Doubly Triggered Harmony in Laal as Subphonemic Agreement by Correspondence

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This paper is concerned with how modern phonology can account for doubly triggered assimilations. The unusual case of Laal (unclassified, Chad) is presented, in which rounding harmony requires two triggers which, unlike the rare but familiar cases of Cantonese (Flemming 1997) and Woleaian (Suzuki 1997), can either be on the same side of the target or on opposite sides. As shown in (1), in this language with maximally disyllabic words, the first vowel of a root is rounded in the presence of a round V_2 only if both vowels are of identical height, AND if the root contains a labial consonant in any position: before (1a) or after (1b) the target vowel.

(1)   Laal doubly triggered rounding harmony:
    a.   /ɓɨr-ú/   > **ɓùr-ú**   'hook-pl'   (Height, Lab > rounding)
    b.   /tə̀b-ó/   > **tòb-ó**   'fish(sp.)-pl'   (Height, Lab > rounding)
    c.   /gɨ́n-ù/   > gɨ́n-ù   'net-pl'   (Height, *Lab > no rounding)
    d.   /mə̀ə̀g-ú/ > mə̀ə̀g-ú   'tamarind-pl'   (*Height, Lab > no rounding)
    e.   /də̀n+-ú/   > də̀n-ú   'tree(sp.)-pl'   (*Height, *Lab > no rounding)

This doubly triggered assimilation poses problems to an analysis in terms of feature spreading. In particular, why should spreading to V_1 of the [round] feature borne by V_2 be conditioned by a parameter external to the two vowels involved?

Based on an analysis of data collected over the last three years, I claim that this rounding harmony is driven by a subphonemic similarity threshold effect. I argue that the non-round vowels /ɨ/ and /ə/ in (1)a-b are subphonemically rounded ([ɨ°] and [ə°]) due to the coarticulatory effect of the labial consonant. Drawing from Terbeek (1977), Linker (1982), and Stevens (1998), I propose a rounding similarity scale based on vowel height and backness that includes a subphonemic level (e.g. [ɨ°] is more similar to [u] than [ə°] is, by virtue of having the same height). Rounding harmony in Laal occurs when the similarity between subphonemically-rounded V_1 and round V_2 reaches a certain threshold on this similarity scale, i.e. when they are too similar in rounding for the weak contrast that distinguishes them to be maintained.

In so doing, I concur with Flemming's (1997: 11) statement that "cases of doubly-conditioned assimilation (…) provide evidence that coarticulation is relevant to uncontroversially phonological processes, and therefore must be represented in the phonology. This implies a considerable enrichment of phonological representations…" The phonological representations that I propose to enrich are those of Agreement by Correspondence theory.

Agreement by Correspondence, initially developed for long-distance consonant agreement (Hansson 2001, Rose and Walker 2004, inter alia), has since been shown to successfully account for vowel harmony (Sasa 2009, Rhodes 2012), consonant-tone interaction (Shih 2013), and also for the behavior of contour segments and tones in harmony processes provided it can reference quantized subsegmental material (Inkelas and Shih 2013). I show in this paper that it can also account for doubly triggered assimilations such as the one attested in Laal, on the condition that its representations be granted access to subphonemic information additionally to phonological features.

Specifically, I propose to allow the CORR-XX constraints establishing segmental correspondence to make reference to subphonemic levels of similarity: each degree of similarity *n* in any given similarity scale for a particular property P (e.g. rounding)

corresponds to a separate CORR-XX(P-*n*) constraint (defined in (2)). All the constraints referring to the degrees of a given similarity scale are ranked from the highest to the lowest degree of stringency of the similarity relation they represent, e.g. for the rounding similarity scale: CORR-XX(RD-3) >> CORR-XX(RD-2) >> CORR-XX(RD-1). IDENT$_\alpha$-XX[ɸ] constraints (defined in (3)) enforce agreement in the phonological feature [ɸ] corresponding to the property P, between segments that participate in the relevant correspondence, *i.e.* that are at least *n*-similar in P.

(2)   CORR-XX(P-*n*): Any two or more segments within an output string of segments are in correspondence if their similarity in the phonetic property P reaches level *n* on the similarity scale corresponding to P.

(3)   IDENT-XX[ɸ]: Any two or more segments in a given output string agree in the phonological feature [ɸ] if and only if both segments are in the correspondence relation defined as CORR-XX(P-*n*), and if [ɸ] ⊂ P.

The relative ranking of these two constraints and other faithfulness and markedness constraints accounts for the patterns attested in Laal. The modification of Agreement by Correspondence theory proposed here is thus shown to strengthen it, both by fixing some of its defects and by broadening its empirical scope and its descriptive and explanatory adequacy.

Flemming, E. 1997. Phonetic Detail in Phonology: Towards a unified account of assimilation and coarticulation. In Suzuki, K. and D. Elzinga (eds.) *Southwest Workshop on Optimality Theory: Features in OT (SWOT)*, Coyote Papers.

Hansson, G. 2001. Theoretical and typological issues in consonant harmony. Unpublished doctoral dissertation. University of California, Berkeley.

Inkelas, Sh. and S. Shih. 2013. ABC+Q: Contour segments and tones in (sub)segmental Agreement by Correspondence. Paper presented at the Phonetics and Phonology Forum, UC Berkeley, 29 Apr. 2013.

Linker, W. 1982. Articulatory and acoustic correlates of labial activity in vowels: A cross-linguistic study. Doctoral dissertation, UCLA. Published in *UCLA Working Papers in Phonetics 56*.

Rhodes, R. 2012. Vowel Harmony as Agreement by Correspondence. *Annual Report of the UC Berkeley Phonology Lab (2012)*, pp.138-168.

Rose, Sh. and R. Walker. 2004. A typology of consonant agreement as correspondence. *Language* 80:475–531.

Sasa, T. 2009. Treatment of vowel harmony in Optimality Theory. PhD dissertation. University of Iowa.

Shih, S. 2013. Consonant-tone interaction as Agreement by Correspondence. Ms.

Stevens, K. 1998. *Acoustic phonetics*. MIT Press.

Suzuki, K. 1997. Double-sided Effects in OT: Sequential Grounding and Local Conjunction. In Suzuki, K. and D. Elzinga (eds.), *Proceedings of the 1995 Southwest Workshop on Optimality Theory: Features in OT (SWOT)*, Coyote Papers.

Terbeek, D. 1977. A cross-language multidimensional scaling study of vowel perception. PhD dissertation, UCLA. Published in *UCLA Working Papers in Phonetics 37*.