Implications of Katu Nominalization for Infixation Typology

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Abstract

In the Mon-Khmer language Katu (as spoken in the Lao P.D.R.; Costello 1998), nominalization is marked with a variety of forms at the leftmost periphery of the root word, and occasionally as a phonologically reduced infix, /-r-/, appearing in the coda of the initial syllable of the nominalized word. This paper will analyze the Katu case as an example of prosodically conditioned allomorphy, resultant in OT from a surface merger of underlying root and affix segmentism. It will be shown that *segmental default-to-opposite*, a phenomenon predicted but unattested in Katu, must be ruled out in OT grammars with the *Edge Proximity Condition*, a strengthening of the Morphology/Phonology Strict Concordance Condition (McCarthy and Prince, 1995). The resulting theory makes a strong prediction: that infixation may only occur where an affix is dominated by an edge-bound prosodic constituent. Challenges posed by cases of prosodic subcategorization, as exemplified in English expletive infixation, will be considered, along with an alternative prohibition on morpheme dislocation, the Subcategorization Non-violability hypothesis of Yu (2003).

1 Introduction

Infixation is ubiquitous in languages of the Mon-Khmer family, being so common to the languages, in fact, that the process has been used as a litmus test for membership in the broader Austroasiatic family (Haiman, 1998). In the majority of known cases, there is an overwhelming tendency to infix over the initial consonant of the root, particularly in forming nominals from verbal roots, as shown below.

(1) Over-initial-C infixation in Mon-Khmer languages

- Khmer (Haiman, 1998; Jenner and Pou, 1982): cih ‘ride’ → c-n-ih ‘vehicle’
- Chrau (Thomas, 1971): tung ‘carry’ → t-an-ung ‘armload’
- Kamhmu (Merrifield and Story, 1965): hiip ‘eat with spoon’ → h-rn-iip ‘spoon’
- Mlabri (Jørgen, 1995): klaap ‘to hold’ → k-r-laap ‘forceps of split bamboo’
- Surin Khmer (Thomas, 1990): k^hɤɤc ‘to knot’ → k^h-n-ɤɤc ‘bamboo string’
- Kentakbong (Omar, 1975): sapoh ‘sweeps’ → s-ən-apoh ‘sweeps, is sweeping’

The exception to the generalization is found in the Katu language of the Lao P.D.R., in which a nominalizing morpheme appears to infix over the initial vowel of the root. Costello (1998) presents *r*-nominalization as the realization of a postalveolar trill, /r/, immediately after the first vowel of the verbal root.

(2) Katu Infixation over V_1 (Costello, 1998)

(a) atʃia 'advise'→ a-r-tʃia 'things given'

(b) saʋɛɛŋ 'be between' → sa-r-ʋɛɛŋ 'place between'

Infixation of this type may be classified as "immobile" in a sense, inasmuch as there is no prefixal allomorph in the paradigm, and the infix does not appear to vary in its surface position. As such, the case is exemplary of a class of infixational phenomena which Yu (2003, 2007) argues to occur in clear contradiction to the Prosodic Morphology theory of McCarthy and Prince (1999). Prosodic Morphology theory allows variability in the surface positioning of affixes under certain rankings of universal constraints in particular grammars. The most-cited example of such phonologically motivated infixation in found in the Austronesian language Tagalog, where an actor focus marker /-um-/ appears after the initial segment of a verbal root to maximize the number of onsetted syllables in the resulting word. An account couched within the framework of Yu, however, must argue that Katu infixation is fundamentally unobservant of phonological well-formedness conditions and therefore an example of an infixation phenomenon not predicted in Optimality Theory (OT) under the {M $\gg$ P} prosodic morphology ranking schema of McCarthy and Prince (1999). In such a framework, it must be argued that the underlying form of the nominalizer is exactly as shown above: the underlying representation of the allomorph in is monosegmental, i.e., /r+(C)V~/ → [(C)V-r-~]. The account has the additional effect of bifurcating infixation in Mon-Khmer languages generally into two types, languages with over-initial-C infixation and one language with over-initial-V infixation, Katu.

This paper will revisit the facts of Katu nominalization (Costello and Sulavan, 1996; Costello, 1998) and present a theory of infixation that brings the phenomenon into conformity with those observed in the rest of the Mon-Khmer examples, i.e., infixation over C_1. It will be shown that Katu *r*-nominalization in (2) above is but one phonologically conditioned allomorph of an underlying morpheme /ar/, which may surface as a prefix or an infix, depending on the prosodic and segmental structure of the root to which it affixes. An OT account of the surface distributions of the morpheme will argue for fusion of affix and root segments to meet prosodic binarity conditions on output words, thus effectively maintaining the overarching generalization that Mon-Khmer infixation occurs over a root-initial consonant. Katu nominalization is not, under this approach, an exemplar of infix immobility at all, and fits perfectly well within the {P $\gg$ M} ranking schema. The account does require us to reconsider the predictions made by an OT capable of re-ordering morphological exponence in the output, however. This paper will propose a strengthening of the M/P Scope Concordance Condition of McCarthy and Prince (1995) to enforce strict locality at prosodic word edges, thus ruling out a class of unattested infixation types we will refer to here as segmental default-to-opposite (DtO henceforth).[1] The resulting theory makes a strong prediction: that infixation may only occur where the affix in its entirety is immediately dominated by an edge-bound prosodic constituent. This prediction will be tested against the survey of known infixation types presented in Yu (2003), and the proposed theory will be compared with a prosodic subcategorization approach, which stipulates the positioning of infixes with alignment of prosodic and morphological edges on a language-specific basis. It will be shown that the proposed theory is advantageous in that it allows infixation to remain a phenomenon predicted by the Prosodic Morphology theory of McCarthy and Prince (1995), rather than stipulative conditions on the placement of particular morphemes.

2 An OT Account of Katu Infixation

2.1 Descriptive preliminaries

An understanding of Katu word-level prosody is necessary to an understanding of the infixational allomorphy observed in the language. Costello (1998) observes that the size of the Katu word is restricted to either a single heavy syllable or a disyllable, consisting of an optional anacrustic 'presyllable' and a main, bimoraic syllable. Costello (1998) is not specific as to normal stress assignment in the language, but iambic structure

[1] A phenomenon referred to as "hyperinfixation" by Orgun and Sprouse (1999).

is likely, given the propensity for iambic stress in other Mon-Khmer languages (see Haiman, 1998) and the assertion of Wallace (1969) that stress always occurs on the main syllable in the Vietnamese dialect of the language. This assumption is further supported by the fact that the range of vowels and consonants appearing in presyllables is severely restricted. Only /a/ and /i/ may occur as the presyllable nucleus, and the presyllable coda is limited to nasal segments (not necessarily homorganic with a following stop) or a post-alveolar trill, /r/. Onset clusters may occur in either the presyllable or the main syllable, and an appear to obey sonority sequencing restrictions: only $_{\sigma}$[Cr$\sim$ and $_{\sigma}$[Cl$\sim$ sequences may occur.

Word maximality conditions of this type are handled straightforwardly in OT with the undominated ranking of familiar constraints on output word form. Strict disyllabic word structure results from the undominated ranking of two constraints, FTBIN (Prince and Smolensky, 2004), which penalizes any candidate with ternary structure at the level of the foot or syllable, and LX$\approx$PR, a constraint proposed by McCarthy and Prince (1993b) to force the strict coincidence of foot and prosodic word edges at both the left and right periphery of the word, ruling out surface words syllabified [$\sigma(\sigma\sigma)$]. Where these constraints dominate faithfulness constraints preserving segmental structure, i.e., constraints of the MAX$_{IO}$ family, the surface word in Katu will be strictly limited to the structure shown below.[2] The iambic footing of the language results from similarly familiar ranking of FOOTFORM constraints.[3]

(3) Word maximality in Katu

- Ranking: {LEX$\approx$PR, FTBIN $\gg$ MAX$_{IO}$}, {FOOTFORM(IAMB) $\gg$ FOOTFORM(TROCHEE)}
- Word structure: $_{Prwd}[_{Ft}[(_{\breve{\sigma}}$[(C)(C)$\left\{\begin{array}{c}\text{a}\\ \text{i}\end{array}\right\}$($\left\{\begin{array}{c}\text{N}\\ r\end{array}\right\}$)]$)_{\acute{\sigma}}$[(C)(C)V(C)]]]]

Nominalized words conform to the emergent template in all cases, and closer examination of the nominalization paradigm reveals a broader distribution of the nominalizing marker than one would expect were this a truly 'immobile' phenomenon. As the data in (4) show, three allomorphs may mark nominalization (NOM henceforth).[4]

(4) Realizations of /ar/ (from Costello, 1998)

Surface	*Examples*	*Root Conditions*
[ar-]	*a*) kəl 'to exchange' → ar-kəl 'goods exchanged'	root = $[\overline{\sigma}]_{Prwd}$
	b) a 'to judge' → ar-a 'judgement'	
	c) ɔɔp 'to wrap' → ar-ɔɔp 'wrapping'	
	d) ʧʰuh 'to blow on' → ar-ʧʰuh 'the blowing on'	
[-r-]	*e*) aʧia 'advise'→ a-r-ʧia 'things given'	root = $[\breve{\sigma}\overline{\sigma}]_{Prwd}$
	f) alɔɔm 'to offer a gift '→ a-r-lɔɔm 'gift offered'	root V_1 = affix V
	g) katas 'to name' → ka-r-tas 'name'	
	h) savɛɛŋ 'be between' → sa-r-vɛɛŋ 'place between'	
	i) kaʧʰiit 'to be shy' → ka-r-ʧʰiit 'shyness'	
[-a-]	*j*) klɔɔs 'to exchange' → k-a-lɔɔs 'an exchange'	root = $[\overline{\sigma}]_{Prwd}$
	k) kroong 'to make fence' → k-a-roong 'fence'	root = $_{Prwd}$[CC$\sim$
	l) plah 'to divide' → p-a-lah 'division'	
	m) tres 'make small slit' → t-a-res 'small slit'	

Elementary morphological analysis of these data would suggest a single underlying form, /ar/, with various

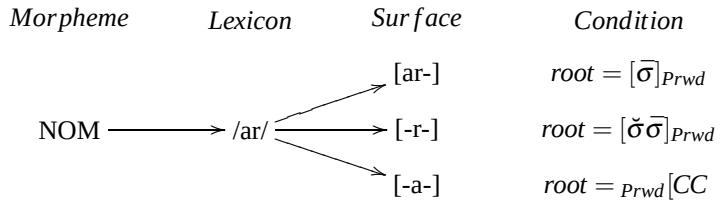
[2] MAX-seg$_{S1\text{-}S2}$: Every segment of S_1 has a correspondent in S_2. (McCarthy and Prince, 1999)

[3] I.e., the RHTYPE constraints of Prince and Smolensky (2004).

[4] Costello (1998) reports an additional range of nominalizing allomorphy—some prefixal, some infixal—that will not be dealt with here. Many of the allomorphs occur with a low lexical frequency or have identical conditioning environments and must be lexically specified. Prefix /phar/ and infix /an/ appear in nearly identical consonantal environments to /ar/ : /ʧəng/ → [pʰar-ʧəng], /ʧiem/ → [ʧ-an-iem], ʧʰuh → [ar-ʧʰuh]. Given the surface similarity of prefix /aN/ and infix /an/, we might expect some form of patternable relationship between the two; alas, no: /aN+kuɔt/ → [aŋ-kuɔt] 'a knot', but /an+kuɔh/ → [k-an-uɔh] 'notch in a branch'. Prefixal and infixal forms can also co-occur in the same paradigm, c.f., mamɔŋ 'to be alive' → pʰar-mɔŋ 'livelihood', ma-r-mɔŋ 'characteristics of life'. The remaining allomorphs, /arn/, /tri/, and /tar/, are not reported by Costello to occur with frequency.

surface instatiations conditioned by the prosodic and segmental makeup of the roots to which the affix attaches.

(5) Infixal allomorphy of the Katu NOM

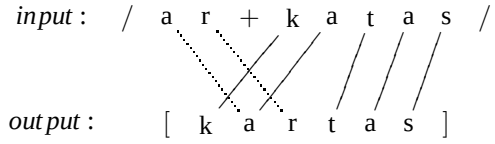


Under this model of the allomorphy, the infix is indeed descriptively mobile and is thus exactly the kind of alternation that we would expect from a ranking of prosodic well-formedness constraints over morphological constraints, the {P ≫ M} ranking schema of McCarthy and Prince (1999). In §2.2, we will formalize this characterization of the allomorphy in Optimality Theory in exactly this manner.

2.2 Deriving the allomorphy

The account to follow will argue that infixation over initial C in Katu occurs as the fusion of underlying affix and root segments, satisfying the templatic restrictions on the output form of the Katu word discussed above. Of primary interest are mappings such as /ar+katas/ → [kartas]. The exemplar mapping is shown below.

(6) Hypothesized mapping in Katu NOM infixation



The rankings which derive this mapping are straightforward, the essential argument being that FTBIN and LX≈PR both dominate faithfulness constraints preventing perturbation of input identity and precedence relationships.[5] Simple prefixation, under any syllabification of the resulting segments, results in a surface word larger than the disyllabic template, as shown in ((7)a-b) below. The merged candidate (7c) compresses the two input morphemes to a single disyllabic structure to conform to the iambic word shape.

(7) Merger of root and affix to meet templatic conditions

/a_1r+k$a_4$tas/	FTBIN	LX≈PR	INTEGRITY$_{IO}$	LINEARITY$_{IO}$
a. [(a_1r.ka_4.tas)]	*!			
b. [a_1r(ka_4.tas)]		*!		
☞ *c*. [(ka_{14}r.tas)]			*	***

(Word boundaries shown '[]'; foot boundaries shown '()'; syllable boundaries shown '.'.)

This contrasts with the behavior of monosyllabic roots, such as /kəl/ below. The prefixal candidate goes unmarked by all of the markedness constraints discussed thus far. Undominated FTBIN is satisfied equally well by candidates which prefix or infix, allowing lower-ranked faithfulness constraints to rule out infixational candidates.

[5] From McCarthy and Prince (1999): INTEGRITY$_{S1\text{-}S2}$ = No element of S_2 has multiple correspondents in S_1; LINEARITY$_{S1\text{-}S2}$ = S_1 reflects the precedence structure of S_2 and v.v.

(8) Where prefixation results in a well-formed iamb, no infixation is necessary.

/a$_1$r+kə$_4$l/	FTBIN	LEX≈PR	INTEGRITY$_{IO}$	LINEARITY$_{IO}$
☞ *a*. [ar-.kəl]				
b. [k-ə$_{14}$r-l]			*!	
c. [k-a.r-əl]				*!

The mapping (6) presupposes the superiority of a merged candidate ([k-a$_{14}$r-.tas]) over a phonetically identical but phonologically distinct candidate which simply deletes the underlying affix vowel: [ka-■r-.tas]. Independently of the desire to unify Mon-Khmer infixation under one descriptive type, it might be argued that deletion is the most straightforward approach to the allomorphy. As shown in Tableau (9), however, such an approach could not predict the surface positioning of the underlying trill. Where merger is ruled out under a ranking of {INTEGRITY ≫ MAX-*seg*}, the candidate in which the trill syllabifies as part of the initial syllable onset, (c), harmonically bounds the preferred trill-in-coda candidate, (b).

(9) Incorrect prediction under deletion approach

/a$_1$r+ka$_4$tas/	FTBIN	INTEGRITY$_{IO}$	MAX-seg$_{IO}$	LINEARITY$_{IO}$
☞ *a*. [ka$_{14}$r.tas]		*!		***
b. [ka$_4$■r.tas]			*	**!
☛ *c*. [k■ra$_4$.tas]			*	*

Further implications of the correct ranking, {MAX-seg$_{IO}$≫ INTEGRITY$_{IO}$}, are seen in the case of the third nominalizer allomorph, [a], appearing between onset clusters of monosyllabic roots, as in /ar+klɔɔs/ → [kalɔɔs]. The crucial observation in all such cases is that the second consonant of the root cluster is always a liquid, /l/ or /r/, and is thus in featural terms identical or nearly so to the consonant of the affix. The disappearance of the affix trill in proximity to a root liquid will here be attributed to a conspiracy of common phonotactic markedness constraints, which together produce fusion of liquid segments, rather than vowels as we have seen previously.[6]

(10) Phonotactic constraints

(a) *COMPLEX-ONSET
Complex onsets are prohibited, i.e., *σ[CC.

(b) *LIQ$^2_{AdjSeg}$
Adjacent liquids are prohibited,
i.e., $(*\begin{bmatrix} +cons \\ +son \\ +del.rel. \end{bmatrix} \wedge_{AdjSeg} * \begin{bmatrix} +cons \\ +son \\ +del.rel. \end{bmatrix})$.

These two constraints, when ranked above INTEGRITY, give way for the NOM marker to simply the structure of the output word considerably, as shown in the optimal candidate in Tableau (11).[7]

[6] A constraint such as *LIQ$^2_{AdjSeg}$ is easily justifiable on cross-linguistic grounds. Rice (2005) notes occurrence of assimilation of liquid-liquid clusters in a variety of languages.

[7] Complex onsets and non-derived [rl] sequences occur in Katu, thus {MAX-*seg*$_{IO}$ ≫ *COMPLEX, *LIQ$^2_{AdjSeg}$}.

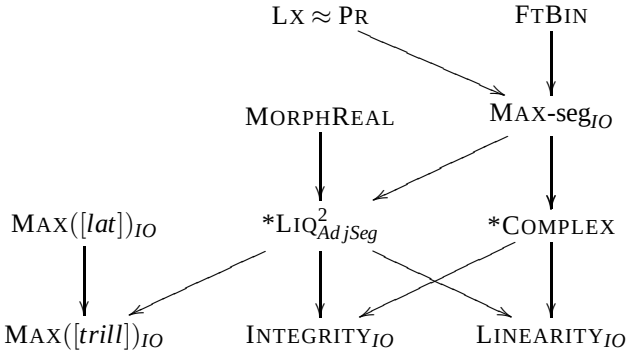
(11) Fusion to avoid marked liquid sequence

/ar$_2$+kl$_4$ɔɔs/	MAX-*seg*$_{IO}$	*LIQ$^2_{Ad\,jSeg}$	*COMPLEX	INTEGRITY$_{IO}$
a. [ar$_2$.kl$_4$ɔɔs]			*!	
b. [kar$_2$.l$_4$ɔɔs]		*!		
c. [ka■$_2$.l$_4$ɔɔs]	*!			
☞ *d*. [ka.l$_{24}$ɔɔs]				*

A number of residual points must be clarified about the resulting ranking. Rice (2005) observes that liquids [r] and [l] are equipollent—neither is more marked than the other cross-linguistically. It is an open question, then, why one consonant or the other would be ultimately preserved in the surfacing form. We may hypothesize that featural faithfulness to lateral features dominates similar faith to trill features in the language. The fact that /r/ doesn't merge with other segments is also attributable to featural faithfulness. Merger with non-liquids would result in a loss of distinctive features in the IO mapping; if featural MAX constraints for [±son], [±cons], and [±del.rel.] are undominated in the language, free neutralization of [rC] clusters to [C] can be ruled out. It is also notable that [rl] sequences do occur in the NOM paradigm, for example in cases such as /ar+alɔɔm/ → [arlɔɔm]. Liquid fusion must be ruled out in such instances by an undominated constraint on input recoverability. MORPHREAL (Samek-Lodovici, 1993; Kurisu, 2001) forces realization of the trill in spite of the markedness consideration just in the case that surface evidence of morphological complexity would be lost.

Together, these arguments give us a picture of Katu prosodic morphology formalized in the grammar fragment below.

(12) Final Katu ranking



Observe a recurrent form of ranking in the diagram. Faithfulness constraints like INTEGRITY and LINEARITY act to preserve morphological structure in the output. Markedness constraints enforce prosodic and phonotactic simplicity in the output. Rankings such as {FTBIN ≫ MAX} and {*COMPLEX ≫ LINEARITY}, then, are clear instantiations of the {P ≫ M} ranking schema of McCarthy and Prince (1999). Not only is the Katu example descriptively 'mobile', but a clear example of Prosodic Morphology as characterized by McCarthy and Prince (1999).

3 Enforcing Locality

The account of Katu given thus far relies upon the fusion of affix and root segments to achieve various surface realizations of the /ar/ morpheme. The account uses various run-of-the-mill constraints on prosodic well-formedness to achieve this result, and conforms to the generalized Prosodic Morphology ranking arguments put forth by McCarthy and Prince (1993b, 1999): {P ≫ M}. As will be seen in this section, however, the essential mechanics of the approach produce segmental DtO, an alternation unattested in Katu

and indicative of a pathological prediction made by OT as a whole. It will be argued that a restriction on the generative component of the theory is necessary to rein in the undesirably consequences of the account and others like it.

Default-to-opposite is a well-established occurrence in stress systems (Bakovic, 1998; Hayes, 1995; Prince, 1983; Gordon, 2000). In Classical Arabic, for example, stress falls on the rightmost heavy syllable, otherwise on the initial syllable (McCarthy, 1979). Outside the realm of prosody, however, the pattern is of questionable linguistic reality. Zoll (1996) argues that the pattern extends to featural phenomena, as well. In Japanese Mimetic Palatalization, a palatal feature appears at the left edge of the mimetic-stratum word unless the word contains a rightmost coronal consonant, in which case the feature appears rightmost. Alderete and Kochetov (2007) show, however, that featural DtO is not productive in Japanese, with native speaker participants in a nonce study finding the expected DtO pattern acceptable with roughly chance frequency and only one form in a mimetic dictionary instantiating the pattern in the first place. Orgun and Sprouse (1999) argue that segmental DtO is linguistically unknown, but that it can potentially occur in OT grammars anywhere high-ranked markedness constraints dominate constraints positioning morphological exponence in the output. Closer examination of the Katu analysis presented in the last section presents exactly such a scenario.

The account begins with the observation that morphological paradigms commonly contain gaps. Prince and Smolensky (2004) argue morphological gaps in OT to arise from the emergence of the *null parse*, a candidate which fails to parse phonological material into the morphological constituents contained in the input, as optimum in a given evaluation. The constraint which penalizes this candidate is shown below. MPARSE must be high-ranked in Katu if infixation is to occur at all. Tableau (13) below demonstrates the crucial ranking that rules out the null candidate in Katu. Where MPARSE dominates a constraint, that constraint will be violated to prevent the emergence of the null candidate, shown 'Ø' below; where it dominates LINEARITY, infixation will be preferred to null parsing of the output.

(13) The necessary ranking of MPARSE and LINEARITY

- MPARSE
  Morphemes are parsed into morphological constituents. Prince and Smolensky (2004)

/a_1r+ka_4tas/	MPARSE	LINEARITY$_{IO}$
☞ *a*. [ka_{14}r.tas]$_{NOM}$		******
b. Ø	*!	

This ranking leads to an unfortunate consequence, however, when we consider roots containing a high-front vowel in the presyllable and /a/ in the main syllable, words such as [kita] 'to vomit'. A crucial component of the merger analysis of Katu infixation proposed in §2.2 was preservation of underlying vowel features: infixation, it was argued above, cannot occur into a syllable if its the nucleus is not /a/ or loss of distinctive vowel features would occur. When we consider a verb like [kita], which has no *ar*-nominalized form,[8] we find that a ranking {MPARSE ≫ LINEARITY}, together with an undominated constraint preserving the feature [+back] of the affix vowel, predicts the emergence of a candidate in which the affix dislocates to the far edge of the root to avoid loss of affix backness. This candidate (14a) below, bests the expected null parse precisely because of the ranking so crucial in Tableau (13).

(14) Incorrect prediction: segmental default-to-opposite

/a_1r+ki_4ta_6/	MAX([+back])	MPARSE	LINEARITY$_{IO}$
☛ *a*. [ki.ta_{16}r]			********
b. [ki_{14}r.taʔ]	*!		****
☞ *c*. Ø		*!	

[8] None in a Katu dictionary (Khamluan et al., 1998), at least.

Unfortunately, segmental DtO of this nature is not only unattested in Katu, it is also unknown cross-linguistically. This is a familiar problem, and segmental DtO has been the subject of considerable discussion in the OT literature. Analyzing a similar case of infixation in Tagalog, Orgun and Sprouse (1999) argue for a post-EVAL filter which effectively renders candidates violating certain constraints null after optimization has taken place. This rules out segmental DtO on a language-particular basis, but does little to explain the overarching absence of the phenomenon in human language. McCarthy (2003) argues that alignment constraints positioning morphemes in OT are specified for prosodic categories such that positioning a morpheme outside of the specified category results in categorical violation of the morpheme positioning constraint. Thus ALIGN-BY-SYLLABLE (i.e., ALIGN(NOM, L, root, R, σ)) would effectively prevent segmental DtO in the Katu case, just as it does in the infamous Tagalog example. This approach captures the intuition of most approaches to the problem clearly: infixation within a specified prosodic domain is allowed, infixation outside that domain is not. Unfortunately, the account cannot rule out segmental DtO in factorial typology; in grammars where ALIGN-BY-SYLLABLE is low-ranked, segmental DtO may occur. Yu (2003, 2007) argues that infixation is not prosodic morphology at all; all dislocational alternations, like the one we observed in Katu, are epiphenomenal of historical sound changes and the re-analysis of morphological complex forms into simple ones over time. The formalism used to capture this assumption, however, fails to rule out segmental DtO under certain rankings of phonological constraints; see §5 below. None of these approaches rule out segmental DtO universally, and, if such is to be accomplished, some more aggressive approach to the prediction must be taken.

It is preferable in OT to derive linguistic universals from the composition of CON, the set of universal constraints; this is the strongest theory of constraint interaction and optimization. However, it is at times necessary to invoke overarching conditions on GEN, the generative component, to reduce the set of possible candidates compared by EVAL, the component of grammar which produces a most-harmonic output from a candidate set, CAND. McCarthy and Prince (1995), for example, argue that *exfixation*, the dislocation of a morpheme outside the morphological scope of affixation, is ruled out in GEN with the following condition, which states roughly that the linear order of the output correspondents of two morphemes reflects the structural relationships between those morphemes.

(15) M/P Scope Concordance Condition (McCarthy and Prince, 1995)
M-Scope(β) $\subset$ M-Scope(α) $\Longrightarrow$ P-Scope(^β^) $\subset$ P-Scope(^α^)

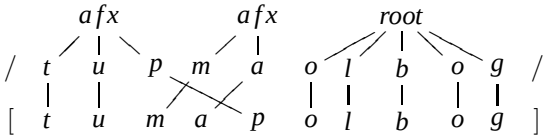
(a) Dfn. M-Scope
Constituent β is in the M-Scope of constituent α iff α c-commands β.

(b) Dfn. P-Scope
Constituent β is in the P-Scope of constituent α if:

- $\alpha < \beta$ and α associates to an input prefix; or
- $\beta < \alpha$ and α associates an input suffix.

The M/P Scope Concordance Condition (SCC henceforth) has the effect of preventing one morpheme from 'raising' into another, as shown in figure (16) below, where a structurally medial prefix surfaces internal to an initial prefix, ostensibly to avoid vowel liaison with the root.

(16) The unattested exfixation mapping (from McCarthy and Prince, 1995)



The SCC rules out such a candidate because the P-Scope of the prefix /ma-/ is not a subset its M-Scope. Under the assumption that morphological structure is binary in its branching, the /ma-/ prefix c-commands

the root, /olbog/, in the input; the M-Scope of /ma-/ is thus a singleton morpheme set, {olbog}. In the output, however, the /ma-/ prefix linearly precedes both the segmental associates of /olbog/ and one segmental associate of the initial prefix, /tup-/; the P-Scope of [ma] is thus {p, olbog}, a superset of {olbog}. The SCC would remove the mapping in (16) from GEN entirely, meaning it could never emerge as an optimal candidate under any ranking of constraints.

The SCC is a reasonable limitation on the generative component of our theory, but does it solve the locality problem? No. Because P-Scope is defined for affixes only, the formulation in (15) has no jurisdiction over combinations of a single affix and a root. The P-Scope of a root is always, effectively, the null set. Since the null set is a subset of any set, the SCC will be vacuously satisfied in the segmental DtO case and moreover can never rule out any affix+root combination from GEN, regardless of the segmental permutations under which it might manifest.

(17) SCC fails to rule out segmental DtO

/a$_1$r+kita$_6$/ $\rightarrow$ *[kita$_{16}$r]

- M-Scope(kita) = {} $\subset$ M-Scope(ar) = {krat}
- P-Scope(^kita^) = {} $\subset$ P-Scope(^ar^) = {}
- SCC satisfied, but vacuously

This makes perfect sense; the SCC was designed to rule out an interaction between two prefixes, not to limit the dislocational distributions of infixes. Needed to rule out segmental DtO in Katu and in OT grammars generally is a condition that allows a certain amount of dislocation of a morpheme from a prefixal or suffixal position, *but not too much dislocation*. This is accomplished with a more stringent version of the SCC, the formulation of which relies crucially on structural relations between constituents of prosodic categories in the output. We will refer to this condition as the Edge Proximity Condition (EPC).

(18) The Edge Proximity Condition

If a prefix (suffix) α c-commands a morpheme β in the input, one of the following conditions must hold:

(a) some phonological constituent of α must be linearly adjacent to the leftmost (suffix, rightmost) segment of β in the output

(b) some phonological constituent of α must p-command the leftmost (suffix, rightmost) segment of β in the output

(19) Dfn. *p-command*

$\alpha \in \{seg, \mu, \sigma, Ft, Prwd\}$ p-commands $\beta \in \{seg, \mu, \sigma, Ft, Prwd\}$ iff:

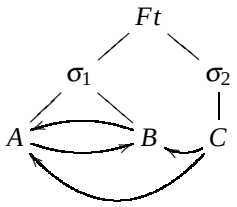
the first branching prosodic category (σ, Ft, Prwd) that dominates α also dominates β.

The condition in (18) differs from the SCC in a number of ways, disjunctively mandating that affixes be licensed pre-/suffixally at the edges of the morphemes they c-command in the input or else be licensed within edge-bound prosodic domains. The formulation hinges upon an asymmetric, transitive structural relation, p-command, as the determinant of the prosodic domain within which an affix may be so licensed. P-command is essentially a variant of the familiar syntactic c-command relation, but one attuned to prosodic structures, rather than X′ theoretic ones. Conceptually, p-command as a relation is non-controversial in any theory which recognizes levels of the prosodic hierarchy as domains for phonological phenomena (McCarthy and Prince, 1986; Archangeli and Pulleyblank, 2002; Cole and Kisseberth, 1995, represent diverse examples). The utility of the relation is demonstrated in the following abstract example, construed over three morphemes of arbitrary segmental content, A, B, and C. In (20), constituents A and B are syllabified

together into the same syllable, and constituent C syllabifies with them into the same foot. Because A and B are sisters of the same syllabic node, σ_1, they p-command each other. They do not p-command C, however, because σ_1 does not dominate it. Constituent C is a complete prosodic unit unto itself, σ_2; the first branching node above it is the foot node. Because the foot node (transitively) dominates A and B, C p-commands both A and B.

(20) Constituent relationships exemplified

- A p-commands B and v.v.
- A and B do not p-command C because the first branching node above them, σ_1, does not dominate C
- C p-commands both A and B because the first branching node above it, Ft, dominates them



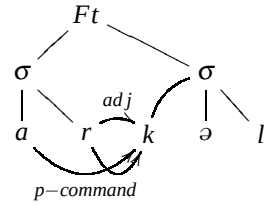
Ultimately, the EPC allows that infixation may occur where affix segments syllabify within a syllable occurring at the edge of the string c-commanded by the affix in the input. If any part of an affix dislocates to a position in which it may syllabify within an edge-bound syllable, the root segments of that syllable will be within the p-command domain of the affix. Deeper dislocation, however, is ruled out, except in the special case that the infix syllabifies as a complete prosodic constituent, either a syllable or a foot, as exemplified by C above. This effectively gives non-branching entities a privileged status, allowing them to have a broader scope than infixes which are composed across syllable boundaries. The importance of this designation will be considered more carefully in §4 below, with examination of the range of infixation types occurring outside an edge-bound syllable.

By preventing infixation from dislocating an affix beyond an edge-bound prosodic constituent, the new condition gives us the means to eliminate DtO infixation candidates from OT grammars. In 21 below we see the evidence relevant to the Katu case. The simple prefixal allomorph is allowed straightforwardly in (a), with the affix linearly adjacent to the root morpheme it c-commands in the input. As the first branching prosodic node above the prefix is the Foot, the prefix also p-commands the root-initial segment in this case.[9] In the infixation example, (b), the affix syllabifies with the first segments of the root, merging with the first root vowel as discussed in §2.2 and taking the initial consonant as onset. The first branching prosodic category above the affix is the initial syllable. The root-initial consonant is thus in the p-command domain of the infix. In the DtO candidate, (c), however, the affix is neither adjacent to nor in a p-command domain with the root-initial segment.

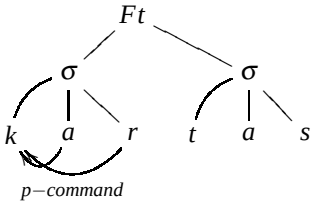
[9]The redundancy is accidental. The necessity of the adjacency disjunct in the EPC is seen in a hypothetical example in which an affix syllabifies with a preceding affix, rather than with the root or as an independent syllable: /pa$_{afx}$+t$_{afx}$+kita$_{root}$/→[pat.ki.ta]. Here the medial affix does not p-command the initial segment of the root, the morpheme it c-commands. Such a configuration would be ruled out without the adjacency disjunct of the EPC.

(21) EPC rules out the hyperinfixation candidate

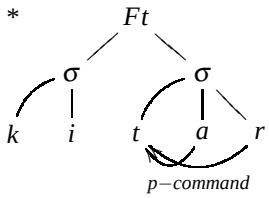
(a) Prefix p-commands and is adjacent to root-initial segment
input: [$_{NOM}$ ar [$_{V}$ kəl]]
output:



(b) Over-initial-C infix p-commands root-initial segment
input: [$_{NOM}$ ar [$_{V}$ katas]]
output:



(c) DtO infix does not p-command root-initial segment
input: [$_{NOM}$ ar [$_{V}$ kita]]
output: *



The account does suggest a possible situation in which segmental DtO could still occur: segmental DtO could arise where the base of affixation is itself only a syllable in size. If syllabification within an edge-bound syllable is necessary for infixation, it stands to reason that an affix could appear within any position in monosyllabic word and still satisfy the requirements of the EPC. Fortunately, empirical evidence suggests that such morphology is possible. Stemberger and Bernhardt (1999) and Nicklas (1975) describe a morphological process in the Muskogean language Choctaw in which exactly such a scenario seems to occur.

(22) Choctaw h-infixation

(a) Suffixal
pisa-či → pisa-h-či ‘show’

(b) Infixal
pisa → pi-h-sa ‘see’
čito → či-h-to ‘big’

(c) Prefixal (root = bi)
sa-bi → sa-h-bi ‘he kills me’
či-bi → či-h-bi ‘he kills you’

(d) Infixal (into prefix)
iš-bi → i-hi-š-bi ‘you (sg.) kill him’
ĩ:-pa → i-h-ĩ:-pa ‘eat (intr.)’

Finally, it is important to consider whether or not we have lost the original prediction of the SCC in our

revision of it. Reconsideration of the hypothetical exfixation mapping in (16) above reveals that the EPC in fact subsumes the SCC, ruling out exfixation for different reasons.

(23) Exfixation mapping

/tup$_{afx}$+ma$_{afx}$+olbog$_{root}$/ → *[tu-ma-p-olbog]

Under the formulation advocated by McCarthy and Prince (1995), it is the appearance of the first affix segment /g/ in the P-Scope of the second affix which rules out the mapping. The M-Scope of /pa/ (i.e., /upo/) is contained in the M-Scope of /mag/ (i.e., /pa+upo/), therefore the same relationship must obtain in the P-Scopes of the morphemes. Under the EPC, there is no necessary entailment between statements of M- and P-Scope among different morphemes; examination of simple adjacency and p-command relations of the medial affix [ma] is sufficient. The affix is not adjacent to the initial segment of the root. Nor does the affix syllabify with any portion of the root; the p-command domain of the affix is [ma-p]$_{\sigma}$. As a result, the exfixation candidate is safely ruled out.

4 Beyond an Edge-bound Syllable

The approach now established, we're in a position to consider its larger consequences. In many respects the EPC is a more restrictive condition on the morphology-phonology mapping than its predecessor. The SCC rules out exactly one form of surface expression of morphological exponence, preventing a morpheme from "raising" into a structurally superordinate morpheme. The EPC, in contrast, places strict limitations on the surface positioning of morphemes, and does so in a manner with some surprising consequences. Cases, such as those in (24) below, stand out as an apparent challenge to the cross-linguistic distributions of infixation predicted by the EPC, since each involves the positioning of an affix adjacent to some prosodic constituent which may or may not be edge-adjacent, often with the result that the infix is syllabified beyond the edge-bound syllable of the base-initial segment. The current effort will remain agnostic on the morpho-phonological factors which motivate particular cases of such infixation, but will demonstrate that such cases are not ruled out wholesale by the restrictions on surface word form imposed by the EPC.

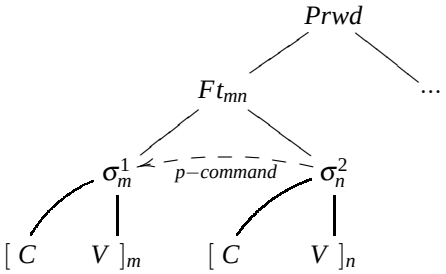
(24) Infixation beyond σ_1 allowed where infix is a complete prosodic unit

example	*infix size*	*edge cat*
Koasati (Kimball, 1991) /ho+okcayyan/ → {(ok.<u>ho</u>)(cay.yan)}	σ	Ft
Samoan (Marsack, 1962) /RED + savali/ → {(sa.<u>va</u>)(va.li)}	σ	Ft
Ulwa (McCarthy and Prince, 1993a) /siwanak + ka/ → {(si.wa)(<u>ka</u>.nak)}	σ	Ft
Cantonese (Yu, 2003) /gwai#matyah/ → {(mat)(<u>gwai</u>)(yah)}	Ft ($\sigma^{\mu\mu}$)	PrWd
Nakanai (Broselow and McCarthy, 1983) /RED + tuluga/ → {(tu)(<u>lu.ga</u>)(lu.ga)}	Ft	PrWd
English (McCarthy, 1982) /fucking#fantastic/ → {(fan)(<u>fucking</u>)(tastic)}	Ft (or PrWd)	PrWd

(Infixes <u>underlined</u>.)

Beyond the usual observation that the infix in each case appears proximate to a prosodic category of high salience (either an edge-bound or main-stressed syllable or foot), we may also observe of these data that, in each case, the dislocating affix comprises a complete prosodic unit unto itself, either a syllable, foot, or (possibly) prosodic word. This generalization shapes our approach to these phenomena: when a morphological category is coextensive with a prosodic category, the p-command domain of the morpheme is the p-command domain of the prosodic category as a whole. Consider figure (25), which shows (subscripts) the morphological affiliations of segments in a [CVCV] sequence.

(25) P-command above the segment



- Phonological constituents of morpheme *n*: {C_n, V_n, σ_n^2}
- P-command domain of morpheme *n*: {C_m, V_m, σ_m^1}

P-command as a relation obtains among constituents above the segment. Per the definition of the EPC advanced in §3, infixation is allowed where a phonological sub-constituent of a morpheme stands in a p-command relationship with an edge-bound segment—specifically, a segment standing at the morpheme's pre-/suffixal edge of orientation. If the underlying morphological structure of the above structure is [$_n$ CV [$_m$ CV...]], then we would expect the structure in (25) above to be allowable under the EPC, despite the dislocation of the underlying prefix to a position outside the initial syllable of the surface word. The logic of this approach extends to any given level of prosodic structure, so that an affix which is syllabified as a given prosodically complete unit may dislocate to any position within a prosodic category of the next higher order.

(26) P-command domains by affix size

affix size	p-command domain
σ	Ft
Ft	PrWd
PrWd	PrWd

A concrete example of these workings is instructive. In the well-known case of English Expletive Infixation (EEI; McCarthy 1982; Hammond 1999), a morpheme (*fucking*, *bloody*, *damn*, *effing*, etc.) prosodically characterizable as a foot or prosodic word (Artstein, 2004) infixes to a position immediately proximate to the mainstressed foot of the resulting word.

(27) (a) English Expletive Infixation Examples

(a) Base adjectival/adverbial phrase

- fucking phantasmagorical

(b) EI word:

- phan-fucking-tasmagorical
- phantas-fucking-magorical
- phantasma-fucking-gorical

The prosodic completeness of the infix is demonstrable in two ways. First, Borowsky (1993) observes that certain final consonant clusters are reduced word-finally in English, as evidenced by such alternations as *da*[m]∼*da*[mn]*ation*. Infixed forms with *damn*, however, are not pronounced with a coronal nasal, suggesting that the infixed form constitutes a full prosodic word in its own right. Second, where the infix terminates in a consonant which could serve as an onset in English, the consonant is not syllabified with the base of affixation, as in the example given in (28b) below.

(28) EI is infixation of a prosodic word

(a) Word-final Cluster Simplification argued to occur word-finally

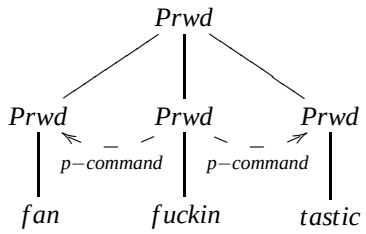
- Root word: da[m]
- Under suffixation: da[mn]ation, da[mn]able
- Under expletive infixation: un-da[m]-apologetic, *un-da[mn]-apologetic

(b) Syllabification of final nasal

- un-fuck[ɱ-.æ]cceptible, *un-fuck[ɪ.n-æ]cceptible

This speaks to the presence of a recursive prosodic word (Selkirk, 1995; Kabak and Revithiadou, 2007) in EI words. As the diagram below shows, the first branching category above the infix is the top-most prosodic word, meaning that every segment of the output word is effectively within the p-command domain of the infix. In cases like EI, the EPC allows the full range of dislocation, such that any position in which a complete prosodic word is licensed in the resulting string is an available site of dislocation.

(29) P-command relations of EI



The difficulty, it seems, is not in expanding the domain of dislocation in this case, but in restraining it occur only word-medially. The simplest account of these facts in OT begins with the observation that stress assignment is commonly preserved across morphologically related words (Alderete, 2001; Benua, 1997). Working under the assumption that transderivational relationships hold between a single derived word and the multiple output words from which is composed,[10] the surface position of the infixed expletive can be derived from faithfulness to positioning of metrical prominences in the words from which the EI form is derived.

(30) MAXPROM$_{OO}$ (Alderete, 2001)
Every prominence in O1 must have a corresponding prominence in O2.

In OT, recursive prosodic structure of the type shown in (29) is explained with the interaction between two constraints. Selkirk (1995) argues for a constraint NONREC, which penalizes recursive prosodic structure. In English this constraint must be dominated by a constraint LEX≈PR, which in turn ensures that every morphological word aligns with both edges of the same prosodic word (McCarthy and Prince, 1993b). When a morphological word is input to evaluation under this ranking, a recursed prosodic word will result. When also undominated, MAXPROM marks any candidate in which the main-stressed syllables of derivationally related words {fúcking}$_{PrWd}$ and {fantástic}$_{PrWd}$ do not also receive main stress in the derived output. Preservation of these prominences in a grammar that allows recursive prosodic words captures the basic structure of EI straightforwardly.

[10] As proposed for compounds in Japanese (Ito and Mester, 1997)

(31) Faith to prominence forces PrWd recursion

/fucking+fantastic/$_{Mwd}$	MAXPROM$_{OO}$	LEX≈PR	NONREC
☞ *a.* {{fán}-{fúcking}-{tástic}}			*
b. {fán}-{fúcking}-{tástic}		*!	
c. {fan-fucking-tástic}	*!		

We will assume that infixation of the expletive is morphologically, rather than phonologically, conditioned. This is achieved in OT with the ranking of an transderivational faithfulness constraint which requires the morphological head of the EI construction (i.e., the adjective, *fantastic* in the example below) to be anchored at the left edge of the output string.

(32) L-ANCHOR(Head)$_{OO}$
The segment standing at the left edge of O1 stands at the left edge of derived word O2.

The literature on the use of anchoring constraints to drive morphological operations is considerable (McCarthy, 1997; Kurisu and Sanders., 1999; McCarthy and Prince, 1993b; Nelson, 2003; Horwood, 2004; Lamontagne, 1996), and this appeal to it is again not a remarkable departure from canon. The constraint rules out a candidate, (c) below, which preserves the simple concatenative ordering of the morphemes. Complete transposition of the expletive and the morphological head is ruled out by LINEARITY, which penalizes segment-wise dislocation of the affix.

(33) Anchoring and Linearity force infixation

/fucking+fantastic/$_{Mwd}$	L-ANCHOR$_{OO}$	LINEARITY
☞ *a.* {{fán}-{fúcking}-{tástic}}		***
b. {{fantástic}-{fúcking}}		****!*****
c. {{fúcking}-{fantástic}}	*!	

While implementational details will vary from case to case, this kind of infixation, exemplified by the cases in (24), should not present itself as a counter-example to the proposed restriction on GEN.

5 Against Subcategorization Non-violability

Yu (2003, 2007) presents the strongest arguments against segmental DtO as a prediction of OT grammars, and proposes a radical approach to infixation in OT to rule the phenomenon out. Yu argues that infixation is simply not prosodic morphology. All patternable dislocation alternations, like the ones we observed in Katu, are the result of historical sound changes and diachronic re-analysis of morphological complex forms. Within this framework, segmental DtO should be, in the majority of cases, ruled out as a synchronic process. If phonological constraints simply do not condition affix placement in synchronic grammars, there can be no migration of morphemes away from morphologically specified edges. In this section we will examine Yu's claims in detail, and discover that Yu's model is formally unsatisfactory in meeting its objectives, not only ignoring the obvious linguistic generalization in the Katu case, but failing to rule out segmental DtO in factorial typology.

The Pivot Theory proposed by Yu (2003, 2007) holds that infixes are lexically specified to be surface edge-adjacent to any of a set of phonological 'pivot' categories, shown below. Stipulation of these categories proceeds from generalization over a convenience sample of some 140 cases of infixation in typologically diverse languages (Yu, 2003).

(34) Affix pivots (Yu, 2003, 2007)

(a) Edge pivots: first consonant, first vowel, final syllable, final vowel

(b) Prominence pivots: stressed syllable, stressed foot, stressed vowel

Pivot Theory is formalized with a long-held staple of the OT formal architecture, the alignment constraint. Yu proposes that affixes are positioned with language-particular alignment constraints construed over the edges of the observed pivot categories. Examples of morpheme-alignment constraints are abundant in the OT literature (McCarthy and Prince, 1993a; Akinlabi, 1996; Zoll, 1996). Yu's approach goes beyond simply use of such constraints, however. In order to rule out segmental DtO, Yu argues that such constraints are lexically encoded as the subcategorization frames of particular morphemes and are thus effectively *inviolable* in OT grammars. This is stated unequivocally as the Subcategorization Non-violability condition (Yu, 2003).[11]

(35) Subcategorization Non-violability (Yu, 2003)

{M$_{ALIGN}$ ≫ P} universally

The result of the theory is the exclusion of infixation from the range of phenomena previously analyzed as prosodic morphology, wherein prosodic well-formedness conditions impose positional and structural restrictions on the surface distributions of morphemes. We can see the impact of this position on analysis of the Katu phenomenon. Recall the allomorphy presented in §2:

(36) Katu NOM allomorphy

(a) NOM → [ar-] where root = $[\bar{\sigma}]_{Prwd}$
ex., kəl 'to exchange' → ar-kəl 'goods exchanged'

(b) NOM → [-r-] where root = $[\breve{\sigma}\bar{\sigma}]_{Prwd}$
ex., atʃia 'advise'→ a-r-tʃia 'things given'

(c) NOM → [-a-] where root = $_{Prwd}$[CC~
ex., klɔɔs 'to exchange' → k-a-lɔɔs 'an exchange'

Yu's theory formalizes this morphology as merely suppletive. Despite bearing obvious structural similarities to one another and being straightforwardly predictable in distribution, these allomorphs are, under the Yu theory, synchronically unrelated to one another, each lexically encoded with an alignment constraint which positions it separately from the others. This follows from the fact that no single alignment constraint can capture the distributions of both the [ar-] allomorph and the [-a-] allomorph, which surface at opposite edges of C_1, the ostensible pivot category.

(37) Alignment constraints positioning the Katu NOM

(a) ALIGN(/ar/$_{NOM}$, R, C_1, L)

(b) ALIGN(/r/$_{NOM}$, L, V_1, R)

(c) ALIGN(/a/$_{NOM}$, L, C_1, R)

This is an obvious loss of linguistic generalization. Yet more troublesome is the fact that the model fails to completely rule out the unattested phenomenon that inspires it. Within Pivot Theory, prosodic heads—such as a main-stressed syllable or foot—are acceptable pivots; thus does the theory account for the infixation

[11] Yu (2007) captures this as a by-product of the Sign-Based Morphology framework, rather than an explicit statement of ranking universals, but the effect remains the same. We will retain the original statement of the theory for expository simplicity.

cases observed in §4 above. Given the availability of lexical specification of prosodic head subcategorization, it is not difficult to construct a possible scenario in which segmental DtO can still occur.

Consider a hypothetical language with a stress system similar to that of Classical Arabic (McCarthy, 1979), which main word stress appears on the leftmost syllable of the word unless the word contains a heavy syllable, in which case stress appears rightmost. In OT, alternations of this type stem from the tension between constraints militating against stressed light syllables[12] and right-positioned foot heads (Gordon, 2000; Bakovic, 1998).[13]

(38) A hypothetical DtO stress system

- Stress pattern
  - Stress rightmost heavy syllable: $\breve{\sigma}\bar{\sigma}\breve{\sigma}\acute{\bar{\sigma}}$
  - Otherwise leftmost syllable: $\acute{\breve{\sigma}}\breve{\sigma}\breve{\sigma}$
- Necessary ranking: {WEIGHTTOSTRESS ≫ HEADFTLEFT}

Suppose next that our hypothetical language has an affix, [pa], which subcategorizes to align with the left edge of the main-stressed syllable of the surface word. When [pa] is affixed to roots of differing segmental makeup, as shown in tableau (39) below, we observe exactly the segmental DtO phenomenon that the Subcategorization Non-violability theory proclaims an impossibility. In each comparison, the prosodic subcategorization constraint makes no distinction between candidates, allowing lower-ranked phonological constraints to choose a surface position for the affix. As mapping (b) demonstrates, when stress is assigned to the heavy syllable, satisfying WEIGHTTOSTRESS, the affix must appear string-finally to satisfy the prosodic alignment constraint.

(39) Segmental DtO remains, hypothetically

mappings	ALIGN([pa]$_{afx}$, L, $\acute{\sigma}$, R)	WTS	HEADFTLEFT
a. **Prefixation** /pa+CVCVCV/ → ($\acute{\breve{\sigma}}$-pa-)($\breve{\sigma}\breve{\sigma}$) ∼ *($\breve{\sigma}\breve{\sigma}$)($\acute{\breve{\sigma}}$-pa)	(W≈L)		W
b. **Suffixation** /pa+CVCVCVC/ → ($\breve{\sigma}\breve{\sigma}$)($\acute{\bar{\sigma}}$-pa) ∼ *($\acute{\breve{\sigma}}$-pa-)($\breve{\sigma}\bar{\sigma}$)	(W≈L)	W	L

Yu's theory, then, allows what might be considered parasitic DtO of affix material: where DtO stress occurs, so may DtO morphology. Empirical evidence of this prediction, like segmental DtO more generally, is unattested. In contrast, the EPC rules out the phenomenon straightforwardly. In the DtO mapping, /pa+CVCVCVC/→ (CV.CV)(CV́C.-pa), the affix does not p-command the initial segment of the root and will be unambiguously barred from the candidate set.

6 Conclusion

Based on the facts of Katu, we have proposed a universal condition on GEN which makes the following prediction: infixation doesn't occur outside of the first (or last) syllable of a surface word unless the infix is

[12] WEIGHTTOSTRESS = Heavy syllables must bear primary stress.
[13] HEADFTLEFT = The primary-stressed foot is leftmost in the word.

a complete prosodic unit unto itself, in which case the infix may occur within the next higher category of the prosodic hierarchy appearing at the base edge. Examination of a survey of infixation types conducted by Yu (2003), a convenience sample of some 140 cases of infixation, suggests that, while the SCC allows the most commonly observed forms of infixation, it is too restrictive overall. Yu's survey was driven by theoretical concerns, and every case of infixation is a little bit different, requiring closer examination before decisive statements of the empirical validity can be made. However, we can make some positive statements about the theory's predictions. Superficial examination of the sample reveals that some 65% of the reported instances of infixation occur within an edge-bound syllable, and are almost certainly non-problematic for the proposal.[14] Cases of infixation in which the infix constitutes a complete prosodic constituent account for yet another 28% of the sample, and are likely to fall to the kind of analysis set forth in §(4). This leaves 10 of cases as likely counter-examples to the proposed restriction on GEN.

Half of these cases occur in members of the Muskogean language family, as shown below. Infixation of a segment or CV sequence over a final extrametrical syllable occurs in each case. All are problematic in that p-command, as we have defined it here, cannot apply to segments which are not parsed at the syllable level, as is commonly assumed of extrametrical segments. While an account of such cases is beyond the scope of the current paper, a solution to the dilemma might be found in closer examination of what qualifies as an "edge" segment for purposes of EPC evaluation. If the extrametrical segments are simply ignored in the computation of EPC satisfaction, the cases are not problematic.

(40) Muskogean infixation cases

Language	*Morpheme*	*Examples*
Alabama (Hardy and Montler, 1988)	type I second person singular: -ic-, -c-, -ci-	pa 'eat'/i-s-pa 'you eat coopa 'buy'/coo-s-pa 'you buy takco 'rope'/ta-ci-kco 'you rope'
Alabama (Hardy and Montler, 1988)	increase in degree: -h-	kano 'be good'/ ka-h-no 'be better' kasatka 'be cold'/ kasa-h-ka 'be colder'
Alabama (Montler and Hardy, 1991)	1st person plural: -il-, -li-, -l-	pa 'eat'/ilpa 'we eat' coopa 'buy'/coolpa 'we buy' takco 'rope'/talikco 'we rope'
Choctaw (Lombardi and McCarthy, 1991)	instantaneous: -h-	waaya 'to grow (of plants)'/ wa-h-ya
Koasati (Kimball, 1991)	pluractional: -s-	aka:non/aka-s-non 'to be hungry' akopi:lin/akopi-s-lin 'to knock something away'

Five additional cases come from the Afro-Asiatic family (Amharic, Hausa, Tigre, Tigrinya), and are more likely cases of root-and-pattern morphology than infixation. Root-and-pattern morphology should be unproblematic under the proposed account, since the exponence of the consonantal or vocalic melody is distributed over the consonant pattern. As long as some portion of the morpheme is proximate to an edge in the sense mandated by the EPC, distributed affix exponence is non-problematic. A remaining case in the Salish language Lillooet (van Eijk, 1997), wherein a reduplicative infix appears proximate to a stressed syllable, requires further investigation, but might fall to an analysis couched in terms of non-reduplicative copy.

(41) Lillooet diminutive infixation

(a) p'aʔx^{w} 'more' → p'ə<u>p'</u>ʔax^{w} 'little bit more'

(b) səmɣáw 'lynx' → səmɣə<u>ɣ</u>əw^{ʔ} 'little lynx'

These complications not withstanding, the EPC stands as a means to narrow the gap between the possible and the observed in infixation, reducing the space of possible infixation types without completely abandoning the explanatory advances made in OT under the Prosodic Morphology Hypothesis.

[14] Included in this number are all cases in which the base of infixation is exemplified as a monosyllabic root. Expansion of the minimal data presented for each case in Yu 2003 might require some adjustment of the figure.

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