige-Yuki. 1967. *Yawelmani phonology*. Cambridge, MA: MIT Press.
- de Lacy, Paul. 2002. The Formal Expression of Markedness. Doctoral Dissertation, University of Massachusetts.
- McCarthy, John. 1999. Sympathy and phonological opacity. *Phonology* 16:331–399.

- McCarthy, John, and Alan Prince. 1995. Faithfulness and reduplicative identity. In *University of Massachusetts Occasional Papers: Papers in Optimality Theory*, ed. Jill Berman, Laura Walsh Dickey, and Suzanne Urbanczyk. GLSA, UM Amherst.
- McMahon, April. 2000. *Change, Chance and Optimality*. Oxford: Oxford University Press.
- Mester, Armin. 1994. The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 12:1–62.
- Munro, Pamela, and Charles Ulrich. 1984. Structure-preservation and Western Muskogean rhythmic lengthening. In *Proceedings of WCCFL 3*, ed. Mark Cobler, Susannah MacKaye, and Michael Wescoat, 191–202.
- Myers, Scott. 2002. Gaps in factorial typology: the case of voicing in consonant clusters. Ms., University of Texas at Austin.
- Newman, Stanley. 1944. *Yokuts Language of California*. New York: Viking Fund.
- Ohala, John. 1992. What's cognitive, what's not, in sound change. In *Diachrony in synchrony: language history and cognition*, ed. G. Kellerman and M.D. Morrissey, 309–355. Frankfurt am Main: Peter Lang.
- Padgett, Jaye. 1997. Perceptual distance of contrast: height and nasality. In *Phonology at Santa Cruz*, ed. Rachel Walker, Motoko Katayama, and Daniel Karvonen, volume 5.
- Padgett, Jaye. 2003. The emergence of contrastive palatalization in Russian. In *Optimality Theory and Language Change*, ed. D. Eric Holt, Studies in Natural Language and Linguistic Theory. Dordrecht: Kluwer.
- Parker, Steve. 1994. Laryngeal codas in Chamicuro. *International Journal of American Linguistics* 60:261–271.
- Parker, Steve. 2001. Non-optimal laryngeal onsets in Chamicuro. *Phonology* 18:361–386.
- Prince, Alan, and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint Interaction in Generative Grammar*. Malden, MA: Blackwell.
- Rigler, Jakob. 1963. *Južnonotranjski Govori: Akcent in glasoslovje govorov med Snežnikom in Slavnikom*. Ljubljana: Slovenska Akademija znanosti in umetnosti.
- Smith, Jennifer. 2005. *Phonological augmentation in prominent positions*. Outstanding Dissertations in Linguistics. New York and London: Routledge.
- Sprouse, Ronald. 1997. A case for enriched outputs. Handout from presentation at Tri-Lateral Phonology Weekend (TREND) 1997. ROA 86.
- Ulrich, Charles. 1986. Choctaw morphophonology. Doctoral Dissertation, UCLA, Los Angeles.
- Ulrich, Charles. 1993. The glottal stop in Western Muskogean. *International Journal of American Linguistics* 59:430–441.
- Yu, Alan. 2004. Explaining final obstruent voicing in Lezgian: phonetics and history. *Language* 80:73–97.