

## University of California, San Diego

---

From the SelectedWorks of Eric Baković

---

June 2006

# Looks can be deceiving: transparency revisited

Contact  
Author

Start Your Own  
SelectedWorks

Notify Me  
of New Work



Available at: <http://works.bepress.com/ebakovic/38>

Looks can be deceiving:  
**Transparency revisited**

*Eric Baković*

*UC San Diego*

*bakovic@ling.ucsd.edu*

*<http://camba.ucsd.edu/bakovic/>*

Current Perspectives on Phonology Workshop

PhonologyFest, Indiana University, June 23, 2006

# Some definitions

- *Trigger (vowel)*  
The vowel which appears to (initially) determine the harmonic feature value of other vowels in the word.
- *Target (vowel)*  
Those other vowels in the word.
- *Neutral (vowel)*  
Vowels that could be targets but aren't (only evident when they happen to disagree with the trigger).

# Neutral behavior

- Given a (left-right symmetrical) sequence:  
*trigger*–(*targets*<sub>1</sub>)–*neutrals*–*targets*<sub>2</sub>,  
*targets*<sub>2</sub> may either have the same feature value as *neutrals* (‘opacity’) or the same feature value as *trigger* (‘transparency’).
- (Note that *targets*<sub>1</sub> must agree with *trigger*; this is the ‘myopic’ property of harmony, on which see Wilson’s talk.)
- (I also ignore the possibility of neutrals reversing the direction of harmony, on which see Baković 2000.)

# Reasons for neutrality

- *Lexical*

Lexically-specified nontargethood; e.g., the *o* of the Turkish progressive *-iyor*, which must be [+round] and [+back] despite harmony for these features.

- *Phonological*

Feature co-occurrence constraints sensitive to values of the harmonic feature; e.g., [+low] vowels may not be [+ATR], and so are neutral to [±ATR] harmony.

# Opaque behavior

- This is the kind of opacity that's not difficult to account for with a surface-oriented theory.
- Agreement of *targets*<sub>2</sub> with *neutral* is the best way to satisfy some AGREE(*feat*) constraint, given that full satisfaction is not possible.
- E.g., / i<sub>+</sub> • ε • a • ε / → [ i<sub>+</sub> • e<sub>+</sub> • a • ε ]  
= just one AGREE(ATR) violation.

# Transparent behavior

- This is the kind of transparency that is difficult to account for with a surface-oriented theory.
- Agreement of *targets*<sub>2</sub> with *trigger* is a terrible way to satisfy some AGREE(*feat*) constraint, given that full satisfaction is not possible.
- E.g., / u<sub>+</sub> • ä • i • ä / → [ u<sub>+</sub> • a<sub>+</sub> • i • a<sub>+</sub> ]  
= two AGREE(back) violations.

# Approaches to transparency

- Four basic approaches:

- Derivational
- Representational
- Realizational

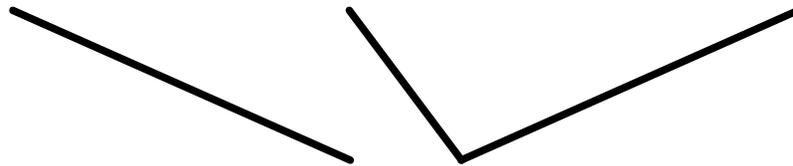
These three approaches have an assumption in common that the fourth does not.

- “When harmony fails, markedness prevails.”

— *silly rhyme imagined while reading Steriade (1981)*

# The common assumption

- What the derivational, representational, and realizational approaches to transparency all have in common is the assumption that **the harmonic feature value of *targets<sub>2</sub>* is due to (non-local) agreement (or not disagreement) with *trigger*.**
- *trigger*–(*targets<sub>1</sub>*)–*neutrals*–*targets<sub>2</sub>*



# So what's wrong with that?

“The very existence of transparent neutral vowels, on the other hand, immediately raises a theoretical puzzle: why should the doubly disharmonic [sequence with a transparent vowel] ever be preferable to [a sequence with an opaque vowel], which has just one disharmonic transition? The term “transparent” reflects the powerful intuition, which has guided many an analysis in different ways, that the effect of harmony somehow reaches “across” this kind of neutral vowel. But how can such apparent “action at a distance” be reconciled with the principle of locality on which so many fundamental results in phonology depend? This has been one of the central issues about vowel harmony from the beginning, and has become more urgent still with the advent of OT [...]”

9 Kiparsky & Pajusalu (2003:220)

# Approaches to transparency

- Derivational approaches
- **Crucial derivational stage:**

/ u<sub>+</sub> • ä • i • ä /

→ | **u<sub>+</sub> • a<sub>+</sub> • i<sub>+</sub> • a<sub>+</sub>** |

→ [ u<sub>+</sub> • a<sub>+</sub> • i • a<sub>+</sub> ]

- Confusingly, of course, this is the type of opacity that's difficult to do ...

# Approaches to transparency

- Examples of the derivational approach in OT  
(plenty of examples in SPE-style phonology, natch):
  - Sympathy theory  
Walker (1998/2000)
  - Targeted constraints theory  
Baković (2000), Baković & Wilson (2000)



# Approaches to transparency

- Examples of the representational approach in OT (building on work in autosegmental phonology):
  - Violable ‘NoGAP’ constraint  
Akinlabi (1997); Ito, Mester & Padgett (1995)
  - Embedded featural domains  
Smolensky (1994)
  - ‘Twin peaks’ representation  
Archangeli & Pulleyblank (1994), Pulleyblank (1996)
  - Explicitly nonlocal anti-disagreement  
Pulleyblank (2003)



# Approaches to transparency

- Examples of the realizational approach:
  - Violable ‘EXPRESS<sub>[F]</sub>’ constraints  
Cole & Kisseberth (1994, 1995), O’Keefe (2005)
  - Contrast and redundancy  
Ní Chiosáin & Padgett (1997/2001)
  - Syllable-to-syllable spreading  
Piggott & van der Hulst (1997), Piggott (2003)
  - Quantal relation b/w artic. & acoustics  
Gafos & Benus (2003), Benus (2005), Benus & Gafos (2005)

# Strict locality argument

- Locality is violable in the representational approach, but must be an inviolable output constraint in the other two approaches.  
(Else, why not just go representational?)
- And yet: transparent vowels, in at least some cases, really don't participate! Strict locality is at odds with nonparticipation.

# Derivational reconciliation?

- Locality ends up being “violable” as a result of being able to be hidden at an intermediate stage of derivation.
- This reduces to the representational approach: strict locality is maintained, but not at the level that matters.

# Realizational reconciliation?

- This approach is contingent on several debatable assumptions about:
  - the role of contrastiveness in the phonetic implementation of features, or
  - the relation between articulatory events and acoustic results.

# Markedness prevails

- Disharmony (due to neutrals) triggers emergent unmarkedness through local conjunction (Kiparsky & Pajusalu 2003).
- Basic idea: if there is disharmony (due to presence of neutrals), there must be unmarkedness — where ‘unmarked’ happens to be agreement with triggers.

# Finnish vowel inventory

		[-back]		[ + back]	
-l	+h	i	ü	*i̥	u
	-h	e	ö	*õ	o
+l		ä		a	
		[-round]	[ + round]	[-round]	[ + round]

# Kiparsky & Pajusalu

- ‘Opaque’ candidate
  - / u<sub>+</sub> • ä • i • ä / → \* [ u<sub>+</sub> • a<sub>+</sub> • i • ä ]
    - \* AGREE(back) violation — [ a<sub>+</sub> • i ]
    - \* \*ä, \*ö, \*ü violation — [ ä ]
  - The latter conjunct violation can be avoided by ‘transparency’ — [ u<sub>+</sub> • a<sub>+</sub> • i • a<sub>+</sub> ] — which is thus really just emergent unmarkedness.

# Problematic issues

- Potential for nonuniformity
  - K&P assume that *\*ä, \*ö, \*ü* is a unified conjunct.  
If e.g. *\*ö, \*ü* is a separate conjunct, then *i, e* are predicted to behave opaquely w.r.t. *a/ä*!
- Other reasons for disharmony
  - Neutrals are not the only causes of disharmony!  
E.g., disharmonic roots are also predicted to provoke emergent unmarkedness (they don't).

# Desiderata of the analysis

- The relative markedness of  $\ddot{a}$ ,  $\ddot{o}$ ,  $\ddot{u}$  must be due to:
  - the absolute markedness of  $\dot{i}$ ,  $\tilde{o}$  (hence the absence of  $\dot{i}$ ,  $\tilde{o}$  from the inventory)
  - the disharmony-causing presence of neutral  $i$ ,  $e$  (which are the would-be harmonic counterparts of  $\dot{i}$ ,  $\tilde{o}$ ).

# Markedness relation

- Absolute markedness restriction:  
 $[-\text{low}] \wedge [-\text{round}] \rightarrow [-\text{back}]$   
‘If  $[-\text{low}]$  and  $[-\text{round}]$ , then  $[-\text{back}]$ .’  
(In other words:  $*i, *õ$ .)
- Converse, relative markedness restriction:  
 $[-\text{back}] \rightarrow [-\text{low}] \wedge [-\text{round}]$   
‘If  $[-\text{back}]$ , then  $[-\text{low}]$  and  $[-\text{round}]$ .’  
(In other words:  $°ä, °ö, °ü$ .)

# Finnish vowel inventory

		[-back]		[+back]	
-l	+h	✓i	°ü	*i̥	u
	-h	✓e	°ö	*õ	o
+l		°ä		a	
		<b>[-round]</b>	[+round]	[-round]	[+round]

\*V = absolutely marked vowel

°V = relatively marked vowel

✓V = neutral vowel

# Deriving relative markedness

- If a language with  $[\pm f]$ -harmony lacks vowels banned by a constraint  $\mathbb{C}$  that can be stated as  $[\alpha g, \beta h, \dots] \rightarrow [\gamma f]$ , then disharmonic (nonvacuous) satisfaction of  $\mathbb{C}$  activates  $\mathbb{C}$ 's converse  $\mathbb{C}'$ , which can be stated as  $[\gamma f] \rightarrow [\alpha g, \beta h, \dots]$ .
- (Otherwise,  $\mathbb{C}'$  is inactive.)

# Deriving relative markedness

1. “If a language with  $[\pm f]$ -harmony ...”
  - Due to  $\text{AGREE}(f) \gg \text{IDENT}(f)$ .
2. “... lacks vowels banned by a constraint  $\mathbb{C}$  that can be stated as  $[\alpha g, \beta h, \dots] \rightarrow [\gamma f] \dots$ ”
  - Due to  $\text{IDENT}(g), \text{IDENT}(h), \dots *[\alpha g, \beta h, \dots -\gamma f] \gg \text{IDENT}(f)$ .
3. “... then disharmonic (nonvacuous) satisfaction of  $\mathbb{C} \dots$ ”
  - Due to  $*[\alpha g, \beta h, \dots -\gamma f] \gg \text{AGREE}(f)$ .
4. “... activates  $\mathbb{C}$ 's converse  $\mathbb{C}'$ , which can be stated as  $[\gamma f] \rightarrow [\alpha g, \beta h, \dots]$ . (Otherwise,  $\mathbb{C}'$  is inactive.)”
  - Wherever  $\mathbb{C}'$  may be in the hierarchy, it assigns violations only to candidates conforming to (3).

# ‘Transparency’ in Finnish

/ u <sub>+</sub> ä i ä /	°ä, °ö, °ü	* <i>t̥</i> , * <i>õ</i>	AGREE (back)	IDENT (back)
[ u <sub>+</sub> a <sub>+</sub> i <sub>+</sub> a <sub>+</sub> ]		* !		***
[ u <sub>+</sub> a <sub>+</sub> i ä ]	° !		*	*
 [ u <sub>+</sub> a <sub>+</sub> i a <sub>+</sub> ]			**	**

# Opacity in Khanty

/ u <sub>+</sub> ä i ä /	* <i>ɨ</i> , * <i>õ</i>	AGREE (back)	° <i>ä</i> , ° <i>ö</i> , ° <i>ü</i>	IDENT (back)
[ u <sub>+</sub> a <sub>+</sub> i <sub>+</sub> a <sub>+</sub> ]	* !			***
☞ [ u <sub>+</sub> a <sub>+</sub> i ä ]		*	°	*
[ u <sub>+</sub> a <sub>+</sub> i a <sub>+</sub> ]		** !		**

# Ifẹ Yoruba vowel inventory

		[ + ATR ]		[ -ATR ]	
-1	+h	i	u		
	-h	e	o	ɛ	ɔ
+1					a
		[-back]	[ + back ]	[-back]	[ + back ]

Absolute markedness:

[ + high ] → [ + ATR ], [ + low ] → [ -ATR ]

# Ifẹ Yoruba vowel inventory

		[ + ATR ]		[ -ATR ]	
-1	+h	i	u	*ɪ	*ʊ
	-h	e	o	ɛ	ɔ
+1			*ɐ		a
		[-back]	[ + back ]	[-back]	[ + back ]

Absolute markedness:

[ + high ] → [ + ATR ], [ + low ] → [ -ATR ]

Relative markedness:

°[ + ATR ] → [ + high ], †[ -ATR ] → [ + low ]

# Ifẹ Yoruba vowel inventory

		[ + ATR ]		[ -ATR ]	
-1	+h	✓i	✓u	*ɪ	*ʊ
	-h	◦e	◦o	†ɛ	†ɔ
+1			*ɐ		a
		[-back]	[ + back ]	[-back]	[ + back ]

Absolute markedness:

[ + high ] → [ + ATR ], [ + low ] → [ -ATR ]

Relative markedness:

◦[ + ATR ] → [ + high ], †[ -ATR ] → [ + low ]

# 'Transparency' in Ife Yoruba

/ a <sup>-</sup> e i e /	°e, °o	*I, *U	AGREE (ATR)	IDENT (ATR)
[ a <sup>-</sup> ε <sup>-</sup> ɪ <sup>-</sup> ε <sup>-</sup> ]		* !		***
[ a <sup>-</sup> ε <sup>-</sup> i e ]	° !		*	*
 [ a <sup>-</sup> ε <sup>-</sup> i ε <sup>-</sup> ]			**	**

# Opacity in Ife Yoruba

$/i_+ \varepsilon a \varepsilon /$	$*\nu$	AGREE (ATR)	$\dagger_{\varepsilon, \nu}$	IDENT (ATR)
$[i_+ e_+ \nu_+ e_+]$	$*!$			$***$
 $[i_+ e_+ a \varepsilon]$		$*$	$\dagger$	$*$
$[i_+ e_+ a e_+]$		$**!$		$**$

# A tenuous connection

... with completely unrelated work of mine  
(Baković 2005ab, 2006ab).

/ si:t + d / 'seated'	No-GEM	AGREE (voi)	DEP	IDENT (voi)
[ si:td ]		* !		
[ si:tt ]	* !			*
 [ si:təd ]			*	

# A tenuous connection

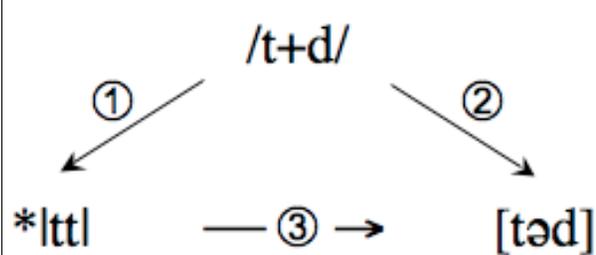
... with completely unrelated work of mine  
(Baković 2005ab, 2006ab).

/ u <sub>+</sub> i ä /	°ä, °ö, °ü	*i, *õ	AGREE (back)	IDENT (back)
[ u <sub>+</sub> i <sub>+</sub> a <sub>+</sub> ]		* !		***
[ u <sub>+</sub> i ä ]	° !		*	*
 [ u <sub>+</sub> i a <sub>+</sub> ]			**	**

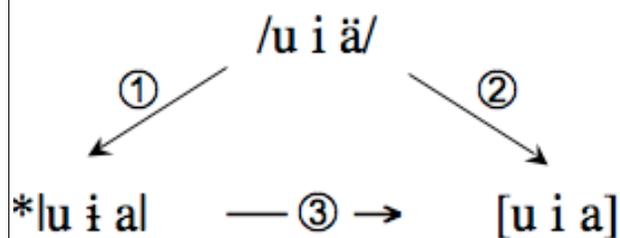
# Cross-derivational feeding

- In the English /si:t + d/ → [si:təd] example, the independent existence of voicing assimilation in this context (/beɪk + d/ → [beɪkəd] ‘baked’) is what justifies epenthesis despite the difference in voicing between [t] and [d].
- In the Finnish example, the independent existence of (complete) backness harmony is what justifies disharmony between [i] and [a<sub>+</sub>] despite the lack of agreement between [u<sub>+</sub>] and [i].

# Cross-derivational feeding



- ① = counterfactual assimilation, resulting in disallowed adjacent identical consonants
- ② = epenthesis between nearly-identical consonants, resulting in surface representation
- ③ = cross-derivational feeding relationship



- ① = counterfactual complete harmony, resulting in absolutely marked vowel
- ② = disharmony and avoidance of relatively marked vowel, resulting in surface representation
- ③ = cross-derivational feeding relationship

- Viewed in this light, the basic insight of the derivational approach to transparency may be able to be maintained.

# Prospects

- “When harmony fails, markedness prevails.”
  - What this silly rhyme actually refers to is Steriade’s (1981) treatment of examples of parasitic harmony. (See Hansson’s talk for a very interesting example & analysis.)
  - Consider e.g. Yawelmani [Yowulmne] Yokuts rounding harmony, which is parasitic on [ $\pm$ high]:
    - [+high] vowels are [+round] after [+high, +round]
    - [–high] vowels are [+round] after [–high, +round]
    - Otherwise, markedness prevails: noninitial vowels, whether [+high] or [–high], are [–round].

# References cited

- Akinlabi, A. 1997. Kalabari vowel harmony. *The Linguistic Review* 14, 97-138.
- Archangeli, D. and D. Pulleyblank. *Grounded phonology*. MIT Press, Cambridge.
- Baković, E. 2000. *Harmony, dominance and control*. PhD dissertation, Rutgers.
- Baković, E. 2005a. Antigemination, assimilation and the determination of identity. *Phonology* 23, 279-315.
- Baković, E. 2005b. Phonological opacity and counterfactual derivation. ROA-777.
- Baković, E. 2006a. Cross-derivational feeding, globality, and opacity. Ms., under review. [[http://camba.ucsd.edu/bakovic/work/bakovic\\_cross-derivational-feeding.pdf](http://camba.ucsd.edu/bakovic/work/bakovic_cross-derivational-feeding.pdf).]
- Baković, E. 2006b. A note on overapplication opacity. Ms., under review. [[http://camba.ucsd.edu/bakovic/work/bakovic\\_note-on-overapplication.pdf](http://camba.ucsd.edu/bakovic/work/bakovic_note-on-overapplication.pdf).]
- Baković, E. and C. Wilson. 2000. Transparency, strict locality, and targeted constraints. *WCCFL* 19, 43-56. [ROA-430.]
- Benus, S. 2005. *Dynamics and transparency in vowel harmony*. PhD dissertation, NYU.
- Benus, S and A. Gafos. 2005. Qualitative and quantitative aspects of vowel harmony: a dynamic model. *Proc. 27th Annual Conference of the Cognitive Science Society*, 226-231.
- Cole, J. and C. Kisseberth. 1994. An Optimal Domains theory of harmony. ROA-22.
- Cole, J. and C. Kisseberth. 1995. Nasal harmony in Optimal Domains theory. ROA-49.
- Gafos, A. and S. Benus. 2003. On neutral vowels in Hungarian. *ICPhS* 15, 77-80.

# References cited

- Ito, J., A. Mester and J. Padgett. 1995. Licensing and redundancy: underspecification in Optimality Theory. *LI* 26, 571-614. [ROA-38.]
- Kiparsky, P. and K. Pajusalu. 2003. Towards a typology of disharmony. *The Linguistic Review* 20, 217-241.
- Ní Chiosáin, M. and J. Padgett. 1997/2001. Markedness, segment realization, and locality in spreading. ROA-503. [In L. Lombardi (ed.), *Segmental Phonology in Optimality Theory*, 118-156. Cambridge University Press, Cambridge.]
- O'Keefe, M. 2005. Transparency in Span Theory. ROA-770.
- Piggott, G. L. Theoretical implications of segment neutrality in nasal harmony. *Phonology* 20, 375-424.
- Piggott, G. L. and H. van der Hulst. 1997. Locality and the nature of vowel harmony. *Lingua* 103, 85-112.
- Pulleyblank, D. 1996. Neutral vowels in Optimality Theory: a comparison of Yoruba and Wolof. *Canadian Journal of Linguistics* 41, 295-347.
- Pulleyblank, D. 2003. Harmony drivers: no disagreement allowed. *BLS* 28.
- Smolensky, P. 1994. Harmony, markedness, and phonological activity. ROA-87.
- Steriade, D. 1981. Parameters of metrical harmony rules. Unpublished ms., MIT.
- Walker, R. 1998. Nasalization, neutral segments, and opacity effects. PhD dissertation, UC Santa Cruz. [Published 2000 by Garland, New York.]