Structure Preservation is Not a Necessary Factor in Determining Vowel Transparency

Vowel Harmony, wherein the vowels of a word agree for certain features, does not always extend to all vowels. For Kirghiz (Fig. 1), all vowels agree for [±back] and [±round], but in Finnish, the phonetically front, non-low, non-round /i/ and /e/ frequently surface in forms in which all other vowels are phonetically back. In Wolof, in which a word's vowels are typically all lax or all tense, phonetically [+ATR] /i/ and /u/ are frequently found in otherwise [-ATR] words (Fig. 2). Previous studies have justified transparency in three different ways, but the most usual, structure preservation, is actually unnecessary.

Preserving a language's inventory does *seem* to license transparency: in Finnish, *[ɯ] and *[ɤ]—back equivalents of /i/ and /e/—are ill-formed segments. Similarly, [-ATR] equivalents of Wolof's transparent /i/ and /u/, *[ɪ] and *[ʊ], are ungrammatical. From initial analyses employing the Duke-of-York gambit, to OT approaches using targeted constraints (Bakovic 2000) and Turbidity Theory with Spread (Finley 2008), a common idea motivates transparency with *ALIEN or equivalent, a constraint that disfavors segments not found in the language's inventory. In these analyses, a form featuring a transparent vowel is grammatical because it is minimally different from the fully harmonious form, lacking only the ungrammatical segment. Transparency is thus licensed by the ungrammatical results if the vowel were to undergo harmony, an analysis that suffices theoretically for most transparent vowel systems.

Certain transparent vowel languages, namely Ascrea (Romance) and Eastern Cheremis (Finno-Ugric), are not adaptable to inventory-gap-licensed transparency. Ascrea height harmony entails the raising of a stressed vowel, triggered by a high vowel: If they are adjacent, then there is no transparency: the high vowel raises mid lax vowel to mid tense, and mid tense to high tense (Figure 3). If an unstressed vowel intervenes, then this vowel is not raised: it is transparent. These facts support Kaun's finding (2004) on the phonetic motivation for harmony, namely that vowels that spread their features are those that cannot saliently display that feature, while the target of the spread is one that does. For instance, Kaun found the featural cues for roundedness are stronger for high vowels than for mid vowels, such that mid vowels often spread their roundedness to high vowels, but only vice versa in unrestricted systems. In the case of Ascrea, it is the stressed vowels that are more salient. When unstressed /e/ is passed over for height harmony, it is not because [i] is ungrammatical: indeed, [i] was the *trigger* for harmony. No *ALIEN constraint can prevent harmony here, thus a gap-licensed analysis is not valid. Instead, its unsuitability as a target (as an unstressed vowel) licenses the transparency of Ascrea transparent vowels.

In Eastern Cheremis, with a harmony pattern not dissimilar from the Turkic languages above, [ə], (phonetically mid, back, and unrounded: [ɤ]) will occur surrounded by vowels specified for either frontness, roundedness, or both (Figure 4). Odden provided evidence that this is due to the vowel not being specified for vocalic place features by demonstrating its alternations with other non-high vowels for other rules. Because these other non-high vowels are grammatical, /e/'s transparency to vowel harmony cannot be licensed by structure preservation. It is licensed instead by its underspecification: since it is not specified for vocalic place, of which [±back] and [±round] are two sub-features.

One possibility, then, is that there are three ways of licensing transparent vowels: by inventory gap, as traditionally done for languages such as Finnish and Wolof, by unsuitability as target, as in Ascrea, and by underspecification, as in Eastern Cheremis. We have argued that latter two cannot be analyzed as inventory-gap-licensed, so the only method to decrease the overall typology of transparent vowels is to eliminate structure preservation as a motivation for transparency. This could be done by reanalyzing those systems as either underspecification-licensed, unsuitability-licensed, or a combination of the two. This analysis opts for the latter.

Taking from underspecification theory the position that vowels are underlyingly unspecified for the harmonizing feature, we can say that the front, unrounded, nonlow transparent vowels of Finnish are simply unrounded and nonlow, as Finnish has backness harmony. Then they would not harmonize to the value [+back] because this feature is not salient on unrounded vowels (Hayes and Londe 2009), their transparency licensed by unsuitability as targets rather than the inventory gap. Similarly, in Wolof, high vowels cannot saliently display the feature [-ATR] because the tongue would have to be simultaneously raised and retracted (a marked articulation according to Kiparsky and Pajusalu 2003). Vowels can thus be licensed by underspecification or by unsuitability as a target, but not by inventory gaps.

	“know”	**“laugh”**	**“do”**	**“be”**
Definite past	bil-d**i**	kyl-d**y**	kɨl-d**i**	bol-d**u**

Figure 1: Unrestricted Kirgiz Vowel Harmony

Finnish		Wolof	
[kot**i**-na]	“home” essive	[tɛkk**i**-lɛ:n]	“untie!”
[tunt**e**-vat]	“feel” 3pl	[sɔpp**i**w**u**-lɛn]	“you have not changed”

Figure 2: Transparent Vowels of two languages.

UR	**SR**	**gloss**	**UR**	**SR**	**gloss**
sórdu	súrdu	“deaf”	kapɔ́ti	kapóti	“overturn”
tórewu	túrewu	“cloudy”	mɔ́rtseru	mórtseru	“died”

Figure 3: Non-structure-preserving vowel transparency in Ascrea (Romance).

bujə-ʃto	“head” (inessive)	pørtə-ʃtø	“house” (inessive)

Figure 4: Non-structure preserving vowel transparency in Eastern Cheremis (Finno-Ugric)

Works Cited

Baković, Eric (2000) *Harmony, Dominance, and Control*. PhD diss., Rutgers. http://roa.rutgers.edu/files/360-1199/roa-360-bakovic-1.pdf

Hayes, Bruce and Zsuzsa Cziráky Londe (2009). “Stochastic Phonological Knowledge: The Case of Hungarian Vowel Harmony” Preprint version; to appear in *Phonology*, vol. 23, no. 1

Kaun, Abigail (2004). “The typology of rounding harmony.” In Bruce Hayes, Robert Kirchner, and Donca Steriade, eds., *Phonetically-Based Phonology*. Cambridge: Cambridge University Press, 87-116.

Kiparsky, Paul and Karl Pajusalu (2003). “Towards a typology of disharmony.” *The Linguistic Review* **20**. 217-241.

Finley, Sarah. (2008) “Alternatives and Additions to Turbidity Theory: Turbid Spreading” *Formal And Cognitive Restrictions On Vowel Harmony* Dissertation for Johns Hopkins University: 72-137.

Odden, David (1991) “Vowel Geometry” *Phonology* Vol. 8, No. 2, pp. 261-289 Cambridge University Press: New York.

Walker, Rachel (2009) “(Non-)Adjacency in Harmony Systems” Presentation, CLS 45.