The division of labor between representations and cophonologies in doubly conditioned processes in Amuzgo

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Introduction

Doubly conditioned alternations: both a morphologically specific and a lexically specific condition must be met for an alternation to surface.

Predicted locality restrictions on conditioning factors:

- Both triggers are stem- or word-level (Lexical Phonology, Kiparsky 1982; Stratal OT, Bermudez-Otero 1999, Kiparsky 2000, 2008)
- Both triggers introduced within the same syntactic phase domain (Phase-based spell-out, Embick 2010; Cophonologies by Phase (CBP), Sande & Jenks 2018, Sande 2019)
- Suppletive allomorphy is outwardly conditioned by (adjacent) syntactic features and inwardly conditioned by (adjacent) phonological content (Distributed Morphology, cf. Bobaljik 2000).

An apparent exception: We examine data from Amuzgo (Oto-Manguean) [southern Mexico], where lexical inflection class and first-person features appear to jointly condition phonological alternations (Kim 2019a), despite being introduced in different phase domains.

Tonal evidence for phase boundaries

- Data: variety of San Pedro Amuzgos, Oaxaca, as documented by speaker Fermín Tapia García and analyzed by Kim (2016, 2019ab).
- 8 Lexically contrastive tones (Smith-Stark & Tapia García 1984): H, M, M+, L, L+, HM, HL, MH
- Most Amuzgo verb stems are monosyllabic and inflect for person and number via mutations in glottalization, vowel height, and tone.
- Lexical tone surfaces in 3sg, but is overwritten in 1sg & 2sg. There are at least 10 arbitrary tonal inflection classes (Kim 2016).

Gloss	a. 'chew'.CPL	b. 'see'.CPL	c. 'hear'.CPL	d. 'arrive'.CPL
1sg	hndɛ [L]	hndⁱʔia [HM]	hndʲi [HM]	tʲhɛ [L]
2sg	hndɛʔ [HM]	hndⁱiaʔ [L]	hndʲiʔ [HM]	tʲhɛʔ [L]
3sg	hndɛ [MH]	hndⁱiaʔ [MH]	hndʲi [MH]	tʲhɛʔ [MH]

- Upon causativization, inflectional tones become predictable based on lexical/3sg tones: e.g. M does not change (b), and all H stems move to the majority default marking of HM for both 1sg & 2sg.

Gloss	a. 'run'.CPL	b. 'cause run'.CPL	c. 'sleep'.CPL	d. 'cause to sleep'.CPL
1sg	ŋaᴹ-nɔ̃ [HM]	siᴴ-naᴹ-nɔ [M]	tsɔ [L]	siᴴ-kiᴴ-tsɔ [HM]
2sg	ŋaᴹ-nõʔ [L+]	siᴴ-naᴹ-nõʔ [M]	tsuʔ [HM]	siᴴ-kiᴴ-tsoʔ [HM]
3sg	ŋaᴹ-nõ [M]	siᴴ-naᴹ-nõ [M]	tso [H]	siᴴ-kiᴴ-tso [H]

- In causatives, inflectional tones are derived from the interaction of lexical tones with morphosyntactic features. Since the lexical underlying tones are present and visible in the derivation, 1sg/2sg tones cannot be analyzed in terms of suppletive allomorphy.
- Causative is thus associated with a significant boundary: tones introduced above it have access to phonological information, but not lexically arbitrary information about inflectional class.
- We assume that causative formation is associated with a Voice head which constitutes a phase head (Chomsky 2000, 2001), i.e. triggers spell-out, and as such intervenes between AGR and the stem.

Glottalization facts

Amuzgo allows six possible syllable rimes; the only possible coda is a glottal stop (Kim 2019a):

	Non-laryngealized V	Laryngealized V
No coda	V hV	ʔV
Final ʔ	Vʔ hVʔ	ʔVʔ

For all verbs, there seems to be a ban on final glottalization in first person contexts,
- Including classes 4 & 5, which surface with final glottalization in all other forms (Kim 2019a)

These two classes show different repairs to final glottals in first-person contexts:
- Class 4 shows a glottalization metathesis in first person contexts, while Class 5 shows apparent final vowel epenthesis.

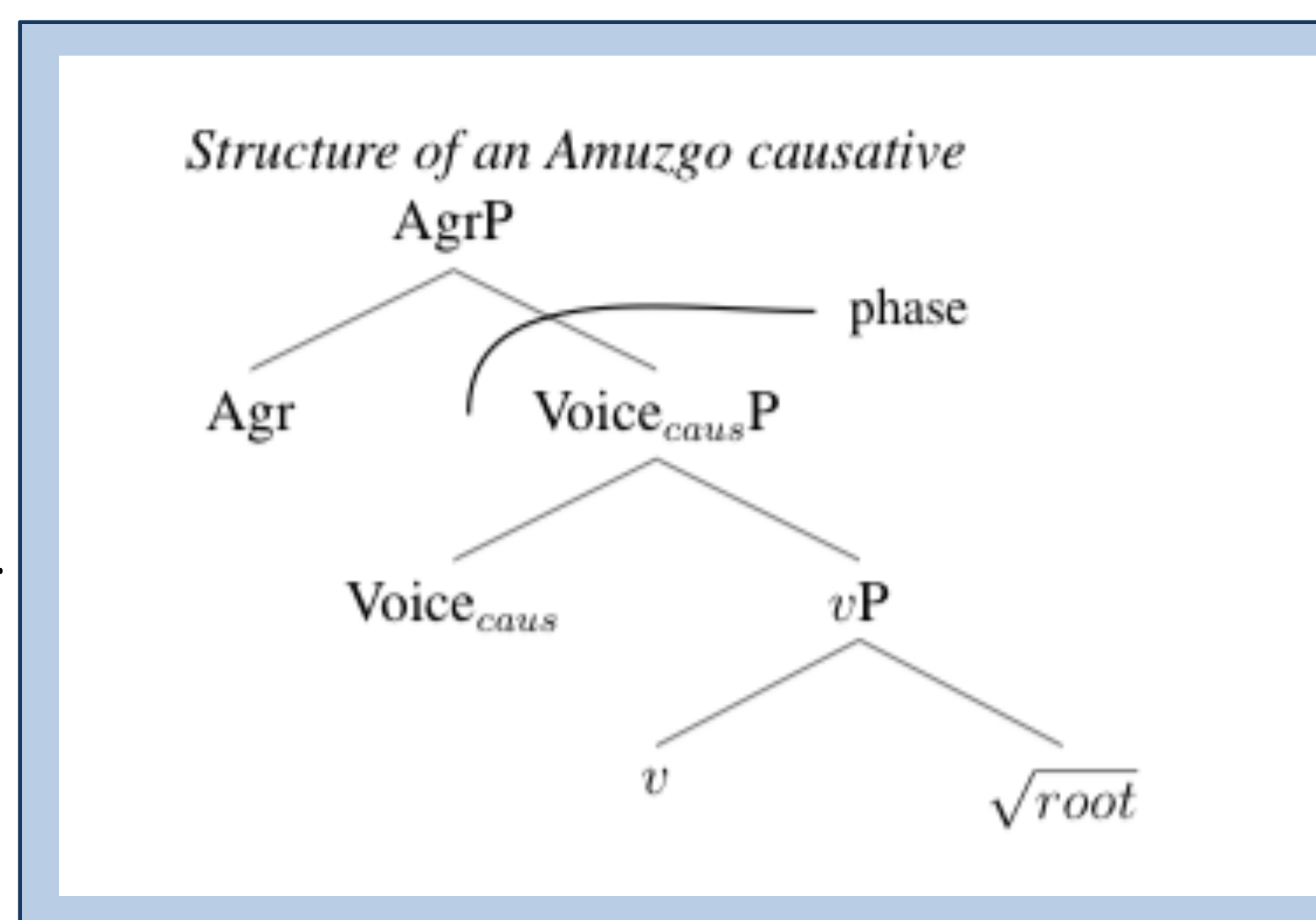|	Class 4	'eat'.CPL	Class 5	'mend'.CPL
1sg/excl/incl	CʔV	tkʷʔaᴴᴹ	CVʔV	thaʔᴴᴹaᴹ
2sg/pl	CVʔ	tkʷaʔᴸ	CVʔ	thaʔᴴᴸ
3sg/pl	CVʔ	tkʷaʔᴹ	CVʔ	thaʔᴹᴴ

Unlike for tonal alternations, causative does not block the glottalization alternations associated with persons: the Class 4 vs. 5 difference remains in derived causative forms, illustrated in (1a,b).

(1)
a. siᴴ-kiᴴ-**tʔa**ᴴᴹ   cf.3sg. siᴴ-kiᴴ-**taʔ**ᴴᴹ
   CAUS-ʔ-begin.CPL
   'begin something, 1sg. completive'
b. siᴴ-**ntʰ5ʔ**ᴴᴹᴹ   cf. 3sg. siᴴ-**ntʰõʔ**ᴴᴹ
   CAUS-unify.CPL
   'unify, 1sg. completive'

Lexical inflection-class features of the stem and 1st person features in AGR appear to jointly condition the shape of the surface form.
- Kim (2019a) analyzes this lexical and morphological conditioning of glottalization alternations as a cophonology sensitive to the presence of more than one morpheme (along the lines of Sande 2019).
- However, note that lexical roots and class information are introduced lower in the structure (√ or v) than person features (AGR). (See tonal evidence for Voice_caus as a phase boundary.)

Structure of an Amuzgo causative

Problem:
Neither a suppletive allomorphy analysis nor a double-conditioning analysis can derive the difference between (1a) and (1b), since both require simultaneous visibility of person features and lexical class information across the phase boundary.

Analysis

Solution:
We analyze the Amuzgo glottalization facts not as double conditioning, but rather as a single morphological trigger (first person) associated with a cophonology that disprefers final glottal stops.

Noting that lexical glottalization classes in Amuzgo never have a morphosyntactic or semantic effect, we propose a purely representational difference between classes.
- Class 4 are underlyingly /CVʔ/
- Class 5 are /CVʔV/

The CBP-style 1st person vocabulary item (mapping morphosyntactic to phonological content), given in (2), is not associated with any underlying phonological form (F) or prosodic content (P), but is associated with a phonological sub-grammar, or cophonology (R).

(2) 1st person ↔   F: Ø
                           P: Ø
                           R: NoCoda, Dep >> Max >> Linearity, ω=σ

Following Kim (2019a: 266-267), we propose that in first person contexts only there is a ban on words ending in a glottal stop.
- This provides a unified account of the behavior of first person forms across all five lexical classes of verbs.
- In non-first person contexts, the default ranking of Max, Dep, Linearity >>ω=σ, NoCoda will apply.

"Class 4" Derivation
1. Voice phase evaluation for "Class 4" /si-tkʷaʔ/: Default ranking applies and the faithful [si[tkʷaʔ]] is optimal.
2. The optimal output of the lower phase /[[si[tkʷaʔ]]/ is the input to the CP phase with 1st person ranking:

sitkʷaʔ	NoCoda	Dep	Max	Linearity	ω=σ
a. sitkʷaʔ	*!				
b. sitkʷaʔa		*!			*
→ c. sitkʷʔa			*		
d. sitkʷa			*!		

"Class 5" derivation
1. Voice phase evaluation for "Class 5" /si-thaʔa/: Default ranking applies and the faithful [si[thaʔa]] is optimal.
2. The optimal output of the lower phase /[si[thaʔa]]/ is the input to the CP phase with 1st person ranking:

sithaʔa	NoCoda	Dep	Max	Linearity	ω=σ
a. sithaʔ	*!				
→ b. sithaʔa					*
c. sithʔa			*!		
d. sitha			*!*		

The analysis unifies the metathesis and V-Ø alternations, capturing the fact that in first person contexts, we never see a final glottal stop.
- In 2nd and 3rd persons, the following ranking applies: Linearity, ω=σ >> Max, Dep >> NoCoda. /CVʔ/ roots surface faithfully as [CVʔ], and /CVʔV/ roots as [CVʔ] due to the high-ranked ω=σ.
- For Kim (2019a) lexically specific co-phonologies differentiated Class 4 vs. 5 verbs. However, because at least one phase boundary intervenes, CBP does not predict lexical class information to be accessible during the spell-out of first person features. Instead, we propose an independently motivated difference in underlying form for classes 4 and 5, which interacts with the co-phonology of the 1st person morpheme. This also allows us to dispense with the notion of a difference in lexical class (at least for 4 and 5).

Implications and remaining questions

Amuzgo demonstrates that putative morphological and lexical conditions on phonological processes must be examined in morphosyntactic context.

Prediction: True doubly morphologically conditioned phonology, triggered by a lexical item or class and a morpheme, can only occur when the two are introduced within the same syntactic phase domain.
- In other apparent cases of doubly morphologically conditioned phonology, interactions across phase boundaries will necessarily involve recognizable phonological operations and constraints, with differences across lexical items attributable to differences in URs.
- This prediction follows from the architecture of CBP, which guides learners in using morphosyntactic information to resolve otherwise ambiguous divisions of labor across the morphology-phonology interface.

Why CBP?
- CBP accounts for a wide variety of morphophonological processes, including cross-word effects (Sande and Jenks 2018) and sub-word effects (Sande 2019).
- Because of the separate components of the VI in CBP, multiple types of double conditioning are predicted:
  - Interacting rankings (R+R) (Sande 2019)
  - A morpheme-specific ranking interacting with an underlying form (R+F).
- Here we provide a concrete example of the latter type, and provide diagnostics to distinguish R+F from R+R.

Broader consequences: Similar cases potentially arise in any language that appears to have inflection classes defined over lexically specified patterns of stem alternations. Future work on morpheme-specific patterns that differ across lexical classes should investigate the morphosyntax of the construction to determine whether a phase boundary intervenes between conditioning factors.

Remaining question: Buck (2000) describes some uncertainty among speakers about whether some words pattern like Class 4 versus Class 5. A single word can be produced with multiple possible 1sg forms: 3sg [ʔ-nõʔᴴᴹ] `make an excuse' corresponds to 1sg [nʔõ] or [nõʔ(õ)]. Under the account where classes 4 and 5 are simply the result of two different underlying representations. What could be the result of this variation?
- Uncertainty in UR due to little exposure to defining forms of the paradigm?
- A weak underlying final vowel in "Class 5" /CVʔV/ verbs? (as per Gradient Symbolic Representations (Smolensky and Goldrick 2016))

Selected References

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