Restricting the power of cophonologies:
A representational solution to stem allomorphy in Uspanteko

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The issue. We argue that a complex pattern of stem allomorphy in Uspanteko (Mayan) can be successfully analyzed within a morpheme-based model of morphology given two assumptions: i. morpheme representations can contain metrical templates (e.g. Saba Kirchner 2013, Iosad 2016, Köhnlein 2016 for recent proposals); ii. pitch-accent contrasts in Uspanteko are a surface exponent of a difference between trochaic feet (surface with falling tone) and iambic feet (surface with level tone). We claim that our analysis is more restrictive than an account by Bennett & Henderson (2013; *henceforth* B&H), who divide items into several nominal cophonologies. In analyzing non-concatenative exponence as an epiphenomenon of metrical affixation, we subscribe to *Generalized Non-Linear Affixation* (e.g. Bermúdez-Otero 2012, Trommer & Zimmermann 2014, Zimmermann 2017). Furthermore, by arguing that contrastive metrical representations can lead to tonal oppositions within syllables, we follow recent approaches to the analysis of (some) tone accent systems (e.g. Morén-Duolljá 2013 for Swedish, Iosad 2016 for Scottish Gaelic, Köhnlein 2016 for Franconian).

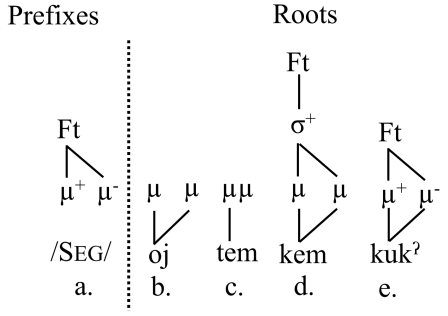
Data. In Uspanteko, certain possessive prefixes lead to variation in stress and pitch accent and can sometimes trigger vowel length alternations or consonant deletion in roots. Here, we focus on long vowels (VV) for purposes of exposition (data from B&H, Can Pixabaj 2006). There are four distinct patterns for VV roots when affixed; examples in (1) show prefixation with /in-/ 'my' (before C) or /aw-/ 'your' (before V). Underlining indicates stress; accent marks indicate H of falling pitch accent.

(1) Stress and pitch accent under possessive affixation for VV roots
   a. Prefix introduces H, VV preserved, final stress – [ooj] ~ [aw-óoj] 'avocado'
   b. Prefix introduces H, VV shortens, penultimate stress – [teem] ~ [ín-tem] 'chair'
   c. Prefix H blocked, VV preserved, final stress – [keem] ~ [in-keem] 'weaving'
   d. VV with H in isolation stays the same – [kúuk'] ~ [in-kúuk'] 'squirrel'

Cophonologies. B&H assume that possessive prefixes come with a lexical H (always realized on the penultimate vocalic mora, attracting stress), and account for variation with four nominal cophonologies: one protecting H and vowel length, leading to VV with H (1a); one protecting H but prohibiting tone on final syllables, leading to shortening and H on the penultimate syllable (1b); one protecting length and prohibiting H on final syllables, leading to a toneless VV (1c); one where root structure is fully preserved due to high-ranked output-output faithfulness (1d).

Our approach – representations (and tonal patterns). Assuming the foot inventory by Kager (1993), we adopt from Authors (to appear) that the language contrasts moraic trochees and (default) syllabic iambs (the general contrast between iambs and trochees is already motivated in B&H), and that tone is postlexical – realized as falling tone on moraic trochees and as level tone on iambs (certain phonetic aspects of pitch and stress still have to be worked out, see B&H: fn. 7). Essentially, we follow de Lacy (2002) in assuming that high tone is blocked from non-head positions. In moraic trochees, the second mora is the foot dependent, so it cannot realize high tone, resulting in a pitch fall after a high-toned first (head) mora. In syllabic iambs with long vowels, both moras in the stressed, heavy syllable are sponsored by the (syllabic) foot head. This licenses high tone on each of the two moras, leading to a level tone in the stressed syllable (see also Köhnlein 2016 on syllabic versus moraic foot heads). To account for allomorphy, we propose that possessive prefixes carry segmental information and a floating trochaic template (2a), plus four underlying metrical specifications in VV roots: bimoraic vowel (2b); monomoraic vowel plus floating mora (2c); bimoraic vowel associated with an iambic template (2d); bimoraic vowel associated with a trochaic template (2e).

(2) Representations of long vowels and prefixes before computation



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Our approach – grammar. There is maximally one foot, which is right-aligned (ALL-FT-R, see B&H). Moraic trochees introduced by possessive prefixation can violate certain restrictions that feet in simplex words have to respect. With regard to the patterns discussed here, this mainly concerns sonority-sensitive stress in disyllabic words with light syllables – [ín-tem] in (1b) would have been [intem] as a simplex word. We account for such apparent paradoxes in Stratal OT. At the stem level, only forms with lexically associated foot structure have feet (iff these feet respect various positional restrictions, 'DEFAULT' (as a cover constraint) >> MAX-FT). Other forms receive no footing (MAX-FT >> *STRESS >> GRWD = PRWD); floating moras remain floating (MAX-μ, DEP-LINK >> *FLOAT). At the word level, footed roots retain their foot structure, and unspecified roots are assigned default feet in isolation due to reranked GRWD = PRWD >> *STRESS (either iambic by default or based on other restrictions, such as sonority). This leads to a largely predictable metrical system, where metrical structure / pitch accent is only contrastive in forms ending in long vowels and disyllabic words with two light syllables of even sonority (Authors to appear).
With regard to stem allomorphy, roots that have feet in the input always retain these feet under possessive prefixation – preserving associated feet is preferred over incorporation of the floating affix foot (3c, d), which would violate additional DEP-LINK and MAX-LINK constraints. Roots unspecified for foot structure will receive a right-aligned trochaic foot from possessive prefixes – this can override certain default patterns (reranked MAX-FT >> 'DEFAULT'). Roots with bimoraic vowels have to preserve association lines between moras and segments (MAX-LINK) and get a right-aligned trochaic foot on the final heavy syllable (3a), with the initial mora / syllable unparsed (ALL-FT-R, MAX-LINK >> PARSE). Roots with a floating mora (3b) surface with a shortened root vowel and stress on the prefix, parsing all lower-level structure while maintaining a right-aligned moraic trochee (cf. trochaic shortening, Hayes 1995). This satisfies ALL-FT-R, MAX-FT, PARSE and MAX-LINK, while potentially violating 'DEFAULT' constraints, as in [ín-tem] (cf. sonority).
Summing up. Our approach to Uspanteko aims to demonstrate that fully exploring the representational possibilities provided by autosegmental phonology makes it possible to account for at least some phonological phenomena that have been attributed to co-phonologies with a consistent constraint grammar across all patterns. We acknowledge that Stratal OT is also a framework that employs cophonologies; yet 'standard' Stratal OT allows no more than three (independently motivated) strata and is therefore more restrictive than a theory permitting morpheme-specific cophonologies (Bermúdez-Otero 2012).

(3) From UR to surface form for four types of items ending in VV in isolation