Nasal harmony and interactions with lexical strata in Paraguayan Guaraní

Katherine Russell, UC Berkeley

Introduction: In this paper, I argue that the differential behavior of segments across lexical strata motivates the adoption of an analysis involving cyclic spell-out, as exemplified by novel data from the interactions of nasal harmony and word-internal language mixing in Paraguayan Guaraní [Tupi-Guaraní: Paraguay]. Phonology can be sensitive to distinctions based on lexical stratum: certain phonological patterns may apply to words of one etymological origin, but not to words of another lexical class. Analyses of the sensitivity of phonological processes to lexical strata typically center on the re-ranking or re-weighting of faithfulness constraints across strata (e.g. Itô & Mester 2006). However, such analyses lack any mechanism to deal with cases of word-internal language mixing, in which morphology of one language attaches to a root of foreign origin.

I adopt an analysis in which faithfulness constraints are re-ranked at the root level in different etymological classes of lexical items. At the stem level, however, the constraint ranking of the native stratum applies to affixal morphology, while the phonological form of the root is subject to faithfulness to the output of prior phonological evaluation. In Paraguayan Guaraní, the combination of loanword roots and native affixal morphology has led to the innovation of a novel system of nasal consonant harmony, an extension of the regressive nasal vowel-consonant harmony already present in the language. I account for cases of word-internal language mixing in an Agreement by Correspondence (ABC) model (Rose & Walker 2004), an account of harmony within Optimality Theory which treats harmony processes as a form of featural agreement between similar segments. This work furthers theoretical discussions about the interface of phonology and morphology by presenting a compelling case for cyclic spell-out in phonological evaluation.

Data: Prior literature on nasal harmony in Paraguayan Guaraní (e.g. Goldsmith 1976, Walker 1999, Estigarribia 2020) establishes that there are two triggers of regressive nasal harmony in the language: a stressed nasal vowel and a phonemic nasal consonant. The first of the two types is exemplified below in (1b), as the stressed nasal vowel *á̃* triggers the nasalization of sonorants to its left within the phonological word, in contrast to (1a), in which no trigger of nasalization is present and segments are instead fully faithful to the input.

1a.	ja-je-pohéi 1PL.INCL-REFL-wash 'We washed ourselves.'	b.	**ɲã-ɲẽ-ɲũpá̃** 1PL.INCL-REFL-hit 'We hit ourselves.'

New data from my work with native speaker consultants shows that nasal consonants within lexical borrowings from Spanish also act as triggers of regressive nasal harmony (2a-b). However, all segments within a loanword root maintain their input specifications for nasality: consonants and vowels which would be expected to undergo nasal harmony in Paraguayan Guaraní do not nasalize within loanwords. At the same time, all sonorants within prefixes do surface as nasalized. This constitutes the innovation of a novel case of non-local consonant harmony, which has been previously unattested in the language.

2a.	**ɲã-ɲõ**-traisjo**n**á 1PL.INCL-RECIP-betray 'We betrayed each other.'	b.	**ɲã-ɲã-ɲẽ**-reko**n**osé-i NEG-1PL.INCL-REFL-recognize-NEG 'We did not recognize ourselves.'

Challenges: This phenomenon presents a challenge for both autosegmental feature spreading and correspondence accounts of nasal harmony. An approach involving autosegmental feature

spreading assumes that the feature [+nasal] spreads from a trigger — here, a nasal consonant — leftwards, resulting in iterative nasalization of segments to the left. However, such an approach cannot straightforwardly account for the transparency of all vowels and consonants within a loanword root: these segments must not be specified as [-nasal], as we would therefore expect blocking of harmony to ensue. Instead, prior literature (Piggott 1992, Hyman 1995) has proposed that the use of more articulated feature geometry may account for transparency. Piggott suggests that a node for soft palate, for example, could account for the transparency of voiceless sounds to nasal harmony: this approach is serviceable for the behavior of native roots, but fails when it comes to loanwords, since there is no logical articulated feature geometry that could ensure that all segments within a loanword are transparent. Under a correspondence approach, on the other hand, one expects all similar segments to behave uniformly: however, it is clear from the data that the behavior of segments within the nasal harmony system must be sensitive to lexical stratum.

Analysis: In order to evaluate the word-internal combination of a loanword root with native Paraguayan Guaraní morphology, I propose an analysis which combines cophonology theory (e.g. Orgun 1996, Inkelas et al. 1997) with the ABC framework. I assume that different lexical strata are associated with distinct cophonologies at the root level: in the native stratum, the faithfulness constraint IDENT-IO[NAS] is ranked low, allowing native roots to show the effects of nasal harmony on the surface, while that same constraint is undominated in loanword strata, resulting in a surface form which is fully faithful to the loanword input. When evaluating the entire word at once, it is unclear under traditional approaches how evaluation may distinguish between the phonological grammar associated with lexical stratum of the root and that of the affixal morphology. I assume that the root constitutes the syntactic spell-out domain of a phase, and that phonological evaluation takes place cyclically, first at the root level and then at the stem level, which encompasses the root and its prefixes. Because the root has already undergone phonological evaluation, it is subject to faithfulness to the output of the previous phase. I make use of the faithfulness constraint ID-PHASE to indicate that the phonological content of the root must be frozen after root-level evaluation, but before stem-level evaluation (McPherson & Heath 2016). Constraints associated with the ABC framework, involving Correspondence between similar segments and Agreement between segments in a correspondence relationship in terms of the feature [nasal], apply at the stem level.

Conclusion: A novel case of nasal harmony within word-internal language mixing contexts in Paraguayan Guaraní provides evidence for my analysis involving cyclic spell-out: a root is first evaluated according to the cophonology associated with its lexical stratum. At the stem level, the phonological form of a root is subject to faithfulness to the output of prior evaluation; at the same time, a segment within a root is able to trigger harmony, affecting the surface form of prefixes. This work, which directly addresses word-internal mixing of distinct lexical strata, fills an important gap in our understanding of the interface between phonology and morphology.

References: **Estigarribia**, **B.** 2020. A Grammar of Paraguayan Guaraní. UCL Press. **Goldsmith, J.** 1976. Autosegmental phonology. Dissertation. **Hyman, L.** 1995. Nasal consonant harmony at a distance. *SIAL* 24: 5-30. **Inkelas**, **S.** et al. 1997. The implications of lexical exceptions for the nature of grammar. *Optimality Theory in Phonology*. **Itô, J. & A. Mester.** 2006. Lexical classes in phonology. *Oxford Handbook of Japanese Linguistics*: 817-838. **McPherson, L. & J. Heath.** 2016. Phrasal grammatical tone in the Dogon languages. *NLLT* 34: 593-639. **Orgun, O.** 1996. Sign-based Morphology and Phonology. Dissertation. **Piggott, G.** 1992. Variability in feature dependency. *NLLT* 10: 33-78. **Rose, S. & R. Walker.** 2004. A typology of consonant agreement as correspondence. *Language* 80: 475–531. **Thomas, G**. A split analysis of nasal harmony in Mbyá. *Revista Linguistica* 10: 75-104. **Walker, R.** 1999. Guarani voiceless stops in oral versus nasal contexts. *JIPA* 29: 63-94.