The Limits of Positive Constraints*

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1 Introduction

- Harmonic Grammar (HG; Legendre et al. 1990, Smolensky & Legendre 2006) makes available positive constraints that reward good configurations instead of penalizing bad ones.
- Kimper (2011): positive harmony-driving constraints avoid Too-Many-Solutions (TMS; e.g. Blumenfeld 2006) problems that plague negative constraints.
- Johore dialect of Malay: rightward nasal harmony blocked by liquids and obstruents (e.g. Walker 2000):

(1)

pəŋãwãsan	'supervision'
mãkan	'to eat'
mĩnõm	'to drink'
baŋõn	'to rise'
mãʔãp	'pardon'
pənõŋãh̃ãn	'central focus'
mãj̃ãŋ	'stalk (palm)'
mənãwãn	'to capture' (active)
məratappi	'to cause to cry'

(2) Align([nasal],R,PWd,R): the right edge of a [nasal] domain must coincide with the right edge of some PWd.

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- Imagine Malay′: word-final clusters are broken up with epenethesis: /kast/ → [kasət]
- If w(Align) > w(*Complex), epenthesis is blocked:

(3)

/nawakast/	Align 3	*Complex 2	Dep 1	H
☞ a. nãw̃ãkast	−4	−1		−14
b. nãw̃ãkasət	−5		−1	−16

- Kimper's solution: Spread(±F): For a feature F, assign +1 for each segment linked to F as a dependent.
- This rewards each position that harmonizes, and unharmonized positions do not hamper candidates:

(4)

/nawakast/	Spread[+nas] 1	*Complex 2	Dep 1	H
a. nãw̃ãkast	+4	−1		2
☞ b. nãw̃ãkasət	+4		−1	3

- Kaplan (2015a,b): positional licensing (Crosswhite 2001, Walker 2004, 2005, 2011, Zoll 1997, 1998) has similar problems under HG; a positive reformulation again helps.

⇒ How many other constraint families would benefit from being recast in positive terms?

- Today: Positional Faithfulness (Beckman 1999)
  - Positional Faithfulness also introduces TMS pathologies (Jesney 2011).
  - Under the right conditions, positive Positional Faithfulness avoids those problems.
  - But those conditions are fragile, and positive constraints are not a general solution to TMS issues.

2 Two Pathologies in Positional Faithfulness

- Both pathologies modified from Jesney (2011), who shows that HS avoids them.
- Is HS the only solution, or do positive constraints provide an alternative?

2.1 Resyllabification to Facilitate Neutralization

- Final devoicing (German, Russian, Catalan, etc.):
  w(Ident(voice)-onset) > w(*VoicedObstruent)

- Jesney (2011): if both outweigh ONSET, intervocalic voiced obstruents are syllabified as codas where they can be devoiced:

(5)

/ʀaːd-ɐ/ 'wheels' (Ger.)	IDENT(voi)-onset 3	*VOIOBS 2	ONSET 1	*H*
a. ʀɛː.dɐ		−1		−2
b. ʀɛː.tɐ	−1			−3
☞ c. ʀɛːt.ɐ			−1	−1

(6) Positive IDENT(voice)-onset: Assign +1 to each onset consonant whose input correspondent has an identical value for [voice].

- Resyllabification is no longer advantageous:

(7)

/ʀaːd-ɐ/	IDENT(voi)-onset 3	*VOIOBS 2	ONSET 1	*H*
☞ a. ʀɛː.dɐ	+1	−1		1
b. ʀɛː.tɐ				0
c. ʀɛːt.ɐ			−1	−1

- Resyllabification doesn't remove a penalty anymore, and it forfeits a reward.
- We'll come back to this...

2.2 Stress Shift to Facilitate Neutralization

- Nancowry: nasal Vs appear only in stressed syllables (Radhakrishnan 1981):

(8)

ʔuŋʔó̰k	'to eat'	*ʔũŋʔó̰k, *ʔũŋʔók
ʔinkṵ́ːʔə	'bench'	*ʔḭ̃nkṵ́ːʔə, *ʔḭ̃nkúːʔə
ʔumpḛ́c̪ak	'narrow'	*ʔũmpéc̪ak, *ʔumpécc̪̃ak ...
kumpḛ́chəŋə	'make it little'	*kũmpéchəŋə, *kumpéchə̃ŋə ...
hat̪ṵ́ʔhət̪ə	'herd of cattle'	*hãt̪úʔhət̪ə, *hat̪úʔhət̪ə̃ ...
ʔá̰hcaʔ	'arrow, nib, pen point'	*ʔá̰hcãʔ, *ʔáhcãʔ
ʔǽ̰hə	'body'	*ʔǽ̰hə̃, *ʔǽhə̃

- w(IDENT(nas)-$\acute{\sigma}$) > w(*[+NAS])
- Idealized Nancowry: stress is governed by TROCHEE

- Jesney (2011): If both constraints outweigh TROCHEE, iambs appear if they permit [+nas] vowels to be neutralized:

(9)

/b̃ide/	IDENT(nas)-σ (3)	*[+NAS] (2)	TROCHEE (1)	*H*
a. (b̃́i.de)		−1		−2
b. (b̃í.de)	−1			−3
☞ c. (bi.dé)			−1	−1

- This time, positive IDENT(nas)-σ́ doesn't help.

(10) IDENT(nas)-σ́: assign +1 to each vowel in a stressed syllable whose input correspondent has an identical value for [nas].

(11)

/b̃ide/	IDENT(nas)-σ́ (3)	*[+NAS] (2)	TROCHEE (1)	*H*
a. (b̃́i.de)	+1	−1		1
b. (b̃í.de)				0
☞ c. (bi.dé)	+1		−1	2

- By shifting stress, the second vowel can satisfy IDENT(nas)-σ́ while the first is changed to satisfy *[+NAS].

3 Why the Difference?

- (11): stress can shop around for a syllable with an oral vowel.
  - /e/ serves as an alternative locus for IDENT(nas)-σ́'s reward, allowing denasalization of /ĩ/.
  - Stress shift doesn't forfeit a reward.
- (7): there's no alternative segment for IDENT(voi)-onset to reward.
- Generalization: Positive PF avoids TMS pathologies when there is no alternative element that can earn PF's reward.
- In fact, by manipulating the configurations, we can make positive PF work for the stress problem but not the syllabification problem.

- Stress: in monosyllables, there's no alternative for IDENT(nas)-$\acute{\sigma}$ to reward.

(12)

/bĩː/	IDENT(nas)-$\acute{\sigma}$ 3	*[+NAS] 2	TROCHEE 1	CULMINATIVITY 1	H
☞ a. (bi̋ː)	+1	−1			1
b. (bíː)					0
c. biː				−1	−1

- Syllabification: with another consonant, resyllabification need not sacrifice the reward from IDENT(voice)-onset:

(13)

/ʀaːkd-ɐ/	IDENT(voi)-onset 3	*VOIOBS 2	ONSET 1	LINEARITY 1	H
a. ʀɛːk.dɐ	+1	−1			1
b. ʀɛːk.tɐ					0
☞ c. ʀɛːt.kɐ	+1			−1	2

- Intervocalic CC surfaces faithfully except [–voi][+voi] sequences, which metathesize.
- Summary: under the right conditions, positive PF avoids TMS problems. But we can't always guarantee those conditions will hold.
  - PF for roots and initial syllables may be OK: can't substitute anything for the root; only one syllable can be initial.
  - PF for stress and onsets is not safe, as we've seen.

4 Possible Solutions: Faithfulness & Feature Theory

- The pathologies persist because the PF constraints reward maintenance of an unmarked feature value exactly as much as it reward maintenance of the marked value.
- Asymmetrical Faithfulness: reward preservation of [+voi] and [+nas] specifically (Hall 2006, Inkelas 2000, Rubach 2003):

(14)
a. IDENT(+voice)-onset: Assign +1 to each [+voice] onset consonant whose input correspondent has an identical value for [voice].
b. IDENT(+nas)-$\acute{\sigma}$: Assign +1 to each [+nas] segment in a stressed syllable whose input correspondent has an identical value for [nas].

(15)

/ʀaːkd-ɐ/	IDENT(+voi)-onset 3	*VOIOBS 2	ONSET 1	LINEARITY 1	H
☞ a. ʀɛːk.dɐ	+1	−1			1
b. ʀɛːk.tɐ					0
c. ʀɛːt.kɐ				−1	−1

(16)

/b̃ide/	IDENT(+nas)-σ (3)	*[+NAS] (2)	TROCHEE (1)	*H*
☞ a. (b̃́i.de)	+1	−1		1
b. (bí.de)				0
c. (bi.dé)			−1	−1

- Introducing IDENT(–voice)-onset and IDENT(–nas)-σ́ would resurrect the pathologies:

(17)

/ʀaːkd-ɐ/	ID(+voi)-ons (3)	ID(–voi)-ons (3)	*VOIOBS (2)	LINEARITY (1)	*H*
a. ʀɛːk.dɐ	+1		−1		1
b. ʀɛːk.tɐ					0
☞ c. ʀɛːt.kɐ		+1		−1	2

(18)

/b̃ide/	IDENT(+nas)-σ (3)	IDENT(–nas)-σ (3)	*[+NAS] (2)	TROCHEE (1)	*H*
a. (b̃́i.de)	+1		−1		1
b. (bí.de)					0
☞ c. (bi.dé)		+1		−1	2

- Asymmetrical faithfulness works only if either:
  - A. IDENT(–voi) and IDENT(–nas) don't exist, or
  - B. The features [voi] and [nas] are privative (e.g. Lombardi 1994, Mester & Itô 1989, Steriade 1995)
- A: Faithfulness to unmarked features would be a TETU effect.
  - Probably OK in many cases, but we need IDENT(–voice)-onset to block intervocalic voicing, e.g.
- B: Privativity for all features is implausible (e.g. [ATR], [back])—the pathologies reemerge with these features.
- Alternative: let PF assign greater rewards for faithfulness to marked values than to unmarked values:

(19)
  a. IDENT(voice)-onset: Assign +2 to each faithful [+voi] onset consonant and +1 to each faithful [–voi] onset.
  b. IDENT(nas)-σ́: assign +2 to each faithful [+nas] vowel in a stressed syllable +1 to each faithful [–nas] vowel in a stressed syllable.

- Not a solution:

(20)

/ʀaːkd-ɐ/	*VoiObs 4	Ident(voi)-ons 2	Onset 1	Linearity 1	*H*
a. ʀɛːk.dɐ	−1	+2			0
b. ʀɛːk.tɐ					0
☞ c. ʀɛːt.kɐ		+1		−1	1

5 Conclusion

- Positive PF avoids TMS problems only if there is no unmarked alternative element that can be rewarded.
- Ensuring this requires not-quite-sound revisions to Faithfulness or feature theory.
- What does this mean for positive constraints versus Harmonic Serialism with respect to TMS problems (setting aside other TMS approaches like Blumenfeld (2006))?
  - Some cases submit only to positive constraints: harmony (Kimper 2011), Positional Markedness (Kaplan 2015a,b)
  - Some cases submit only to HS: Positional Faithfulness (Jesney 2011)
  - Some cases mentioned by McCarthy (2011) and Kimper (2011) are amenable to both approaches.
- This implies a richer typology of TMS problems.
- Despite overlapping empirical domains and similar motivations, Positional Markedness and Positional Faithfulness are actually quite different.

References

Beckman, Jill N. (1999) *Positional Faithfulness*. New York: Garland.

Blumenfeld, Lev (2006) *Constraints on Phonological Interactions*. Ph.D. thesis, Stanford University.

Crosswhite, Katherine (2001) *Vowel Reduction in Optimality Theory*. New York: Routledge.

Hall, T.A. (2006) Derived Environment Blocking Effects in Optimality Theory. *NLLT* **24**(3): 803–856.

Inkelas, Sharon (2000) Phonotactic Blocking through Structural Immunity. In *Lexicon in Focus*, Barbara Stiebels & Dieter Wunderlich, eds., 740, Berlin: Akademie Verlag.

Jesney, Karen (2011) Positional Faithfulness, Non-Locality, and the Harmonic Serialism Solution. In *Proceedings of the 39th Meeting of the North East Linguistic Society (NELS 39)*, Suzi Lima, Kevin Mullin, & Brian Smith, eds., 429–440, Amherst, MA: GLSA.

Kaplan, Aaron (2015a) Long-Distance Licensing in Harmonic Grammar. paper presented at 37. Jahrestagung der Deutschen Gesellschaft für Sprachwissenschaft (37th Annual Meeting of the German Society for Linguistics), Leipzig, Germany, March 4.

Kaplan, Aaron (2015b) Long-Distance Licensing in Harmonic Grammar. paper presented at the 2015 American Meeting on Phonology, Vancouver, BC, Octber 10.

Kimper, Wendell A. (2011) *Competing Triggers: Transparency and Opacity in Vowel Harmony*. Ph.D. thesis, University of Massachusets, Amherst, Amherst, MA.

Legendre, Géraldine, Yoshiro Miyata, & Paul Smolensky (1990) Harmonic Grammar – A Formal Multi-Level Connectionist Theory of Linguistic Well-Formedness: An Application. In *Proceedings of the Twelfth Annual Conference of the Cognitive Science Society*, 884–891, Cambridge, MA: Lawrence Erlbaum.

Lombardi, Linda (1994) *Laryngeal Features and Laryngeal Neutralization*. New York: Garland.

McCarthy, John J. (2011) Autosegmental Spreading in Optimality Theory. In *Tones and Features*, John Goldsmith, Elizabeth Hume, & Leo Wetzels, eds., 195–222, Berlin: Mouton de Gruyter.

Mester, R. Armin & Junko Itô (1989) Feature Predictability and Underspecification: Palatal Prosody in Japanese Mimetics **65**(2): 258–293.

Radhakrishnan, R. (1981) *The Nancowry Word*. Carbondale, USA: Linguistic Research.

Rubach, Jerzy (2003) Polish Palatalization in Derivational Optimality Theory. *Lingua* **113**: 197237.

Smolensky, Paul & Géraldine Legendre (2006) *The Harmonic Mind*. Cambridge, MA: The MIT Press.

Steriade, Donca (1995) Underspecification and Markedness. In *Handbook of Phonological Theory*, John Goldsmith, ed., 114–174, Oxford: Blackwell.

Walker, Rachel (2000) *Nasalization, Neutral Segments, and Opacity Effects*. New York: Garland.

Walker, Rachel (2004) Vowel Feature Licensing at a Distance: Evidence from Northern Spanish Language Varieties. In *WCCFL*, Benjamin Schmeiser, Vineeta Chand, Ann Kelleher, & Angelo J. Rodriguez, eds., 787–800, Somervile, MA: Cascadilla.

Walker, Rachel (2005) Weak Triggers in Vowel Harmony. *NLLT* **23**: 917–989.

Walker, Rachel (2011) *Vowel Patterns in Language*. New York: Cambridge University Press.

Zoll, Cheryl (1997) Conflicting Directionality. *Phonology* **14**: 263–286.

Zoll, Cheryl (1998) *Parsing below the Segment in a Constraint-Based Framework*. Stanford, CA: CLSI Publications.