

Draft : To accompany a poster of the same name at GLOW Budapest 2018 : quite preliminary, modifications to come, comments welcome.

## There are no Bracketing Paradoxes, or How to be a Modular Grammarian

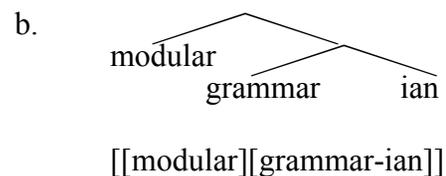
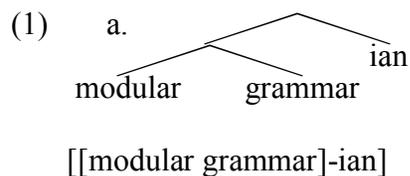
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“Morphological/syntactic structure and phonological structure are independent levels of analysis subject to independent constraints and principles. If this conclusion is correct, “lexical phonology”, in which phonological rules and morphological affixation work in tandem, is deeply wrong.” (Marantz 1987)

### 1.0 Introduction to the problem

This paper has as its central concern the proposition in Marantz (1987) that Bracketing Paradoxes (BP) have deep implications for the (in)correctness of certain proposals within the domain of generative phonology. Where it differs from Marantz’ account, and from every previous account of BPs is in the absence of an appeal to ad-hoc tools to eliminate the paradoxical derivations. It is argued herein that a theory in which phonological representations are limited to linear strings (no Prosodic Hierarchy), and where phonological operations must be triggered via phonological means (no Level-specific morphological diacritics) that Bracketing Paradoxes cease to exist. The necessary conclusion arising from this analysis is that problematic derivations like BPs signal important flaws in our theoretical proposals.

The problem posed by Bracketing Paradoxes for an appropriate analysis of both morpho-syntax and morpho-phonology is well known. Assuming a compositional semantic module, the morpho-syntactic structure of the BP must conform with its attested semantic interpretation (1a). Assuming that the phonological proximity or distance of an affix to/from its base is due to its interpretation in the same or in a different morpho-phonological cycle (as in Lexical Phonology’s Level 1/2 distinction (Kiparsky 1982a, Mohanan 1982), Phonological Strata (Kiparsky 2000, Bermúdez-Otero 2017), or Phases (Chomsky 2001, Marantz 2007) the structure of a BP must conform to its surface phonological representation (1b).



The structure in (1a) conforms to the compositional semantic interpretation of *modular grammarian*; a scholar who adheres to the principles of (Fodorian) *modular grammar* (Fodor 1985), and the structure in (1b) conforms to the phonological requirements that *-ian* be within the phonological domain of *grammar* (as evidenced by stress shift) and that *modular* be outside of the phonological domain of *grammarian* (as evidenced by its independent stress).

Since the 1970s, Bracketing Paradoxes have been subject to numerous analyses ( among which are Allen (1979), Pesetsky (1979), Lieber (1980), Nash (1980), Williams (1981), Strauss (1982), Kiparsky (1982), Selkirk (1982), Speas (1984), Pesetsky (1985), Marantz (1984a/b, 1987, 1989), Sproat (1984, 1985, 1988), Nespor & Vogel (1986), Beard (1991), Carnie (1991), Lieber (1992), Booij & Lieber (1993), Merchant (1995), Newell (2005a/b, 2008, 2018)). See Newell (to appear) for an overview of the research on BPs. In all but Newell (2018)'s (the subject of this article<sup>1</sup>), each analysis of BPs has required the proposal of a BP-specific mechanism, such as special LF rules for prefixes (Pesetsky 1979, Williams 1981), rebracketing at PF (Williams 1981, Nespor & Vogel 1986, Marantz (1984a/b, 1987, 1989), Sproat (1984, 1985, 1988)), quantifier raising (Pesetsky 1985), or suspension of Bracket Erasure (Kiparsky 1982), to account for derivations like that in (1). Another commonality of all of the previous analyses is that they assume hierarchical (bracketed) structure in both the syntax and the phonology. In this article I take such an assumption to be warranted in the syntax, but it is proposed here to be unwarranted in the phonology (see also Lowenstamm 1996, Scheer 2004, Newell 2017a, 2017b, under revision, Newell & Scheer 2017). Prosodic Phonology (Selkirk 1982, 2011, Nespor & Vogel 1986, and much subsequent work) proposed that phonological domain formation be regulated by the Prosodic Hierarchy as a replacement for undesirable boundary symbols found in SPE (Chomsky & Halle 1968), used to explain the application or non-application of phonological rules within a particular portion of a phonological string (see Scheer 2011 for an overview of arguments against these boundary symbols). A consequence of this modification of phonological theory was the introduction of BPs. BPs are only possible in a system wherein phonological representations are hierarchical. There is no bracketed structure in linear phonological representations like in SPE, and therefore there were no BPs;

(2) #modular##grammar+ian#  
       →  
       (módu)<lar> gra(mári)<an>

In (2) stress rules ignore the phonological segment + but are blocked by #. Morpho-syntactic constituency in SPE was translated into phonological [-segmental] primes inserted into the linear string. As no hierarchical structure is built in (2) constituency is not a property of this representation; it is therefore incapable of introducing a Bracketing Paradox. Although the arguments against boundary symbols are clear and convincing, the BPs introduced by Prosodic Phonology are argued here to indicate that such a theory is not the correct replacement for an SPE-style linear phonological system. In the following sections I will discuss the syntactic derivations of all classes

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<sup>1</sup> Newell, H. (2018), of the same name as this article, is a poster, presented at GLOW 41. This paper contains the full elaboration of the ideas presented therein.

of BP in the literature and demonstrate how these syntactic derivations, in combination with a non-diacritic linear phonological system (following Scheer 2008), capture the data in a uniquely satisfying way.

## 2.0 The Phonological Framework

In Newell (under revision) I introduced a liaison account of English Level 1/Level 2 morpho-phonology. This analysis is argued to be a better account of morphological class-membership than the classic analyses in Lexical Morphology and Phonology type frameworks (Classic LMP; Mohanan 1982, Kiparsky 1982, LMP-OT; Kiparsky 2000, Stratal OT; Bermúdez-Otero 2017) for the following reasons. First, it is fully modular; phonological structures make no reference to morphological classes or to morpho-phonological constraints like Alignment. It is therefore a simpler and more restrictive theory than LMP. Second, it accounts for the fact that all Level 1 affixes in English are vowel-initial; it is generally stated that lexical morphological classes cannot be uniformly distinguished based on their phonological shape. Although this may be true for some other languages (necessitating further research to incorporate them into the modular theory argued for here), it is not strictly correct for English; there is, on the surface, a one-way correlation between the first segment of a ‘Level 1’ affix and its phonological behavior (vowel-initial). Underlyingly, Newell (under revision) argues for a two-way correlation; all and only ‘Level 1’ affixes begin with a floating vowel. Third, this proposal accounts for the fact that affixes that are variably ‘Level 1’ and ‘Level 2’ are never specified for ‘Level 1’ behaviour when merged outside of another affix. It has been shown clearly that many English affixes may have both ‘Level 1’ and ‘Level 2’ variants (Giegerich 1999, Bermúdez-Otero 2011). A sub-pattern in this distribution that has gone previously unnoticed is that, among the affixes that switch classes, their ‘Level 1’ variant is always root-attaching, while their ‘Level 2’ variant is always affixed to a complex base. Given that ‘Level 1’ affixes are not restricted to root-attachment (ex. *govern-ment<sub>2</sub>-al<sub>1</sub>*) this pattern is unexpected in a system where class-membership is determined lexically.

The key parts of the analysis in Newell (under revision) is that all affixes traditionally proposed to be Level 1 in fact begin with a floating vowel, as in (3). Floating vowels link to a final empty V slot on the CV tier of the base. This analysis presupposes a Strict-CV (CVCV) linear phonology à la Scheer (2004). Affixes normally proposed to be Level 2 have a fully linked melodic tier as in (4).

- (3)    C   V   C   V   C   V   C   V            C   V   C   V   ‘grammari<sup>a</sup>n’  
          |   |   |   |   |   |   |                    |   |   |   |  
          g   ø   ɪ   ə   m   e   ɪ                      ɪ   j   ə   n   ø
- (4)    C   V   C   V   C   V   C   V            C   V   C   V   ‘grammarless’  
          |   |   |   |   |   |   |                    |   |   |   |  
          g   ø   ɪ   æ   m   e   ɪ   ø                    l   ə   s   ø

The syllabification of the floating [i] in (3) forces a monomorphemic analysis of syllabification and stress on *grammarian* as the phonological system sees a single unified string of timing slots on the CV tier after liaison is effected. In (4), however, *grammar* and *less* are not syllabified as a single uninterrupted string. *less*, being suffixal (clitic-like) leans on the phonological string to its left, explaining its lack of independent stress. For the full details of the above analysis, see Newell (under revision).

Importantly for the discussion of BPs here is the fact that whether an item will be an independent word or an affix is not predictable based on syntactic structure. Both *-less* and *-ian* are affixes, regardless of how much morpho-syntactic or phonological structure separates them from *grammar*. In Prosodic Phonology, the domains of the Prosodic Hierarchy are proposed to diverge from the morpho-syntactic domains from which they are derived (non-isomorphism), but this divergence is not taken to be the norm. Typically, non-isomorphism is seen as an occasional deviation from complete isomorphism, as in Selkirk's Match Theory (2011), and that *words* are generally the phonological interpretation of (complex)  $X^0$ s. Therefore, within a theory of the Prosodic Hierarchy the difference between (3) and (4) must be that the former is a complex  $X^0$  interpreted as a single PWd, and the latter is a complex  $X^0$  interpreted as a nested PWd structure or a Composite Group. That words are not restricted to the phonological interpretation of  $X^0$ s is evident if we look at the cross-linguistic variation in wordhood (Julien 2002, Haspelmath 2011, Newell 2017a, Newell et al 2017). As there is no coherent theory of wordhood or affixhood in the literature (but see Svenonius 2016 for a newer proposal) the lack of a fully fleshed-out definition in this article is not a failing particular to this theory, but rather a puzzle for all theories of phonological domains. The difference between the phonological structures of (3) and (4) is clear and the phonology is sensitive to it. In (3) and (4) the phonology is sensitive to the procedure of syllabification (translated as linking to the skeletal tier and the application of Government and Licensing operations within a Government Phonology/CVCV framework). Why *-less* is an affix and not a separate word is an open question for all theories of morpho-phonology.

An additional tool to be employed in the following pages is one proposed within the theory of Strict-CV phonology to delimit phonological domains; the cycle-initial empty CV proposed by Lowenstamm (1999) and elaborated on by (Scheer 2009a and subsequent work, including Newell & Scheer 2017). Scheer proposes an empty initial CV as a modular replacement for SPE's # and the PWd of the Prosodic Hierarchy. He argues that the CV, unlike the PWd, is a native phonological object, making predictions in the phonology. An initial CV is (i) an interface-visible object (both phonological rules and rules of allomorphy must have access to the CV tier), and (ii) a non-diacritic boundary marker (see Scheer 2009b). This initial CV can block phonological rules from treating (for example) prefixes/first members of compounds as part of a single phonological domain with their base (5).

(5)    C   V   C   V   C   V   C   V   C   V   C   V   C   V   C   V   C   V   C   V  
          |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  
          ∅   ∅   m   a   dʒ   ə   l   ə   ɪ   ∅   ∅   ∅   g   ∅   ɪ   æ   m   ə   ɪ   ∅

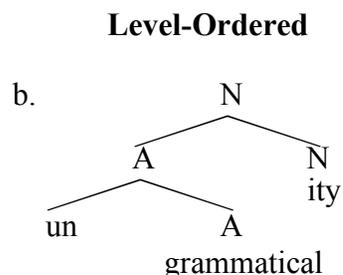
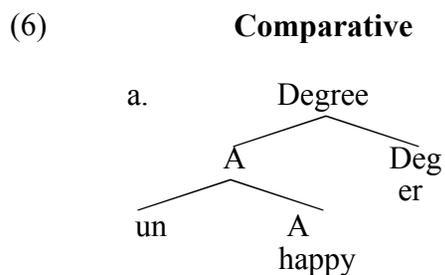
The empty CVs in (5) are inserted upon interpretation of *modular* and *grammar*, assuming a phase-based morpho-syntax as in much work in Distributed Morphology (Arad 2003, Marantz 2007, 2013, Marvin 2001, 2013, Newell 2008, Embick 2014 etc), where

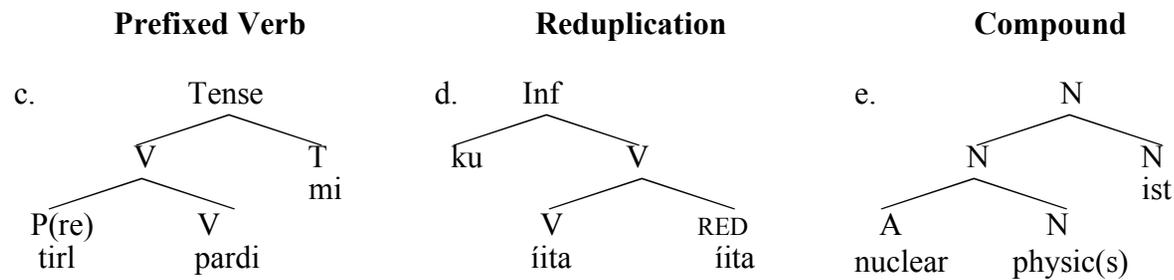
categorizing adjectival, nominal, and verbal heads trigger spell out ([[modul-ar]<sub>a</sub> [grammar-Ø]<sub>n</sub>]<sub>n</sub>). The insertion of these empty CVs is restricted phonologically, as we will discuss further in §4 when we examine particle verbs in Slavic languages.

We have in this paper, therefore, a framework where spell-out domains are determined in the morpho-syntax (phases). In the phonology, strings computed in the same phase will be treated as monomorphemic. Inter-cyclic phonological communications are blocked by the non-interaction of melodic structure in separate cycles, sometimes with the aid of an initial empty syllable/CV. Inter-cyclic communication will be forced by phonological means in the case of liaison, or any case of Phonological Merger (Newell & Piggott 2014) where a phonological operation is triggered, forcing the insertion of external phonological strings into a previously computed domain and triggering resyllabification (as in (3)). We will see below that this results in a purely phonological analysis of phonological domains and the beginning of an explanation for the cross-linguistic pattern whereby prefixes are much more likely to be phonologically independent from their base than suffixes. The following sections will demonstrate how the proposals described here combine with independently supported morpho-syntactic derivational properties to eliminate Bracketing Paradoxes.

### 3.0 The different kinds of bracketing paradoxes

Newell (to appear) summarizes the history of the study of Bracketing Paradoxes, and notes that cross-linguistically they can be split into 5 types. The comparative BP is specific to English (6a) and can be considered a subset of the Level-Ordered paradoxes, where a Level 1 affix is merged outside of a Level 2 affix (6b). The comparative gets its own entry due to the amount of ink that has been spilt over it, including two LI squibs: Sproat's (1992) *Unhappier is not a "Bracketing Paradox"* followed by Kang's (1993) *Unhappier really is a "Bracketing Paradox"*.





(Newell to appear)

Additional categories of BP are prefixed verbs (Warlpiri, Nash 1980 in (6c)), reduplicative structures (Kihehe, Marantz 1987 in (6d)) and compounding paradoxes (6e).

Kiparsky (1982), Newell (2005a,b, 2008), and others have noted that it appears that in all BPs there is always one component (affix or compound modifier) that does not project; one component that has the morphosyntactic properties of an adjunct. Although an adjunct analysis of the left members of BPs involving *un-* and compound modifiers is not too controversial, it is not clear that the structures of particle (prefixed) verbs or reduplication involve modificational adjunction; these constructions will be discussed in §4 and §5 respectively. The following section will begin with the relatively simpler analyses of BPs like in (6a/b/e).

### 3.1 Adjunction and Liaison

The problem with the BPs in (6a/b/e) stems uniquely from the proposition, specific to Lexical Morphology and Phonology and its current iteration, Stratal Optimality Theory, that affixes are assigned to either Level 1/cohering/non-analytic status or to Level 2/non-cohering/analytic status. This lexical status (lexical in the sense that it must be an attribute memorized as part of the lexical entry of each affix) appears to be assigned fairly randomly in the case of derivational morphology. Both classes of affixes can create verbs, nouns, etc. But, as mentioned above, after the Level Ordering Generalization (Siegel (1974), Allen (1979)) was proposed, it quickly became clear that (i) affixes appeared to be rampantly cross-listed (Giegerich 1999) and (ii) that the hypothesis that Level 1 affixes were uniformly affixed inside of Level 2 affixes, did not actually hold true (Fabb 1988).

Before going on, another proposal in the literature must be discussed. Works like that of Plag (1999) and Raffelsiefen (1999) propose that the Level 1/2 distinction has no reality, and that the true generalization is that each affix must be attributed its own specific grammar.

This proposal is based on patterns like the *-ar/-al* distinction, where *-al* creates adjectives from bases that do not contain a local /l/ (ex. *affixal*) while *-ar* creates adjectives from bases that do contain a local /l/ (ex. *scalar*), or the phonological selectivity of *-ive*, which will only attach to bases ending in [t] or [s] (cf. *gerundive*), or the fact that stressed affixes that are vowel-initial may avoid stress-clash (*móuntaineer* vs \**plántáineer* (for *-eer*, *-ese*<sup>2</sup>, *-ize*, but not *-ee*). It is proposed by proponents of morpheme-specific theories that restrictions like these indicate phonological peculiarities of particular affixes. What must be noted about these kinds of phonological selectional restrictions is that they are not transparently phonological (ex. words like *full* can be suffixed with the /l/-containing *-ly*), and that these restrictions are not all clearly affix-specific (avoidance of stress-clash is not restricted to word-internal domains (*fifteen mén*, *Ténéssee Williams*)). Raffelsiefen and Plag have proposed that the *-all/-ive*-type patterns are indicative of “independently motivated phonological markedness constraints such as foot binarity ... and paradigm uniformity...” in conjunction with affix-specific constraints (Raffelsiefen 1998:897), putting the task of dealing with these restrictions strictly within the phonological module. However, there is another possibility; that *-all/-ive*-type restrictions are allomorphic. They are likely to be, just like the restriction that comparative *-er* attach to short stems else it be spelled out as *more*, a property of Vocabulary Insertion (post-syntactic, as in realizational frameworks). The current article is not the place to have the debate over whether morpheme-specific distributional patterns are morphological or phonological, even though the question of where to draw the line between phonological and morphological phenomena is one of great importance in morpho-phonological theorizing. One’s theory of phonology can change drastically depending on where the line is drawn. For this reason, the current study restricts itself to the unquestionably phonological phenomena such as regular stress assignment in the English examples, and to additional other strictly phonological rules in the discussions of other languages for support. As phonological patterns that are not general in the language are arguably outside of the phonological computation, they will be put aside.

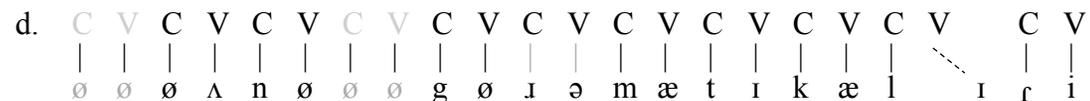
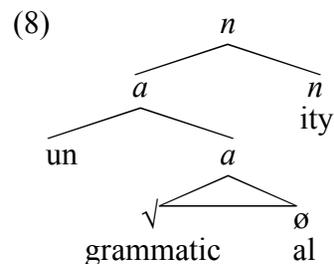
### 3.1.1 *Ungrammaticality-type Bracketing Paradoxes*

Returning to the discussion of the Level 1/2 phonological distinction, Newell (under revision) proposes independently of the BP data, that the two classes can be defined strictly phonologically; traditionally-labeled Level 1 affixes begin with a floating vowel, and traditionally-labeled Level 2 affixes do not. Affixes with an initial floating vowel must merge inside of the domain to their left, as the vowel needs to link to the CV tier in order to be pronounced. This analysis is directly akin to the generally-accepted phenomenon of liaison in French (ex. *peti[ɛ] garçon* vs. *peti[t] ami*). What this entails for Bracketing Paradoxes is that it is only linear order, and not the Prosodic Hierarchy or spell-out in a particular phase/cycle, that determines the phonological behaviour of these ‘Level 1’ affixes. Just like infixation (*absobloodylutely*) and Phonological Merger of unfootable material (see Newell & Piggott 2014 and Newell & Scheer 2017 for similar phenomena in Ojibwe), liaison obscures the boundaries between phases for the strict reason that the phonology does not contain, and therefore cannot be sensitive to, a representation of hierarchical structure. Therefore, in BP derivations like

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<sup>2</sup> Raffelsiefen notes that there are 2 *-ese* affixes. *-ese*<sub>1</sub> takes place-names as its base of attachment (*Jàpanése*) while *-ese*<sub>2</sub> attaches to other nouns (*compùterése*). The former causes stress-shift, and the latter does not attach to finally-stressed bases. To account for the distinction we might propose that *-ese*<sub>1</sub> attaches to roots and that apparent stress-clash is just regular cycle-internal stress assignment, and that *-ese*<sub>2</sub> affixes to already stressed bases.

*ungrammaticality* there is no issue with the phonological output being non-isomorphic with the morpho-syntactic representation. The morpho-syntax is sent to spell-out in phases, and in line with the requirements of a compositional semantic module the interpretation of *ungrammaticality* is ‘the property of being ungrammatical’ (8), an interpretation that is consistent with the morpho-syntactic structure of the word. The output of phonological computation is strictly linear as in (9a-d).



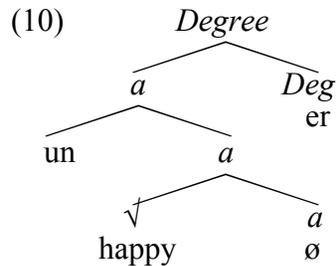
Beginning with the two parallel phases in (9a,b), we must note that the prefix *un-* is clearly a morphological adjunct. Studies of adjunction in the syntax must contend with the fact that adjuncts are islands for movement, and that they evidence prosodic separateness from their bases of attachment. Uriagereka (1999) proposes to account for the particular nature of adjuncts by proposing that they are interpreted

in a separate but parallel syntactic and phonological computation, and then merged post-spell out. Given the arguments in Newell (2005a/b, 2008) that *un-* (i) does not project and (ii) merges with multiple syntactic categories, and (iii) adds only compositional meaning to its base of attachment, it can be concluded that *un-* is an adjunct that undergoes spell-out before merger into the tree containing *grammatical*. This being the case, both *un-* and *grammatical* (a phrase itself, triggered by the category-defining head *-al*) are interpreted separately before merger (phonologically represented as linearized in 9c). This independent interpretation will endow each of these domains with an initial CV in English, separating them phonologically even under affixation. This explains why the nasal consonant in the prefix does not assimilate to the place of articulation of the following consonant; (i) the nasal is interpreted before affixing to the base, so default place is assigned to it, and (ii) even if default place assignment were to wait to be assigned, these two consonants are not local enough to share phonological structure.

Affixation of *-ity* leads to the spell-out of *n* in (8). As *n* contains *a*, *grammatical* will be visible to the floating vowel of *-ity*. This floating vowel will link to the final empty vowel to its left. This linking creates a structure identical to one that would have been created were *grammatical* and *-ity* to have been spelled-out in the same phase. Resyllabification (or the re-analysis of Government and Licensing relations in Government Phonology (GP)) and stress shift therefore occur, but do not effect *un-*, as it is insulated by empty syllabic space from the domain of syllabification of *grammatical*. What is clear from the proposed derivation of *ungrammaticality*, and of similar BPs, is that there is at no point a paradoxical output, as the phonology never contains any hierarchical representation. No matter the morpho-syntactic distance of the liaison affix from its base, it must be syllabified inside the domain to its left.

### 3.1.2 Comparative Bracketing Paradoxes

The derivation of comparative BPs is analogous, but here the adjuncthood of *un-* insulates it from conditioning the allomorphy of the comparative (or superlative) suffix as well as ensuring that it is not in the domain of main stress assignment. The base of attachment of *-er/-est* is the phonological domain to its left. As *un-* is never syllabified within the domain of the root, it is invisible to (or unimportant to) the Vocabulary Insertion of the comparative suffix. The structure in (11), necessary for the correct semantic interpretation of *unhappier* (more unhappy, rather than not more happy) is not incompatible with a linear phonological representation where the comparative is sensitive to the size of its domain of attachment, a domain that excludes *un-*.

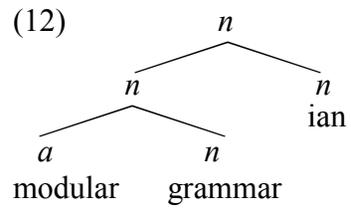


The stages of interpretation of (10/11) are analogous to those of *ungrammaticality*. *un-* and *happy* will be interpreted separately and then linearized. The degree head, with its initial floating vowel, merges inside the domain to its left; a domain that excludes *un-*. Scheer (2016) demonstrates that allomorphy may be sensitive to the CV/skeletal structure it merges with (but not to melody). The invisibility of *un-* to *-er/more* allomorphy is consequently unsurprising.

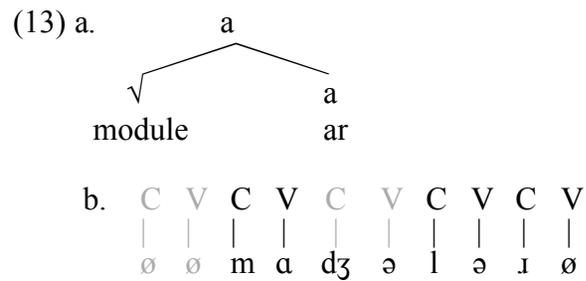
One complication here is that the comparative (and superlative) affixes may condition suppletion (allomorphy) of the bases they attach to (ex. *good/better/best*). The comparative affix must therefore be able to be interpreted in the same spell-out domain as the base for which it conditions allomorphy (Bobaljik & Wurmbrand 2013, Bobaljik & Harley 2017). There are two ways to accomplish this. The first is to propose that the comparative head is always spelled out with its base (that there is no null *a* in (10), and *Deg* is the adjectival categorial head conditioning spell out of *happy*). *un-* will be spelled out in a parallel workspace, then merged with the root *happy*. The *Deg* head will merge with *un-<sup>h</sup>happy*, and the entire *Degree* projection will undergo spell out as a unit. If there is an adjectival head between the root and *Deg* [[[*un*] *happy*] *a*] *Deg*], then Domain Suspension (see Bobaljik & Wurmbrand 2013) will prevent the *aP* from undergoing spell-out until the *Deg* head is merged in the cases where the root has multiple allomorphs. Domain suspension will have to also be operative in derivations with an outer *Superlative* head (see Bobaljik 2012 for a discussion of the universal structure of comparative and superlative constructions). See §3.1.3 just below for a more detailed discussion of Domain Suspension.

### 3.1.3 Compounding Bracketing Paradoxes

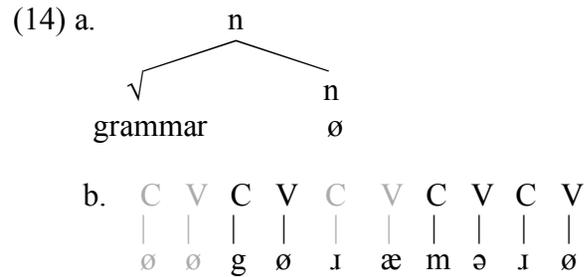
We can anticipate now the discussion of BPs that arise in compounds such as *modular grammarian*. The compositional semantics dictates that the syntactic structure of such a compound will be as in (12).



This structure, like in the last two sections, does not predict any paradoxical domain creation in the phonology. First, *modular*, like *un-*, is an adjunct and therefore will be computed in a separate workspace before merger with *grammar* (13)

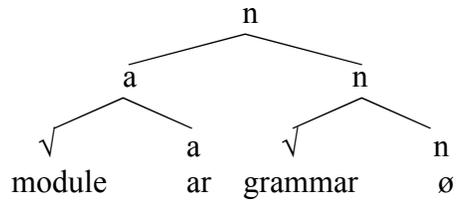


At the same time the noun *grammar* will be derived.



The merger of the two gives (15)

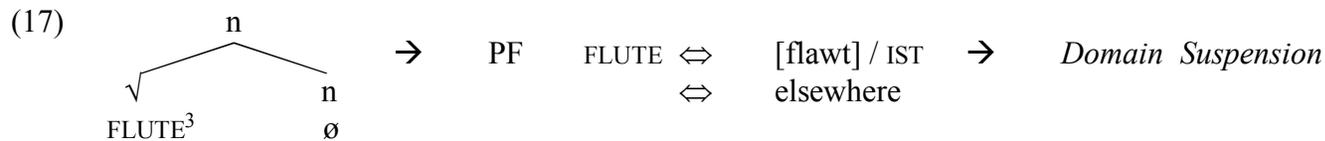
(15). a.



Merger of the adjectival *-ian* may then proceed, and its floating initial /i/ will cause merger of the suffix into the domain of *grammar* causing resyllabification and stress shift. Notably, the domain of *modular* is unaffected, as it is separated from the domain of *grammarian* by an empty CV. The final structure is given below in (16).



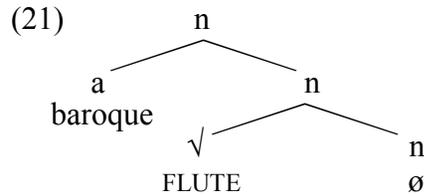
Affixes in compounds may also trigger allomorphy, like the alternation seen in *physics~physicist* or *flute~flautist*. Here we can, as above, appeal to the independently necessary operation of Domain Suspension. Bobaljik and Wurmbrand (2013) argue that morphemes that evidence allomorphy that is conditioned outward-in will delay Vocabulary Insertion (VI) until the next head is merged into the tree, allowing for the suspension of spell-out just in case allomorphic selection will be triggered by said outer head. Consider the following derivation.



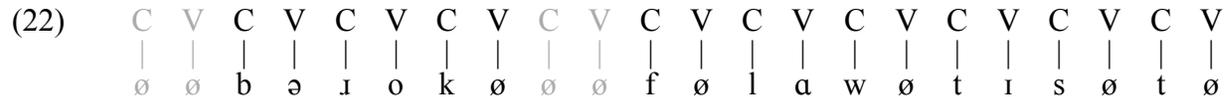
In (17) the structure [[FLUTE] n] is sent to PF. Vocabulary insertion is attempted, but is halted by the presence of a statement of allomorphy linked to the morpheme FLUTE. Domain Suspension allows for a subsequent head to merge and VI to again be attempted.

<sup>3</sup> Small-caps indicate the morpho-syntactic features of the root/affix, which may be syntactico-semantic features or an index number à la Harley (2014).





Since the modifier does not project in the syntax, no phase will be triggered and the structure will not be sent to PF (only a new segment of *n* is projected, and not a new category (Kayne 1994)). No new phase head has been added to the structure and therefore the derivation will continue with the merger of *-ist*. Upon spell-out of this structure (identical to that in (20)) VI will occur for *flute* and *-ist*, giving *flautist*. As *flautist* is the totality of the domain spelled out at this phase, and empty CV will be inserted at its left edge as in (19), giving the final phonological structure of *baroque flautist* as in (22).



The above derivation gives us the (i) separate domains of stress assignment and syllabification of the two members of the compound, (ii) allomorphic selection of *flaut* and (iii) the incorporation of *-ist* into the phonological domain of *flaut*. All other compounds evidencing root allomorphy, like *nuclear physicist*, will be derived in the same manner. As in the sections above, no BP arises due to the fact that phonological structure is computed over the linear string.

#### 4.0 Particle Verbs

Particle verbs are among the original Bracketing Paradoxes. The first full description of a BP was Pesetsky (1979)'s analysis of Russian Yer deletion in Prefixed verbs.<sup>4</sup> Pesetsky notes that Yer vowels (alternating between high vowels (realized as mid-vowels) and unpronounced vocalic positions) are subject to the two following rules:

(23) Yer lowering: Lower a Yer in a syllable preceding another Yer (I/U → e/o / \_\_ C<sub>0</sub> I/U)

(24) Yer deletion: Delete any non-lowered yers.

<sup>4</sup> Here when I say prefixed verbs or particle verbs I mean lexical (not suprallexical) in Slavic, and separable (not fused in verbal constructions) in Germanic. The literature on different kinds of particle verbs is large and particle variants are beyond the scope of this paper.

When multiple Yers are evidenced in a row, we can see that the rule of Yer-Lowering applies from left-to-right, as in the following derivation of *deněček* ‘day-diminutive-diminutive-nominative’.

(25)	Underlying	[[[[dIn] Ik] Ik] U	
	Cycle 1	---	
	Cycle 2	e	
	Cycle 3	e	
	Cycle 4	e	
	Yer-Deletion		∅
	Other rules	denekek	→ deněček

(Pesetsky 1979:7)

If Yer-Lowering were sensitive Right-to-Left, the predicted form would be the ungrammatical \*denkk. The paradox comes into view when considering prefixed verbs. There, the realization of the vowel in the prefix varies depending on whether the following syllable contains a pronounced vowel (see also Matushansky 2002 and Gribanova 2012 for discussions of the morpho-phonology of particle verbs in Russian).

- (26) a. podU-žIg-l-U → podžĕg ‘set fire’  
under-burn-past-masc.
- b. podU- žIg-l-a → podožgla ‘set fire’  
under-burn-past-fem.

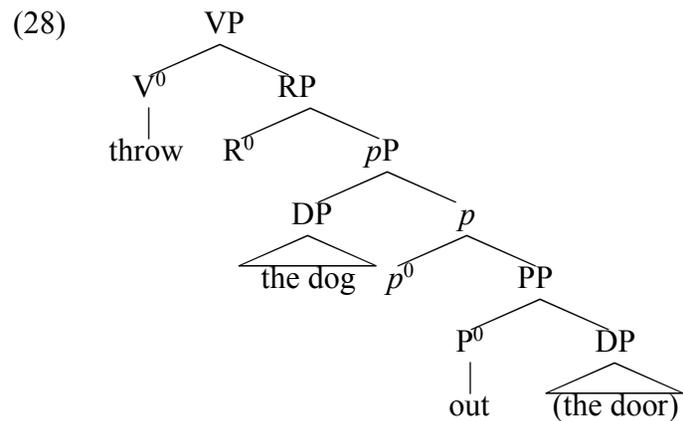
Note that the output of (26a) is distinctly *not* the pattern that occurs in (25) where all vowels but the final Yer are realized. This pattern could be predicted if the prefix were merged after (structurally outside of) the masculine suffix, and the derivation proceeded cyclically as in (27)<sup>5</sup>.

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<sup>5</sup> Matushansky (2002) proposes that the prefix is marked as non-cyclic, causing it to be ignored by cyclic rules like Yer-Lowering. As argued in the previous sections, this analysis is diacritic and non-modular and therefore cannot be adopted here. We will see that there is a fully modular explanation for the behavior of these morphemes.

- (27) Underlying [podU[[žlg] l-U]]
- Cycle 1                    ---  
 Cycle 2                    žeg-l-U  
 Cycle 3                    ---            ---  
 Yer-deletion /podžëg/  
 (+ other phono rules)

The problem here is that the prefix is decidedly *not* merged outside the final U ‘masc.’. Firstly, the semantic interpretation of particle verbs, including this one, may be idiomatic. Here the meaning ‘set fire’ is not predictable from the simple composition of the meanings of the particle and the verb. It is generally held that all members of an idiom must be found within a certain domain, at the phrasal level proposed to be the vP (Marantz 1984b, 1997). Also, the syntactic literature on particle verbs has converged upon the conclusion that the particle heads a PP/Small Clause complement to the verb, as in (28). For the detailed syntactic motivations behind this see (Wurmbrand (1998), Taraldson (2000), Ramchand & Svenonius (2002), Svenonius (2004), Caha & Ziková (2016) and those cited within).



(Svenonius 2004a: 222)<sup>6</sup>

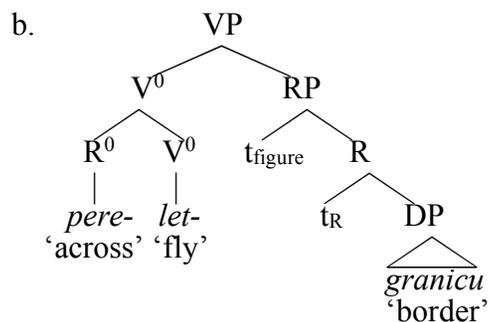
It is clear in many languages that the particle does not remain in-situ (hence the possibility of reordering within the VP in (28); *throw out the dog*). In Slavic languages these particles are always preverbal and cannot be separated from the verb. There have been two

<sup>6</sup> The *ground* argument (the door) is not pronounced.

different proposal types in the literature explaining how the particles come to be pronounced in this position.<sup>7</sup> The first is via head-movement, as in (29).

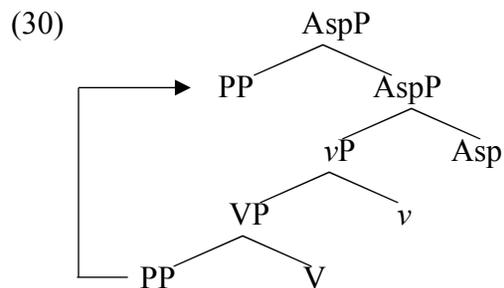
- (29) a. Samoljot pere-letajet granicu.  
 plane across-flies border  
 ‘The plane is flying across the border’ (Russian)

(Svenonius 2004a:220)



(Svenonius 2004a:223)

The second (and less common) proposal is that particles come to precede the verb via phrasal movement, as in (30).



(Caha & Ziková 2016: line 442)

<sup>7</sup> The motivation for movement of the particle is proposed to be the necessity of the null *ground* operator (perhaps incorporated into the particle itself, to scope over and bind a variable in Asp(ect)P, a phrase that sits above VP (see 30). This is proposed by Svenonius (2004) to explain the perfectivizing effect of particles. Note that in Germanic languages the particle may be separated from the verb by the object (English : threw the dog out) by morphology (German: Part-zu-Verb) or by V2 movement (German: *AUF hat Peter die Tür gemacht (nicht zu)* ‘Peter has opened the door’ (Wurmbrand 1998:272)). This behaviour is consistent with an XP movement account of particles, to be supported in this section, following Svenonius (2004) and Caha and Ziková (2016).

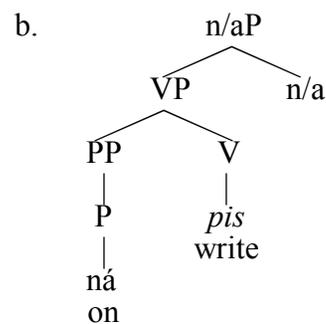
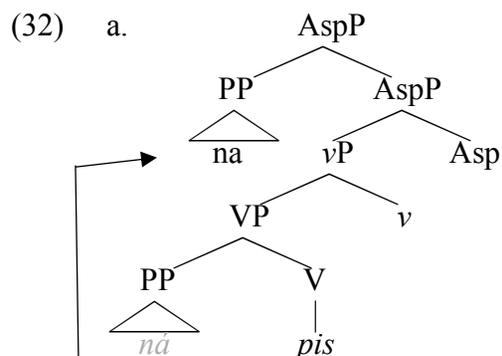
Wurmbrand (1998) for German, Svenonius (2004) for Russian, Taraldson (2000) for Norwegian, and Caha and Ziková (2016) for Czech give arguments that the particle, even in Slavic languages where it is never separated from the verb, moves to the left of the verb via XP movement. The evidence for this for Czech in Caha & Zikova (2016) is especially striking.

Caha & Zikova (2016), following (Zikova 2012 (following Scheer 2001)), note that there is a difference in the vowel length of the prefix depending on whether it finds itself within the scope of an aspectual head. If it is within the scope of Asp, the particle must raise (to scope over and bind the perfectivity-inducing variable in Asp<sup>0</sup> (following Svenonius 2004)). If it is not, there is no trigger for raising and the prefix stays low (ex. in root VP nominalizations). If the particle remains in the VP, its vowel is spelled-out as long, and if it raises its vowel is short.

- (31) a. *Petr na-psal dopis*  
 Petr on-wrote letter  
 ‘Peter wrote the letter’

- b. *ná-pis*  
 on-write  
 ‘a sign’

(Caha & Ziková 2016: line 76)



(Caha & Ziková 2016: line 329)

Caha and Zikova demonstrate this correlation very clearly with reference to verbal, participial, and ‘high-nominalization’ (outside of vP) constructions (short vowel) versus adjectives and ‘low nominalization’ (inside vP) constructions (long vowel). All of the constructions with short vowels are shown to be perfective, hence containing an AspP, while the constructions with long vowels are not perfective, indicating the absence of AspP; the trigger for PP raising. The motivation for vowel lengthening is proposed to be templatic.<sup>8</sup>

<sup>8</sup> Scheer (2001) proposes that the prefix vowel alternations are due to lengthening, while Zikova (2012) and Caha & Zikova (2016) argue that the alternation must be due to vowel shortening.

Inside a PWd (inside nP/aP) the vowel will be long and outside the PWd (in AspP) the vowel will be short.<sup>9</sup> Importantly for the discussion of the syntactic structure, Caha & Zikova argue that this spell-out distinction is only possible if the particle has escaped spellout in the domain of vP and remained in the spell-out domain of an nP. If the particle were to move via head-movement, this distinction would not be predicted. Morphemes that are co-members of a complex head are almost uniformly considered to be spelled out in the same cycle/PWd (see Dobler et al (to appear) for an exception that does not impact the discussion here). As the particle is not in the same PWd as the verb in constructions containing AspP, the analysis of Svenonius (2004), where XP-movement of the PP to Spec,AspP is responsible for the aspectual effects of lexical particle in Slavic languages, is therefore supported.

#### 4.1 Particle Verbs Bracketing Paradoxes Resolved

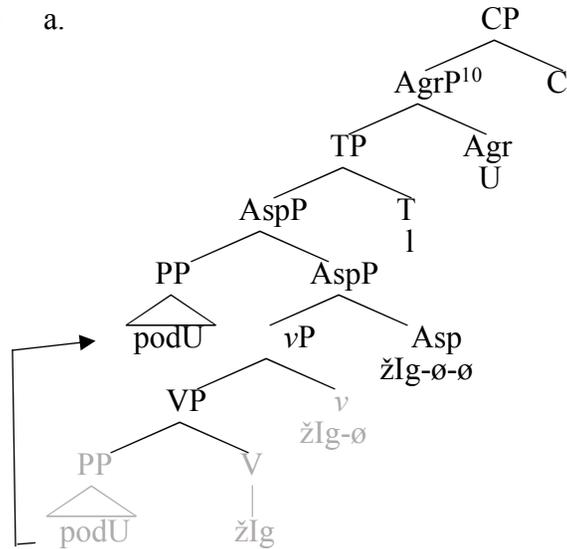
Based on the evidence from Czech, following Svenonius' arguments from Russian, from the separability of particles and verbs in Germanic languages, and a host of other data that indicate a cross-linguistic pattern whereby particles are interpreted separately from the verbs with which they combine, we can argue that XP movement is the means by which particles are spelled out to the left of the verb, raising into AspP to bind a variable. This will allow a uniform analysis of the cross-linguistic particle verb BPs exemplified (but by no means exhausted) by the following data.

First let us consider the Russian BP from Pesetsky (1979). Here the particle will project a PP in the complement of vP.

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<sup>9</sup> Another option for explaining the vowel-length difference in these examples might be that the vowel is spelled out as short if interpreted alone (when moved, following Johnson 2004's theory of numerphology), and long if spelled out in combination with another morpheme. A correlation has been noted in the literature between the licensing of long vowels and diphthongs and the presence of a following vowel (see Lowenstamm 1996, Kaye 1990). This distinction, however, could not be generalized to all long and short vowels in Czech.

(32) a.



In the derivation above, the particle will be spelled out in PP if PP is a phase. If PP is not a phase, then PP will undergo spell-out upon movement to Spec,AspP. Remember that left-branches (adjuncts, as well as specifiers) must undergo interpretation before (re)merger into the tree according to Uriagereka (1999) (see also Johnson 2004). The output of the first cycle of interpretation is therefore (33).

(33)

C	V	C	V
p	o	d	U

In (33), the final Yer is unlinked. According to the rule of Yer Lowering, a Yer will only be lowered and pronounced if followed by another Yer in a subsequent syllable. In the terms of Government Phonology, final Yers are licit due to a parameter that permits final vowel positions to remain empty/unlinked/unpronounced.<sup>11</sup>

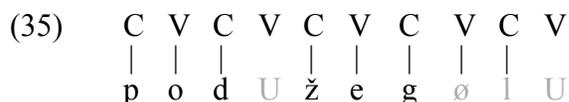
<sup>10</sup> AgrP is included here for expository purposes. Should agreement not project in the tree, but rather emerge due to checking relations in the syntax, nothing will change about the analysis herein.

<sup>11</sup> Languages that require final vowels to be pronounced will not permit consonant-final words.

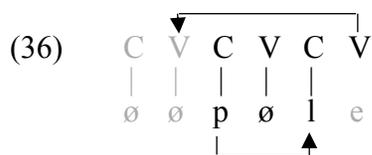
The following cycle will see the spell-out of the verb and its suffixes. Gribanova (2013) argues that the verb in Russian moves to a position above vP and below TP; AspP in (32). As the verb has raised out of vP it will undergo spell-out in the CP phase. Here the output of the CP phase will be as in (34).



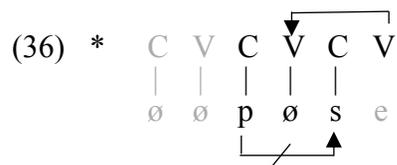
In (34) the final Yer remains unpronounced for the reasons stated above, and the *l* deletes for independent reasons. As the Yer in the root is followed by another Yer, or in terms of GP, as the root Yer is non-final and ungoverned, it must be linked and pronounced. Subsequent to this cycle of spell-out the particle and verb are linearized.



In (35), the final Yer of the particle is not followed by a Yer, as the root-Yer has been previously lowered and linked to the CV tier. It is now indistinguishable from a regular vowel and does not trigger Yer-Lowering of the particle's final vowel. In terms of GP, the full vowel of the root governs the vowel of the preceding syllable, allowing it to remain unlinked and unpronounced. Note that this derivation informs us about the order of operations in the second phase. First *žlg-l-U* is spelled out, and then *podU* and *žlg-l-U* are linearized. If linearization preceded the application of phonological operations on *žlg-l-U* then *podU* would see the yer in *žlg* and would spell-out as *podo*. Also of note here is the distinction in edge-marking between Russian and the English examples in (5) through (22). Russian phase edges will not be marked by an empty CV. This lack of marking is independently supported in Lowenstamm (1999) and Scheer (2009a). Initial CVs are supported only in languages whose onsets conform to the Sonority-Sequencing Principle. In onsets that rise in sonority, the relationship of Infrasegmental Government applies between the two consonants. Obstruents, being structurally more complex than sonorants can govern such a following consonant, permitting the intervening vocalic position to remain unpronounced. This, in turn, allows the vowel of the initial empty CV to be governed by the full vowel that follows the complex onset (36).



In languages where obstruents are not uniformly in a position to Infrasegmentally Govern a sonorant in complex onsets (like in Russian), the vowel separating the two consonants must be governed by a following overt vowel, leaving no governor for an empty vowel in and initial CV. as ungoverned vowels must be pronounced, there must be no initial CV in such languages.



Therefore, when the particle and verb are linearized in (35), the root vowel of the verb is local to the final vowel of the particle, allowing for a government relation to operate between them. This explains why the realization of the prefix Yer is dependent on the pronunciation of the following vowel. In derivations where the following vowel is not pronounced, as in *podožgla* the particle's Yer is ungoverned (as well as non-final) after linearization, and therefore must be pronounced. This configuration also explains why particle final consonants are not devoiced (they are not domain-final, and final devoicing is a post-cyclic rule), why particles can affect stress placement/resist unstressed vowel reduction in pretonic position (they are within the phonological domain of the verb), why their final consonants trigger retraction of following front vowels instead of undergoing palatalization (retraction applies to  $C_{[+back]}V_{[-back]}$  sequences that are linearized post-cyclically), and why hiatus is not resolved across a particle-verb boundary (/po + obedatj / → [poobedatj] (\*pobedatj) 'to have lunch' (Gribanova 2008:224), as hiatus resolution is demonstrably a cyclic rule. We can therefore conclude that cyclic rules are those that apply during the first cycle of interpretation of a phonological string, while post-cyclic rules apply after linearization. Stress/syllabification rules will reapply when retriggered by the merger of two phonological strings into a single domain.

The paradox related to particle verbs can now be resolved by stating, following Ramchand & Svenonius (2002), that the idiomatic interpretation of particle verbs comes about in the same way that other vP idioms do (see Marantz 1984b, 2007, Biskup 2018 for vP domain restrictions on clausal idioms like 'He kicked the bucket'). The phonological separateness of particles and verbs cross-linguistically is due to the need for the PP to raise into Spec,AspP. Some languages will then allow for further operations that separate the particle and the verb (ex. Germanic) and others will not (ex. Slavic). Derivations like the preceding can easily be extended to explain other particle-verb phonological patterns cross-linguistically, including but not limited to, Hungarian vowel harmony (which does not cross the particle-verb domain (37)), Warlpiri vowel-harmony, stress-assignment, and verb conjugation class which is sensitive to the domain of the verb and not to the particle (an empty phase-initial CV will be present in (38)), and compound stress patterns and separability of the particle verb in German (39) (see also Biskup, Putnam & Smith (2011) for a discussion of verb-particle spell-out).

- (37) a. át-lép-és                      b. le-tartóztat-ás  
across-step-dev                      down-hold-dev  
‘transgression’                      ‘arrest’  
(front/back harmony: Kenesai 1995:158)
- (38) a. [[pirri-] kuju-rnu]        b. pirri-kiji-rni  
preverb-throw-PAST                preverb-throw-nonPAST  
‘to scatter’                            ‘to scatter’  
(i/u vowel harmony: Nash 1980:140)
- (39) a. áuf-gèben                      c. ver-gében  
part-give                              prfx-give  
‘give up’                                ‘forgive’  
(particle vs. prefix stress: Wurmbrand 1998)

To conclude this section, particles are interpreted separately from the verb with which they combine due to the fact that they XP-move out of the vP. This movement ensures that they undergo spell-out separately from the verbs that select for them. Subsequent to movement, particles may be treated as left-members of compounds in languages that mark the left edge of a phase with an empty CV (ex. German, Warlpiri), and may be incorporated into the phonological domain of the verb in languages that do not have the ability to CV-mark their phonological domains (ex. Russian, Czech). The proposal in Newell (2008) that all left members of Bracketing Paradoxes are adjuncts is argued here to be wrong, but it still held a core insight. Left branches, adjuncts and specifiers, will be spelled-out separately from the structures they combine with. This generalization over spell-out domains, the independently supported proposals the particles undergo XP movement (Wurmbrand 1998, Taraldson 2000, Svenonius 2004, Caha & Zikova 2016) and a flat theory of phonology combine to erase any paradoxical nature of particle verb constructions. The question of why there is a general tendency for particles cliticize to verbs can be subsumed under the question of why phonological clitics behave as dependents in general; a question to which there is still no comprehensive answer, especially for clitics that are not sub-minimal.

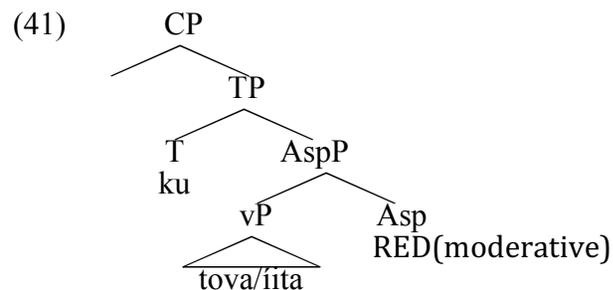
## 5.0 Reduplication

Finally, let us turn to the discussion of the Reduplication paradox presented in Marantz (1987), taken from Odden & Odden (1985). This section does not claim to have anything to say about all of the cases of over- and under-application in BPs that may be presented as paradoxical. It will only demonstrate how the analysis of Particle Verb and ‘Level 1/2’ BPs in the sections above can be easily extended to cover the Kihehe-type domain mismatches in Full Reduplication as exemplified in (40) below.

- (40) a. ku-tova-RED                      →      ku-tova-tova                      ‘to beat a bit’  
          Inf-beat-RED

- b. ku-iita-RED → kwíita-kwíita ‘to pour a bit’  
 Inf-pour-RED
- c. kú-lu-iita-RED → kú-lwiita-lwiita ‘to pour it a bit’  
 Inf-it-pour-RED
- d. n-teléka-RED → neleka-neleka ‘I will cook a bit’  
 1sg-cook-RED

In (40a) we see the output of a reduplicated consonant-initial verb. It is clear that the reduplicative marker scopes outside the domain of the verb (so that the verb may be copied), and under the infinitive (so that it may avoid copying). Yet, as pointed out by Marantz, there are two environments where an outer affix will apparently ‘tuck in’ under the reduplicative morpheme, even though this causes a mismatch between the phonological and morpho-syntactic domains. In (40b,c) we see constructions with V-initial verbs following prefixes that end in a high round vowel. This vowel will syllabify as a glide in the onset of a following V-initial morpheme. In cases where gliding combines with reduplication the affix that syntactically scopes over the reduplicative morpheme behaves as though it sits within the reduplicative domain. Note that the reduplicated domain is the stem, not the verb root (final vowels and other suffixes are reduplicated if present). I have put the RED affix in AspP and the Infinitival prefix in TP. These labels are not crucial. What is crucial is that RED scopes over the vP, and under the position of the Infinitival marker.

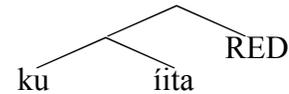


Marantz argues that ‘The Kihehe reduplication involves a morpheme unit, not some unit that is phonologically definable independent of the stem.’ (204). He proposes that Kihehe reduplication is the reduplication of a morpheme-sized-unit that corresponds in size to the root/stem (there is no phonological size limit on the domain of reduplication). He argues (along with Sproat 1985) that BPs are caused by a phonologically-induced rebracketing, as in (42b)

(42) a. Phonological structure isomorphic with (41)



b. Rebracketed structure



Marantz proposes that adjacency at phonological structure associative. This entails that  $[ku[iita RED]]$  is equal to  $[[ku iita] RED]$ . The requirement in Kihehe that high-round segments syllabify as onsets if possible triggers this re-bracketing in the case of vowel-initial stems, or in the case of floating nasal features (see (40d)). Therefore, at spell-out, RED will scope over the relevant prefixes, explaining their inclusion in the reduplicative domain.

The translation of Marantz' solution into a derivation that functions in the system proposed here is not difficult. First, we must take into account the evolution of syntactic theory, and the subsequent effect of phases on phono-syntactic relations. Assuming the verb stem is the spell-out of  $vP$ , we can see that Marantz was mistaken in his statement to the effect that the domain of reduplication is not definable in the phonology. The reduplicated domain is the entire phonological string that is the output of the first phase.



Next, we have to define how the RED morpheme targets this domain for doubling. In a modular system, RED cannot target the morpho-syntactic node that dominates *tova* or *iita*. RED can only target a phonological object, as its copy-function is operative over the phonological output of the previous phase. Phonological outputs cannot contain morphological information in a fully modular derivational system. But, Marantz is also correct that the RED morpheme cannot be of a specific phonological size (syllable, foot), as the size of the reduplicated domain tracks the size of the stem. This type of pattern is easily captured within the system of reduplication found in Raimy (2000). According to Raimy, reduplication adds a loop to the linearization algorithm of a string of segments. Licit targets for the beginning and end of a loop include first and last segments, consonants, vowels etc. Full reduplication is the insertion of a loop that begins at the final segment and returns to the first segment of a phonological domain. According to this type of system, the output of the  $vP$  phase will be a strictly linearized string as in (43), where # signals the beginning and % the end of the string.

(43) #→t→o→v→a→%                      or                      #→i→i→t→a→%<sup>12</sup>

<sup>12</sup> Note that Raimy's # and % are not elements in the string like # and + were in SPE. Here they are included solely to clarify the beginning and endpoint of strings.





## 6.0 Conclusion

In this paper I have argued for a fully modular derivational system, where only strictly phonological objects and operations are present in the phonological part of every derivation. Elements like morphological diacritics (Level 1 or 2 (LPM), or cyclic/non-cyclic (Matushansky 2002)) and morphological reduplicative patterns (m-templates in Marantz 1987) are not needed or permitted in such a system. Neither are bracketed (hierarchical) structures such as those proposed in Prosodic Phonology. In fact, hierarchical structures, if included in the derivation, only serve to create Bracketing Paradoxes that would otherwise not arise. Once these BPs are admitted into the system, then they must be repaired. Over the last 40 years, linguists have been proposing one ad-hoc operation after another in an attempt to rid the system of BPs (rebracketing in the morpho-syntax or the phonology (Williams 1981, Nespor & Vogel 1986, Marantz (1984a/b, 1987, 1989), Sproat (1984, 1985, 1988)), quantifier raising (Pesetsky 1985), the suspension of Bracket Erasure (Kiparsky (1982b)). I have demonstrated here that, using proposals that have been independently motivated; phases, the independent spell-out of adjuncts and specifiers, linearization, lateral relations between segments, CVCV phonology, liaison, and modularity, we have a system in which all the types of Bracketing Paradoxes that have troubled morpho-phonologists over the last decades do not arise. A system that doesn't produce impossible structures is clearly preferable to one that does.

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