

# Bracketing Paradoxes in Morphology

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## Summary

Bracketing Paradoxes: constructions whose morpho-syntactic and morpho-phonological structures appear to be irreconcilably at odds (ex. *unhappier*) are unanimously taken to point to truths about the derivational system that we have not yet grasped. Consider that the prefix *un-* must be structurally separate in some way from *happier* both for its own reasons (its [n] surprisingly does not assimilate in Place to a following consonant (ex. u[n]popular)), and for reasons external to the prefix (the suffix *-er* must be insensitive to the presence of *un-*, as the comparative cannot attach to bases of three syllables or longer (ex. \**intelligenter*)). But, *un-* must simultaneously be present in the derivation before *-er* is merged, so that *unhappier* can have the proper semantic reading ('more unhappy', and not 'not happier'). Bracketing Paradoxes only emerged as a problem for generative accounts of both morpho-syntax and morpho-phonology in the 1970's. With the rise of restrictions on and technology used to describe and represent the behavior of affixes (ex. the Affix-Ordering Generalization, Lexical Phonology and Morphology, the Prosodic Hierarchy), morpho-syntacticians and phonologists were confronted with this type of inconsistent derivation in many unrelated languages.

## Keywords

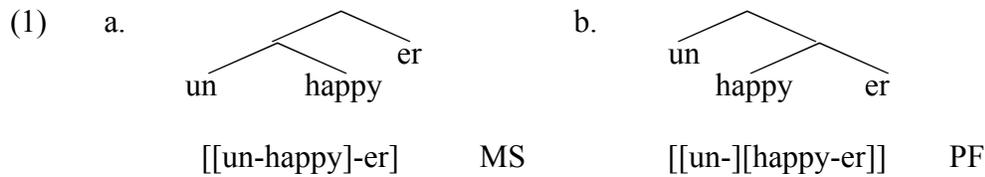
Bracketing Paradox, Phonological Form, Selectional Restrictions, Prosodic Phonology, Level 1 /Level 2 Morphology, Lexical Phonology and Morphology, Particle Verbs, Reduplication, Compounding.

## 1. Bracketing Paradoxes: Definitions and Theoretical Basis

Bracketing Paradoxes are defined as constructions for which two incompatible structural analyses are required in order to simultaneously explain both the morpho-syntactic or semantic properties of a word on the one hand (MS), and its morpho-phonological or phonological characteristics on the other (PF). Such constructions, first discussed in detail contemporaneously in Allen (1979) and Pesetsky (1979), can be exemplified by the word *unhappier* in English.<sup>1</sup>

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<sup>1</sup> Sprout (1985:16) notes that "The morphological forms that would come to be known as Bracketing Paradoxes were noticed--and such forms were analyzed--in Siegel's (1974) dissertation, which was one of the first treatments of morphology within Generative Grammar." This is not entirely true. Siegel notes that if the prefix *un-* is a Level 1 affix this can explain why it cannot affix to adjectives derived by the Level 2 affix *-less*. As *un-* must simultaneously affix to adjectives and merge before *-less*, words like \**unhelpless* would violate its selectional restrictions. Subsequent research has proposed that (i) *un-* is a Level 2 affix, and that (ii) the restriction on words like \**unhelpless* is semantic; *un-* cannot attach to negative words, and *-less* has a negative feature. (Zimmer 1964, Allen 1979, Horn 1989, De Clercq and Vanden Wyngaerd 2017, De Clercq and Vanden Wyngaerd (under review)).



In (1a) we have the structure that accounts for the meaning of *unhappier*, assuming compositional semantic interpretation of the morphemes involved. The meaning of *-er* (more) scopes over the meaning of *un-* (negative), giving ‘more unhappy’. The structure in (1b) cannot explain the semantic interpretation of *unhappier*, but incorrectly predicts, rather, the meaning ‘not more happy’. On the other hand, the comparative morpheme *-er* has a selectional restriction that is sensitive to the phonological size of its base. Importantly here, *-er* cannot attach to a base that is more than two syllables long (c.f. \**beautifuler*). This entails that *-er* may licitly combine with the two-syllable base *happy*, but not to *unhappy*; (1a) cannot be the morpho-phonological structure of *unhappier* and therefore the structure of this word must be as in (1b). Here both (1a) and (1b) are simultaneously (i) necessary to account for the derivation of *unhappier*, and (ii) incapable of expressing the correct derivation of *unhappier*.

Bracketing Paradoxes are not limited to English. Examples in the literature can be found from numerous other unrelated languages such as Italian (2), Irish (3), Warlpiri (4), Russian (5), Navaho (6), and Kihehe (7).

- (2) a. [[ri-suddivis]-ione] MS  
 b. [[ri-] suddiviz-ione]] PF  
 re- subdivide -ion  
 ‘resubdivision’ (Nespor & Vogel 1986:pp)

- (3) a. [[sean-ghleann] -ta] MS  
 b. [[sean] ghlean-ta] PF  
 old glen -PL  
 ‘old glens’ (Carnie 1991:67)

- (4) a. [[tirl-pardi]-mi] MS  
 b. [[tirl-] pardi-mi]] PF  
 tirl- arise -NONPAST  
 ‘open (as of an eye) + NONPAST’ (Nash 1980:140)

- (5) a. [[podŭ-žŭg]-l-ŭ] MS  
 b. [[podŭ-] žŭg-l-ŭ] PF  
 up to- burn -PAST -MASC.SG  
 ‘started a fire’ (Pesetsky 1979:10)

- (6) a. [sh-l- [ya-ti]] MS  
 b. [ya-sh-l-ti] PF  
*talk*-1SG-VOICE-*talk* (ya+ti = *talk*)  
 ‘I talk’ (Sproat 1985:125 from Speas 1984)

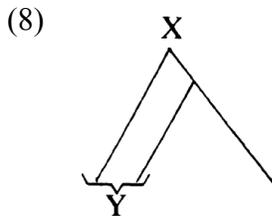
- (7) a. [ku [[iita] RED]] MS  
 [[kwiita] kwiita] PF  
 inf-pour-reduplicant (moderative)  
 ‘to pour a bit’ (Marantz 1987: 203)

In (2) the prefix *ri-* selects for verbs and therefore must attach before the noun-forming *-ione*, arguing for the structure in (2a). This derivation also yields the correct semantic interpretation of the word where the prefix scopes under the suffix; ‘the act of re-subdividing’. The phonology, however, argues for (2b) being the correct structure of *risuddivizone*. Intervocalic s-voicing in Italian applies to the final /s/ of the root *suddivis* but not to the initial one. If *ri-* is in a separate phonological domain from *suddivizone* this can be explained, as the initial /s/ is not intervocalic within its domain. (3) is an example on par with (2), where morpho-syntactic selectional restrictions clash with phonological domains. *sean-* is a derivational affix, and *-ta* is an inflectional morpheme. According to the tenets of Lexical Phonology and Morphology (LPM) (Mohanan 1982, Kiparsky 1982a) regular inflection is merged outside of derivational morphology, arguing for the structure in (3a). Carnie (1991) points out, however, that the phonology of Irish treats inflectional endings as being in the same domain as the base to the exclusion of the derivational prefix, a fact that argues for the structure in (3b) (The initial consonant of *-ta* undergoes assimilation in *caol* or *lethann* quality to the final consonant of its base.) The position of stress in Irish may also be impacted by inflectional suffixes, but not by derivational prefixes. In (4) the preverb-verb combination *tirl-pardi* has the non-compositional, idiomatic, meaning ‘open (as of an eye)’. It is proposed that non-compositional meaning can only be determined within a morpho-syntactic constituent (Marantz 2013, c.f. Jackendoff 1995), and that lexical compounding must occur before the merger of inflectional material (Bauer 2009). These facts argue for the structure of *tirlpardimi* being as in (4a). But, stress assignment, regressive vowel harmony, and conjugation class for verbs (sensitive to syllable count) all operate, paradoxically, on the bracketing in (4b). Like in (4), the following two examples contain verbal derivations that include a preverb or particle. This is a common configuration that gives rise to Bracketing Paradoxes, which we will see in more detail in §2.1 and §4.1. (7) demonstrates the Kihehe Bracketing Paradox seen in Marantz (1987). Here vowel-initial reduplicated verbs unexpectedly copy a higher prefix if that prefix may be syllabified as the onset of the first syllable of the verb. The phonological representation therefore looks as though the reduplicant scopes over the infinitival morpheme in (7b), while the syntactic structure of the verb is actually that in (7a). Examples of Bracketing paradoxes can also be found in Kitagawa (1984) for Japanese, Cohn (1989) for Indonesian, and Zuraw et al. (2014) for Samoan, among others.

### 1.1 Categories of Bracketing Paradoxes

Bracketing paradoxes come in 4 general types. The first is exemplified in (1)-(3), and in (9) below. Bracketing Paradoxes like these, as pointed out by Beard (1991) and discussed further in the following paragraphs, are problematic specifically within the theory of Lexical Phonology and Morphology (although the phonological independence of their prefixal material warrants special note even if LPM is discounted). They are derivations within which the semantics argues, contrary to the phonological facts, that a Level 1 affix must be affixed outside of a Level 2 affix; an order of affixation disallowed by LPM. The second type of Bracketing Paradox involves particle verbs, as in (4)-(6). These derivations take the form of an idiomatic particle+verb combination (as in the relevant (b.) examples) where the particle is nonetheless in a separate phonological domain from

the verb it combines with (as in the (a.) examples). Inflectional morphology in these derivations is within the same phonological domain as the verb, sometimes even linearly intervening between the particle and the verb, as in (5b), even though syntactically inflection is arguably outside the particle+verb domain. The third type of Bracketing Paradox, seen in (7), is similar to the particle verb paradoxes in that it involves inflectional morphemes that are high in the syntax but which must scope under a lower reduplicating morpheme in order to explain the phonological representation. Reduplicative paradoxes are treated as a separate category here solely due to their reduplication-specific phonology, to be discussed further in §3.2. The fourth type of Bracketing Paradox involves derived (or inflected) compounds. In examples like *nuclear physicist*, the compound has an idiomatic or specialized interpretation, arguing for a close morphosyntactic relationship between its members; represented by the bracketing  $[[nuclear\ \underline{physics}]\ -ist]$  ‘one who studies nuclear physics’. The derivational suffix, however, enters into a closer morpho-phonological relationship with the second member of the compound than the first member of the compound does (here triggering allomorphy of *physics*/velar softening), arguing for the bracketing  $[nuclear\ [physics)\ -ist]]$ . As noted in Williams (1981:260), the structure of all Bracketing Paradoxes is as in (8), where the morpho-phonological structure is read off of the tree structure, but the syntactico-semantic interpretation holds the elements in Y to be more closely related than implied by X.



A unique aspect of compound Bracketing Paradoxes that contain relational adjectives is noted in Beard (1991). These also have compositional, non-paradoxical readings (similar ambiguous compound interpretations are discussed in Bolinger 1967 and Vendler 1968). A *nuclear physicist* may be ‘one who studies nuclear physics’ (where it appears that *nuclear* scopes under *-ist*) or it may mean ‘a physicist who is nuclear’ (as ‘in central to a project’, where *nuclear* appears to take *-ist* in its scope). This ambiguity is *only* a property of the relational adjective Bracketing Paradoxes; the Level-ordering paradoxes do not have this property.<sup>2</sup> Neither particle verb nor reduplicative paradoxes are mentioned by Beard; these are also non-ambiguous. He concludes, contrary to most of the literature, that Bracketing Paradoxes do not form a natural class. Beard proposes that the comparative, *unhappier*-type, paradoxes are lexically listed as exceptions, that the Level-Ordering paradoxes are paradoxes only within the theory of Lexical Phonology and Morphology, and that therefore the theory must be wrong (more on this in §1.1.2 and §4). Beard argues that compound paradoxes can be resolved by allowing relational adjectives to combine with any subset of semantic features in their base. Expanding on this, he argues that *physicist* will contain the features of *physics* [MATTER, ENERGY] and the features of *-ist* [ACTOR, STUDY] and that the features of *nuclear* may combine with either set, therefore excluding these compounds from the set of constructions that appear to be Bracketing Paradoxes. Allen (1979) also suggests (but does not

<sup>2</sup> In fact, the idiomatic interpretations never emerge when the compound contains an adjective that is not relational: a *difficult physicist* cannot be someone that studies ‘difficult physics’.

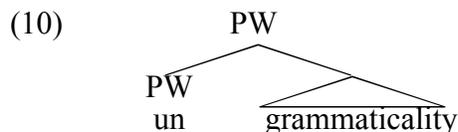
confidently endorse) that ‘un-X-ity’ words are lexicalized. This, however, would be almost the only place in English that a nasal+nonhomorganic C sequence is found inside a lexical item, making it a problematic solution if we follow Bermúdez-Otero & Trousdale (2012) in proposing that only stem-level affixes are lexicalized, and that the relevant assimilation rule occurs at this level. These two proposals demonstrate the spirit of each analysis to be discussed below; every researcher who has worked on Bracketing Paradoxes argues that the paradoxes like those in (1)-(7) are illusory, but their solutions disagree on the source(s) of these illusions.

## 1.2 Theoretical Basis of Bracketing Paradoxes

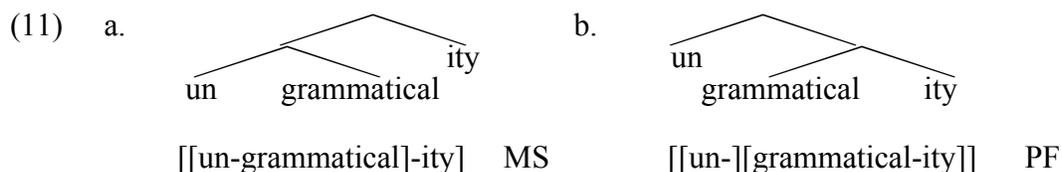
Before discussing the details of the accounts of Bracketing Paradoxes that have been proposed since the 1970’s, it is important to underline the general theoretical basis necessary for Bracketing Paradoxes to emerge. Notably, Bracketing Paradoxes can only exist within a theoretical framework that proposes that hierarchical structure exists both in the morpho-syntax and in the phonology, or that the morpho-syntax/semantics and phonology must both be read off of the same hierarchical structure. This is the reason why Bracketing Paradoxes were not mentioned before the introduction of theories such as Lexical Morphology and Phonology (LPM) (and the preceding work in ex. Siegel (1974), Allen (1979) on affix ordering generalizations and the interleaving of affixation with the application of phonological rules) and Prosodic Phonology (Selkirk 1982, Nespor & Vogel 1986). Within a theory where the morpho-syntax is hierarchical (where arboreal representations are equal to *bracketed* structural representations) but the phonology is purely linear (Chomsky & Halle 1968 (SPE), Kaye, Lowenstamm & Vergnaud 1985, Marantz 1987, Sproat 1985/1988, Scheer 2004, Haugen & Siddiqi 2014, Newell 2018) there can be no Bracketing Paradox, as there is no hierarchical/bracketed structure in the phonology. We will return to current proposals in this vein in §4. Siegel (1974) introduced Class 1 and Class 2 affixes (streamlining SPE’s 3-way ‘=’, ‘+’, and ‘#’ distinction) and what became known as the Affix Ordering Generalization. This opened the path to LPM, and was a necessary step in the emergence of some instances of the Bracketing Paradox problem (as mentioned in Beard 1991). The Affix Ordering Generalization holds that Class 2 affixation must occur after Class 1 affixation. A concomitant proposal is that certain phonological rules (ex. the English Main Stress Rule (MSR) (Halle & Vergnaud 1987) apply to the output of Class 1 affixation, before Class 2 affixation occurs. Consider another classic example of a Bracketing Paradox: *ungrammaticality*. *-ity* is a Class 1 affix, as evidenced by its effect on the position of main stress (*grammátical* / *grammaticálicity*). *un-* on the other hand, is a Class 2 affix that neither affects the phonology of its base of attachment (*grammaticálicity* / *ungrammaticálicity*), nor is affected by this base (no phonological nasal assimilation for Place, c.f. the almost identical prefix *in-*). Within an LPM derivation this entails that first *-ity* is affixed, then the MSR is applied to the domain of *grammatical* and *-ity*, and finally *un-* is affixed.

- (9) Level 1:        grammatical+ity  
                   MSR:        [grammaticálicity]  
                   Level 2:      [un [grammaticálicity]]

The output of this derivation is therefore a structure wherein *un-* is outside of the domain that includes *-ity* and its base. In terms of the Prosodic Hierarchy, *ungrammaticality* must include something like a nested Prosodic Word structure. According to Booij & Rubach (1984), *un-* additionally constitutes its own Prosodic Word domain, explaining why the vowel of this prefix does not reduce.



The morpho-phonological structure proposed in (10) is at odds with the semantic interpretation of *ungrammaticality*, as well as with the selectional restrictions of *un-*. If semantic interpretation is read compositionally off of the syntax, the syntactico-semantic structure of *ungrammaticality* must be as in (11a), *ungrammaticality* being the property of being ungrammatical. (11a) also captures that *un-* must affix to the adjectival *grammatical*, rather than the nominal *grammaticality*. The morpho-phonological bracketing is simplified and repeated in (11b).



Prior to the introduction of LMP and the Prosodic Hierarchy, phonological rules were sensitive to boundary symbols, but were not sensitive to morpho-phonological derivation/hierarchical structure. SPE (Chomsky & Halle 1968) promoted a linear theory of indirect reference where the morpho-syntactic structure in (11a) would be translated into a phonological output such as that in (12).

(12) #un#grammatical+ity#

In pre-Prosodic Phonology analyses, the MSR could apply across a ‘+’ boundary, but not across a ‘#’ boundary. We can easily see that there could be no Bracketing paradox under such theoretical assumptions, as hierarchical structure was not a property of the phonology (although it was still necessary to stipulate which boundary markers were found at the edges of each affix). Marantz (1987) explicitly notes that Bracketing Paradoxes pose a serious problem for LPM. He proposes that Bracketing Paradoxes can only be resolved by dissociating the phonological module from the morphological; “Morphological/syntactic structure and phonological structure are independent levels of analysis subject to independent constraints and principles. If this conclusion is correct, “lexical morphology,” in which phonological rules and morphological affixation work in tandem, is deeply wrong.” (203). We will look at Marantz’ solution as well as other linear phonological solutions to Bracketing Paradoxes in the sections to follow.

LPM and the Prosodic Hierarchy, however, were (and are) argued to have considerable advantages over linear representations like (12). A detailed overview of the history and arguments for and against these theories may be found in Scheer (2012). The most important outcome of LPM for the discussion of Bracketing Paradoxes is that morpho-syntactic affixation is interleaved with the application of phonological rules; affixes may be within or excluded from the domain of

application of such rules. The import of the Prosodic Hierarchy for Bracketing Paradoxes is the explicit proposal that phonological structure is hierarchical, and that this hierarchical structure is normally (but crucially not exclusively) isomorphic with the morpho-syntactic structure from which it is derived.<sup>3</sup>

Bracketing Paradoxes, therefore, are a relatively recent phenomenon (emerging in the 1970's) in the linguistic literature. They are not inherent to the linguistic data, but rather emerge crucially from the theoretical advances that came with our exploration of restrictions on affixation along with revisions to the nature of phonological representations and, concomitantly, to the domains within which phonological rules/operations apply.<sup>4</sup>

### **1.3 Overview**

In the following sections, we will explore (in roughly chronological order) the different types of solutions proposed to account for the interpretation of Bracketing Paradoxes. Section 2 will give an overview of proposals that take the general view that the morpho-phonological bracketing is basic, and that the morpho-syntactic or semantic bracketing must be modified to resolve the paradoxical nature of these constructions. Proposals that hold the morpho-syntactic bracketing to be basic, proposing a modification of the morpho-phonological structure will be discussed in §3. In §4 we will examine theories that propose that the phonology and the syntax/semantics are computed separately in ways that avoid the postulation of Bracketing Paradoxes altogether, including a look into the utility of a non-hierarchical, linear phonological representation. This is followed by some concluding statements in §5.

## **2. Morpho-Syntactic/Semantic Solutions to Bracketing Paradoxes**

### **2.1 The 'Semantics is not Strictly Compositional' Solution**

Pesetsky's unpublished phonology general paper, 'Russian Morphology and Lexical Theory' (1979) is important in that it introduced the two following, interrelated proposals (as discussed in §1.2). It is the first paper of its generation to propose a pre-syntactic word-formation module wherein Siegel's interleaved affixation and phonological rule application could take place; it laid some of the foundations of Lexical Phonology and Morphology. It is also the first paper to discuss Bracketing Paradoxes in detail.<sup>5</sup> The bulk of the paper discusses the seemingly paradoxical bracketing of Russian prefixed verbs. Pesetsky argues that Russian yers (underlying high lax vowels, represented as *i* and *ũ* in (13-16)) undergo lowering cyclically from left to right under the

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<sup>3</sup> Both of these proposals have been questioned in more recent literature. This will be discussed further in §4 where we will reconsider the proposal that phonological structure is non-hierarchical in ways important for the study of Bracketing Paradoxes.

<sup>4</sup> The study of the semantic interpretation of syntactic structure is also at issue in the literature on Bracketing Paradoxes. Most studies of this phenomenon agree that semantic interpretation of syntactic structure should be compositional, beginning from the most deeply embedded morpheme (c.f. Pesetsky 1979, Williams 1991, see §2.1). Relatedly, there was a brief auxiliary debate in the Bracketing Paradox literature over the semantic interpretation of the prefix *un-*. This debate took the form of Sproat's (1992) 'Unhappier is not a bracketing paradox' followed by Kang's (1993) reply, 'Unhappier is really a bracketing paradox'.

<sup>5</sup> Note that the Bracketing Paradox data presented in the unpublished Pesetsky (1979) can also be found in the published Pesetsky (1985).

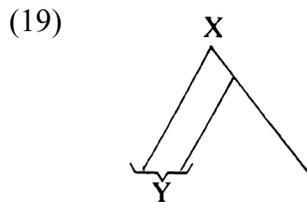




Williams (1981) offers an account of the undefined semantic rule that underpins Pesetsky's solution. He proposes a new rule of 'Lexical Relatedness', defined as follows:

- (18) X can be related to Y if X and Y differ only in a head position or in the nonhead position. (Williams 1981:161)

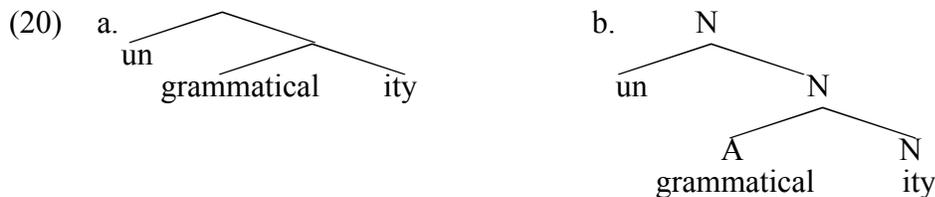
What the above entails is that all words are semantically related to other members of their paradigm, where the paradigm-space is filled by varying either the head or non-head morpheme of a word.<sup>6</sup> So, *nuclear physicist* is related to *nuclear physics* because the latter differs from the former only in the removal of the head constituent *-ist*. The same is proposed to be true for *unhappier*-type Bracketing Paradoxes; *unhappier* is related to *unhappy* by the removal of the head *-er*, and of prefixed verb Bracketing Paradoxes; *tirlpardimi* is related to *tirlparidi* by the removal of the Tense head. As noted in the introduction above, Williams' Lexical Relatedness capitalizes on the fact that all Bracketing Paradoxes involve a semantic relation between the prefix/first member of a compound that is closer than what is predicted by compositional semantics.



In (19), Y is related to (part of the paradigm of) X by the removal of the head (rightmost branch) of X. This analysis adds to Pesetsky (1979) to offer a complete solution to Bracketing paradoxes, but this solution is not without problems.<sup>7</sup>

## 2.2 Level-(Re)Ordering Solutions

Selkirk (1982) points to one important problem with William's solution; the issue of selectional restrictions. According to Williams, the structure of a word like *ungrammaticality* is as in (20a). In (20b) we see the same structure with nodes labeled.



<sup>6</sup> There is a debate in the literature regarding the mental reality of paradigms. For an argument against, see Bobaljik 2002.

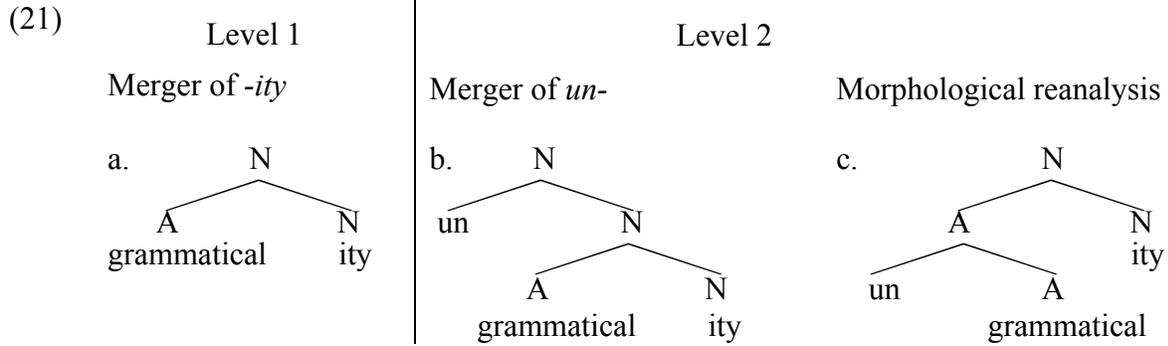
<sup>7</sup> Strauss' (1982) direct reply to Williams will be discussed below in §3.1.1.

Selkirk rejects William's Lexical Relatedness solution as it complicates the morpho-syntax in ways that are very difficult to justify. Most morphologists take *un-* to be an affix that may only productively attach to adjectives (but c.f. Allen 1978, Fabb 1988, Newell 2005a,b, 2008), yet in the structure above *un-* is merged with a noun. Selkirk's solution to this problem is to propose that, like many English affixes, *un-* is variably Class 1 or Class 2. In words like *ungrammaticality*, *un-* must attach inside *-ity*, and must therefore be a Class 1 affix. She therefore does not subscribe to the opinion (held by Pesetsky (1979) and Williams (1981) that semantics need not be strictly compositional, but rather allows the morpho-syntactic structure to mirror its semantic interpretation.

Kiparsky (1982b) criticizes Selkirk's solution, however, for encountering fatal problems of its own. Firstly, if *un-*, and by extension verbal prefixes, were variably Class 1 or Class 2 we would expect their phonological behavior to track this distinction. So, *un-* in *ungrammaticality* should be inside the domain of main stress, and its nasal consonant should assimilate in place to the following velar. As for */podũ-žig-l-ũ/*, the ungrammatical *\*podožëg*, output of the derivation in (14), should be grammatical, as a Class 1 *podũ-* should be followed within its cycle by the yer in *žig*. That neither of these phonological patterns are licit demonstrates that Bracketing Paradoxes cannot be resolved by modifying the class-membership of their prefixal elements. Additionally, Kiparsky notes that Class 2 prefixes never attach to bound roots (ex. *\*anticeive* vs *conceive*), and that Class 2 affixes can be conjoined (ex. *pre- and post-war*, c.f. the Class 1 *\*sub- and transmit*), even in derivations where Selkirk would have to analyse them as Class 1 (ex. *mono- and polysyllabicity*). He then notes that if we consider additional patterns and types of Bracketing Paradoxes, these problems are compounded:

“Why is the stem + suffix combination always an actual word? Why do all secondary [Class 2] prefixes have dual membership? Why do compounds (27b) [ex. *set-theoretical*] and lexicalized phrases (27c) [ex. *three-dimensional*] work the same way? On the dual membership solution they have to be dealt with either in a completely different way from the prefix cases, which seems unfortunate because they otherwise look entirely parallel to them, or else by giving compounds also dual membership in level 1, which multiplies all the above difficulties by a large factor.” (23-24)

Kiparsky also rejects Williams' proposal, and by extension Pesetsky's, for the reason cited above by Selkirk. His solution is to allow morphological reanalysis during the derivation. He postulates that each affix's subcategorization requirements must be met only at the end of each cycle of affixation; they can be temporarily violated prior to readjustment. Consider his following 3-step derivation of *ungrammaticality*.

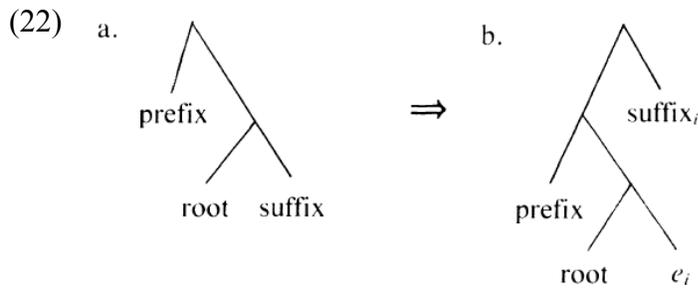


In (21a) we have unproblematic Level 1 affixation. In (21b) we have Level 2 affixation, which leads to a structure in which *un-*'s selectional restrictions are violated. This must be corrected as in (21c) before the end of the Level, re-arranging the structure so that *un-* is closer to *grammatical* than *-ity*, and the selectional restrictions of both affixes are met. Because phonological rules are tied to Levels of affixation in LPM, and not to proximity of morphemes in the structure per se, the affixation of *un-* at Level 2 will ensure that it does not emerge in the same phonological domain at its base of attachment.

Unfortunately, this analysis is, in turn, not without flaws. First, in (21b) *un-* must be permitted to merge with a noun; its selectional restrictions may be temporarily violated. Second, as pointed out by Kiparsky himself, Bracket Erasure must be suspended just in the exceptional case of Bracketing Paradoxes. At the end of Level 1 the structure of *grammaticality* must be retained into Level 2 in order for the operation of morphological reanalysis (21c) to be able to distinguish and target the morpheme *-ity* for reanalysis. Kiparsky proposes that words that contain Bracketing Paradoxes are lexically marked as exceptions to Bracket Erasure (see Sproat 1984 for further discussion). A critical problem with such a proposal is that it involves a look-ahead procedure in the derivation. *Ungrammaticality* is lexically marked as exceptional in Kiparsky's framework, not *grammaticality*. At the end of Level 1, Bracket Erasure must be blocked before *ungrammaticality* has been constructed. It is unclear how this blocking is motivated. Interestingly, Kiparsky notes that Morphological Reanalysis can only occur when one affix (the prefix in all Bracketing Paradoxes, except in some instances of reduplication) is non-category-changing. The reanalysis of the suffix can only be effectuated if the lexical category of its sister remains constant throughout the derivation, otherwise its selectional restrictions would be violated in the final structure. We will come back to this point below in §4.1.2 when we discuss Newell's (2005b, 2008) morphological adjunction analysis.

### 2.3 *The Quantifier Raising Solution*

Pesetsky (1985) offers his own solution to the exact nature of the paradoxical semantic analysis of Bracketing Paradoxes alluded to in Pesetsky (1979). Under his later analysis, morphemes have two types of selectional requirements - positional requirements (A prefix must select for an element to its right, a suffix must select for an element to its left), and subcategorization requirements (an affix X must attach to an element of lexical category Y; Y=A,N,V). Positional requirements are satisfied on first merge of morphemes (22a), and this structure is the input to phonology. Subcategorization requirements are satisfied after the Quantifier Rule of May (1978) is applied (22b), and this structure is the input to Logical Form.



(Pesetsky 1985: 216)

There is no simultaneous requirement that both structures be true, and therefore no paradox. Problems with this analysis are found below in the discussion of Sproat’s analyses in §4, the main issue being that QR is not motivated in Bracketing Paradoxes. Pesetsky’s QR analysis could have been classed with analyses that propose phonological and semantic interpretation to function differently (as do the others in §4), save for the fact that for Pesetsky (1985) both the phonological and semantic structures are isomorphic with, and read-off of, the syntax; both are sensitive to hierarchical structure.

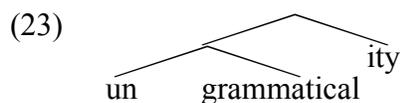
#### 2.4 Conclusions Regarding the Morpho-Syntactic Solutions to Bracketing Paradoxes

The above theories all hold that the derivation of Bracketing Paradoxes is one in which the phonological properties of the word are read off of the primary syntactic structure. The syntactico-semantic properties of Bracketing Paradoxes are either computed via a special rule (Pesetsky 1979, Williams 1981) or read off of a secondary, modified structure after the phonological properties of each affix have been determined (Kiparsky 1982b, Pesetsky 1985). In the following section we will consider proposals where the syntactico-semantic structure is taken as primary, and the phonological derivation is subject to special rules.

### 3. Phonological solutions to Bracketing Paradoxes

#### 3.1 The ‘Phonology will Work Itself Out’ Solutions

As noted in §2.2, Selkirk’s (1982) solution to Bracketing Paradoxes is one where the syntactic derivation is primary, and the correct phonological form must be derived in another, undetermined way. As in the case of Pesetsky’s (1979) semantic rule, the method of deriving the correct phonological form of derivations such as *ungrammaticality* is not explored by Selkirk. She claims that the syntactico-semantic interpretation requires the structure in (23), and therefore that is what the structure must be, forcing *un-* to be categorized as a Class 1 affix in order to accommodate the affix-ordering rules of LPM. This leaves an open question of why *un-* behaves phonologically like it is a Level 2 affix.



Strauss (1982) takes the above analysis a step further. He rejects Williams' (1981) lexical relatedness proposal, stating that

“On a priori grounds, the resolution of such relatedness paradoxes should be sought in a revision of the ordering restrictions, not in the notion of relatedness. This is because the ordering restrictions are absolutely language particular, while the ordinary notion of relatedness is based on the principle of semantic compositionality, which is obviously a strong candidate for being a language universal.” (696).

What this is highlighting is that whether an affix will be Class 1 or Class 2 cannot be universally predicted, but must be lexically marked within a particular grammar. Strauss also notes that Williams' solution forces a violation of the subcategorization requirements of prefixes. That the Principle of Semantic Compositionality (Frege 1892) and the inviolability of selectional restrictions are linguistic universals is presupposed in the majority of work in generative semantics and syntax (an early discussion of which can be found in Chomsky (1965)). Strauss therefore opts to salvage these universal principles by allowing a violation of the language-specific classification of morphemes in certain instances. The particular formulation of Strauss' solution is that Level-ordering is only pertinent among groups of prefixes or suffixes; it is not a relevant metric for determining the order of affixation of prefixes relative to suffixes, and vice versa. Therefore, the affix-ordering rules of LPM are not violated in the construction of Bracketing Paradoxes. The problematic nature of this solution is that Strauss has nothing to say about why a Bracketing Paradox always involves prefixes (or particles, or first members of compounds) that are Class 2, and Suffixes that are Class 1.<sup>8</sup> The motivation behind this generalization, and how the phonology works in general, is left an open question.

### 3.2 *The 'Phonological Structure is Non-Isomorphic with Syntactic Structure' Solutions*

Another proposal in the literature that presumes that the morpho-syntactic structure adheres to selectional restrictions and to the rules of compositional semantics is that found in Sproat (1984, 1985, 1988) and Marantz (1984a,b, 1989). They hold, like for the phonological readjustment accounts in §3.1, that the syntactic structure will adhere to the selectional and semantic restrictions of its affixes, and that readjustments of this structure are possible in the phonological module. This analysis proposes that readjustments of phonological relations are restricted to items that are linearly adjacent.

Before offering a readjustment solution, Sproat (1984) surveys the problems with Pesetsky's (1985) QR analysis of Bracketing Paradoxes. One basic problem with the QR approach is that phrasal QR is proposed to account for ambiguities like the following.

- (24) a. Every man loves a woman.  
b.  $(\forall x): x$  a man  $[\exists y): y$  a woman,  $x$  loves  $y]$   
c.  $(\exists y): y$  a woman  $[(\forall x): x$  a man,  $x$  loves  $y]$  (Sproat 1985:56)

---

<sup>8</sup> Cross-linguistically prefixes are more likely to behave as more phonologically independent than suffixes.

That quantifiers like *some*, *every*, and the indefinite determiner can be interpreted in a way that does not match with the scope predicted by their linear order has been offered as evidence for covert movement. Bracketing paradoxes, unexpectedly if QR is occurring, do not show this kind of ambiguity (c.f. Beard (1991) for relational adjectives). This same argument is given in Hoeksema (1987:199), who notes that "... there is no evidence for QR in morphology." (See also Spencer 1988 for additional issues). The solution to this problem is to propose that syntax and phonology compute the relationships between morphemes in different ways. At the core of this solution is the notion that linear order is not relevant for syntactic structure; the syntax is purely concerned with concatenation (sisterhood), and that phonological bracketing is fluid as long as linear order is maintained. Sproat follows Marantz (1984a) in proposing that syntactic sisterhood maps to phonological adjacency.<sup>9</sup>

(25) Mapping Relation  $\phi$ . (Mapping Principle)

(i) If B is a morpheme then  $\phi(\Sigma(B))=P(B)$   
(If B is a morpheme then it has a syntactic ( $\Sigma$ ) and a phonological (P) entry.)

(ii) If *sister*(A B) then  $\phi([A B])= (\phi(A)*\phi(B))$   
(If A and B are sisters in the syntax, A is adjacent to B in the phonology.)

(Sproat 1988:344)

The phonology, in turn, translates adjacency to linear order, depending of the specification of each affix as a prefix or a suffix.

(26)  $(\phi(A)*\phi(B)) \rightarrow A^{\wedge}B$  or  $B^{\wedge}A$

Crucially, the  $\wedge$  operator is associative. For a string of three morphemes this means that  $((A^{\wedge}B)^{\wedge}C)$  is equal to  $(A^{\wedge}(B^{\wedge}C))$ . In the syntactic construction of *ungrammaticality* selectional restrictions will be adhered to, giving  $((\phi \text{ungrammatical}) \phi \text{ity})$ . When this structure is sent to the phonological module it will be translated as  $((\text{un}^{\wedge} \text{grammatical})^{\wedge} \text{ity})$ . Due to the associativity of  $\wedge$ , this phonological representation may be readjusted, giving  $(\text{un}^{\wedge} (\text{grammatical}^{\wedge} \text{ity}))$ . Sproat proposes that the phonology must apply this readjustment due to the morpho-phonological levels of the affixes involved. This sort of linearization account can also be found in more recent works such as Embick (2010) and Haugen & Siddiqi (2016), where both syntactic and linear adjacency are argued to play a role in allomorphy and morpho-phonological domain formation. Marantz (1987) uses (26) to explain the paradoxical behavior of Reduplication in Kihehe.

(27) ai. [ku [[íita] RED]]  $\rightarrow$  aii. [[kwíita] kwíita]]  
inf-pour-reduplicant (moderative)  
'to pour a bit' (Marantz 1987: 203)

bi. [va [ kúu [n [[loonga] RED]]]]  $\rightarrow$  bii. vakúu [[n[doonga]] ndóonga]]  
3pl- asp- 1sg- nag -reduplicant (moderative)  
'They nag me' (ibid: 205)

<sup>9</sup> This principle is also proposed to account for a Bracketing Paradox in Georgian in Marantz (1984b).

In (27a), as explained in §1, the RED morpheme scopes syntactically over the verb root, but not over the infinitival morpheme. In (27b) the same is argued to be true for the 1sg object agreement and RED. In both cases, however, the phonological domain of reduplication includes the prefixes *ku-* and *n-*. The crucial properties of these prefixes, according to Marantz, is that their phonological selectional restrictions force the syntactic structures in (27ai) and (27bi) to be reanalysed as (27aii) and (27bii). Specifically, the second segment of *ku-* may be syllabified as a vowel (before a following consonant) or as a glide (before a following vowel). In the case that /u/ is syllabified as a glide it will force rebracketing in accordance with (25), as members of the same syllable cannot sit in separate phonological domains. This readjustment will then put the reduplicative morpheme outside the domain of the prefix+root, explaining its ability to copy the phonological material of a morpheme that sits outside its scope in the syntax. When the prefix does not syllabify with the root, reduplication will proceed as expected (*ku-tova-tova* ‘to beat a bit’). The same explanation results in the reduplication of the object-marker in (27bi). This prefix is proposed to consist of a floating [nasal] feature which docks to a following consonant. As a single consonant cannot exist simultaneously in two phonological domains, readjustment of the phonological structure must give (27bii). The associativity of linearity therefore allows for the readjustment of phonological structure when the phonological properties of certain affixes necessitate it. The only inconsistency in the above account lies in the fact that in order for the RED morpheme to copy the syllabified prefixes, the phonology must wait until the prefixes are interpreted to trigger reduplication. Assuming phonological interpretation from the most-to-least embedded morpheme, the derivations of *kwiita-kwiita* and *ku-tova-tova* must be as follows:

- |      |  |      |   |
|------|--|------|---|
| (28) | a. [iita]<br>b. [[iita] RED]<br>c. [ku[[iita] RED]]<br>d. [[kwiita] RED]<br>e. [[kwiita] kwiita] | (29) | a. [tova]<br>b. [[tova] RED]<br>c. [[tova] tova]<br>d. [ku [[tova] tova]] |
|------|--|------|---|

As shown in (29), the derivation of a consonant-initial reduplicated verb allows for reduplication immediately after merger of the RED morpheme, while the derivation of the vowel-initial reduplicated verb must wait until after linearization of the infinitival prefix has occurred. This need for the derivation to ‘look-ahead’ and wait for future operations to occur is similar to the problematic nature of Kiparsky’s (1982b) analysis in §2.1.2.

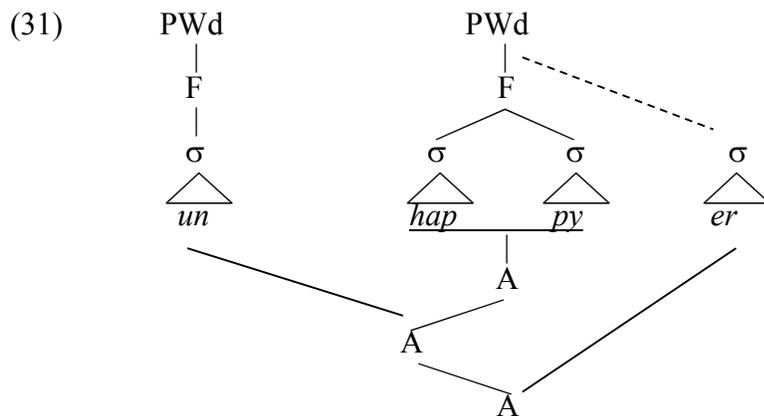
Another well-known account that proposes phonological readjustment is Nespor & Vogel (1986). The main thesis of their book is that phonological and morpho-syntactic structure are not required to be isomorphic. They use the Bracketing Paradox in (2), repeated below, as one piece of evidence for this non-isomorphism.

- |      |   |                                |
|------|---|--------------------------------|
| (30) | a. [[ri-suddivis]-ione] MS<br>b. [[ri-] suddiviz-ione]] PF<br>re- subdivide -ion<br>‘resubdivision’ | (Nespor & Vogel 2007/1986:126) |
|------|---|--------------------------------|

Remember that there is a rule of intervocalic s-voicing (IVS) in Italian that applies selectively in the derivation above (as indicated in (30b)). Nespor & Vogel note that there is no morpho-syntactic

constituent that coincides with the phonological domains necessary to explain IVS (see 30a). They conclude that the phonological component of the grammar therefore projects two separate PWds in the case of (30b), one which includes the prefix, and another which includes the base and suffixes. This is the same type of analysis offered in Booij & Rubach (1984). First-members of Bracketing Paradoxes must be lexically marked to constitute their own PWds, and therefore phonological rules that apply within the PWd will not apply across a prefix-stem boundary. It is of note that for Nespor & Vogel the PWd status of prefixes in Italian is linked to the final segment of the prefix. Vowel-final prefixes will constitute a separate PWd. Consonant-final *dis-*, however, will be incorporated into the PWd to its right due to a restriction on Italian consonant-final PWds, and ISV will apply to the /s/ in *dis-* (*di[z]onesto* ‘dishonest’ (ibid.128)). The PWd projection of affixes in this account is therefore partially lexical, and partially phonological, but in either way not determined by the morpho-syntactic structure.

We can include Lieber (1992) and Booij & Lieber (1993) in the same class as Nespor & Vogel as they also promote a phonological readjustment that leads to non-isomorphism between the phonology and the syntax. Lieber (1992) and Booij & Lieber (1993) argue that morphemes have both morpho-syntactic and phonological selectional restrictions that apply simultaneously; that phonological and morpho-syntactic structures are “...two simultaneous structurings coexisting on different planes.” (Booij & Lieber (1993:24)) This allows for an affix like *-er* to select both for an adjectival complement in the morpho-syntax, and a PWd complement in the phonology, as in (31).



Booij & Lieber argue that this kind of account is necessary as morphemes exhibit both types of selectional restrictions. This fact is universally accepted, but not universally accepted to require simultaneous projection of both types of structure. In a modular account, such as proposed in Distributed Morphology (among other frameworks), the syntactic selectional requirements of the affix will be met upon merger of the affix, and its phonological restrictions will come into play only at the translation of syntactic structure into phonological Vocabulary Items, items that exist solely in the phonological module. The reason I include this simultaneous-projection account in this section on phonological readjustment accounts of Bracketing Paradoxes, is due to the fact that Booij & Lieber (1993) must propose their own type of phonological readjustment to account for infixation. When both the phonological and morphosyntactic structures cannot hold without a violation of the No-Line-Crossing constraint, the authors “assume that a split occurs in the lexical representation of the prefix in order to meet both phonological and morphosyntactic requirements.” (p. 33)

We can also include in this section the account of Merchant (1995), couched within the framework of Optimality Theory. Merchant proposes that each affix be specified with a particular phonological Alignment constraint, in lieu of Level 1/Level 2 affiliation.

- (32) a. Align(Af 1, L, Rt, R)      ‘level 1’ suffix  
 b. Align(Af 2, R, St, L)      ‘level 2’ prefix      (Merchant 1995:10)

The morphological component will project structure according to the morphosyntactic selectional restrictions of each affix. This structure will then be the input to GEN in the phonological module. Taking as an example the case of *ungrammaticality*, *un-* will be specified as in (32b) to linearly Align with the right edge of a phonological stem, while *-ity* will be specified as in (32a) to Align with the left edge of a phonological root. These constraints mirror the work of the Prosodic Hierarchy, where the Root/Level 1 domain is nested inside of the Stem/Level 2 domain. Merchant would then have to suggest a ranking of constraints that recreates the phonological (ex. stress, assimilation) effects of such a nested domain. That this type of account is translatable into Optimality Theoretic terms, however, does not appear to offer any deeper insights than the previous accounts.

### 3.3 *Conclusions Regarding the Phonological Solutions to Bracketing Paradoxes*

The above analyses have in common that the readjustment necessary to explain Bracketing Paradoxes occurs within the phonological component of the grammar. The main problem for the analyses of Nespor & Vogel (1986), Booij & Lieber (1993), and Merchant (1995) is that this rebracketing is triggered by arbitrary, lexically-determined phonological diacritics. This type of explanation is argued in Newell (2005ab, 2008) to ignore that prefixes, particles, and first members of compounds also share specific morphosyntactic properties (no projection of features (see also Kiparsky 1982b)). More specifically, Bracketing Paradoxes appear to all include adjuncts, which can explain their phonological, syntactic, and semantic properties simultaneously (see §4). The analyses in Sproat (1984, 1985, 1988) and Marantz (1984a,b, 1989) do better than the other three analyses in that the phonological rebracketing is triggered by strictly phonological requirements - syllabification of the prefixes with their bases is not due to the presence of arbitrary lexical diacritics. However, these accounts also contain a look-ahead issue, and miss the morpho-syntactic similarities to be discussed below. As pointed out in Newell & Scheer (2007), a single solution that accounts for all of the syntactic, semantic, and phonological particularities of Bracketing Paradoxes at once must be preferred to separate phonological and morphosyntactic proposals.

## 4. **The Resolution of Bracketing Paradoxes without Readjustment**

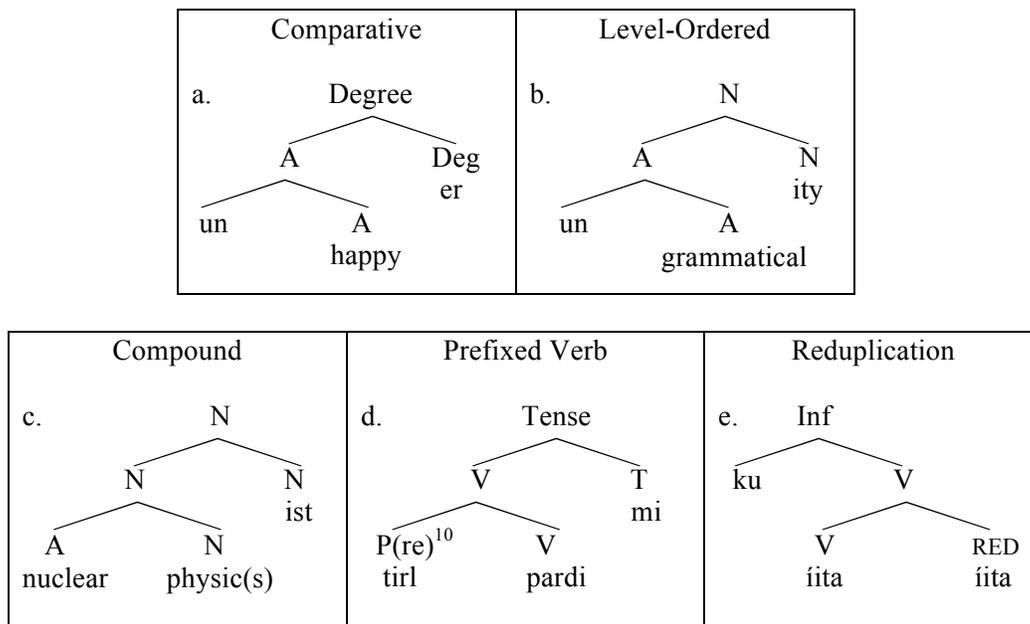
The third type of analysis of Bracketing Paradoxes in the literature are defined here as those that depart from the theoretical basis common to all of the analyses in Sections 1 and 2; that some sort of readjustment operation must be at the heart of the explanation for Bracketing Paradoxes. The analyses in the previous sections all assumed either that the morpho-syntax, the semantics, or the phonology contained a special rule or operation specifically designed to account for the paradoxical nature of the examples we have discussed. The analyses below, however, diverge from the above in that they argue that no readjustment operations are needed. As in the previous

analyses, specific independent requirements in the syntax and phonology lead to the illusion of Bracketing Paradoxes, but here neither the phonological nor the syntactic structures are modified to accommodate them.

#### 4.1 The Late Adjunction Solution

As noted by Kiparsky (1982b), and partially noted by Lieber (1980) and Pesetsky (1985), an interesting pattern in the construction of Bracketing Paradoxes is that one of the affixes involved in such constructions never projects category features in the morpho-syntax. Consider the structures of the different types of Bracketing Paradoxes we have discussed.

(33)



Newell (2005ab, 2008) argues that this morpho-syntactic pattern crucially explains how the suffixes in (33) are interpreted within the same phonological domain as their bases, and how this phonological pattern is only apparently at odds with the structures above. Lebeaux (1988), and later Stepanov (1999), (Ochi 1999), and Nissenbaum (2000) propose that adjuncts may be merged a-cyclically (to a non-root<sup>11</sup> node) as they do not modify any previously-established syntactic relations within a structure. Lebeaux proposes that this Late Adjunction can account for the non-violation of Condition C in sentences like (34b) (c.f. 34a).

- (34) a. \*Which picture of Seonaid<sub>i</sub> does she<sub>i</sub> want?  
 b. √Which picture that Seonaid<sub>i</sub> likes does she<sub>i</sub> want?

<sup>10</sup> Note that preverbs have been proposed to fall into multiple classes, some of which are  $X^0$ s and some of which are XPs. The structure here is not meant to distinguish between these options. For a discussion of the issue see Luedeling (2001).

<sup>11</sup> 'Root' in the sense of the top node of the tree structure, as opposed to the category-less 'root' morpheme proposed in Distributed Morphology.

In (34b) the adjunct *that Seonaid likes* is merged to *picture* after WH-movement has occurred. If this is the case, the R-expression *Seonaid* is at no point c-commanded by *she*, making co-reference possible.

Newell (2005ab, 2008) proposes that each of the adjuncts in (33) are similarly Late Adjoined into their respective structures (I have added the reduplicative structure not discussed in Newell (2005ab, 2008)). She notes that adjuncts, both heads and phrases, are phonologically independent of their bases, and that they do not project morpho-syntactic features, properties of morphemes like *un-*, *nuclear*, and *tirl-*. The derivations of the structures in (33) therefore occur in multiple steps, cycles, or in current syntactic terminology, phases. There are therefore two parallel first cycles in the derivation of a Bracketing Paradox. The base and non-adjunct are merged and sent to the phonological module (Spell-out) (35ai). Concurrently, the adjunct is computed and sent to Spell-out (35aai). Following Uriagereka (1999), adjuncts (and specifiers) must undergo spell-out before merger.<sup>12,13,14</sup> The independent spell-out of the adjunct and stem explains their phonological independence; the lack of place assimilation between the nasal in ‘un’ and a following consonant, the satisfaction of *-er*’s phonological selectional restrictions, the lack of ISV stem-initially in Italian<sup>15</sup>, the word-stress on first members of compounds, the exclusion of the particles in prefixed verbs from the phonological domain of their base, and the deletion of prefix-final yers in Russian.

(35)	Cycle 1a	PF	Cycle 2	PF
ai.		[happier]		[[un][happier]]
	Cycle 1b	PF		
aii.	un	[un]		

In (35b) the adjunct is merged a-cyclically. The phonology linearizes the two previously computed domains (or adjoins the two PWds if we maintain prosodic structure) and does not alter the phonological forms computed in Cycle 1a/b. In this way, the selectional restrictions of the morphemes are never violated in the syntax, and the phonological form from cycle 1 is not readjusted, but rather combined.

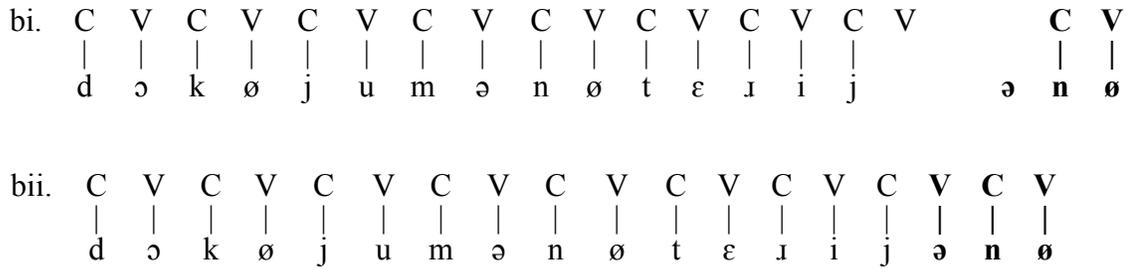
<sup>12</sup> Guerssel (1985) also proposes that the prefixes in Bracketing Paradoxes are spelled out before merger to the stem. For him this distinction is lexical; Level 2 affixes are ‘word affixes’, and word affixes are subject to word-level phonology independently of their bases. This account, like the readjustment accounts discussed in previous sections, captures the phonological behaviour of these affixes, but not their morpho-syntactic characteristics.

<sup>13</sup> It is clear that interpretation of the RED affix will not produce any interpretable phonological output until it is re-interpreted following its merger into the larger structure.

<sup>14</sup> Note that the prefix *un-* does not project in the morpho-syntax. It may merge with nouns (unbirthday), verbs (undo), and adjectives (unhappy) and does not modify the syntactic category of the structure to which it attaches. This indicates that *un-* is an adjunct, unlike morphemes like *-ion* (ex. *construction*) that project categorial features or inflectional elements like *not* that have been argued to project a NegP. See Newell (2008) for a detailed discussion.

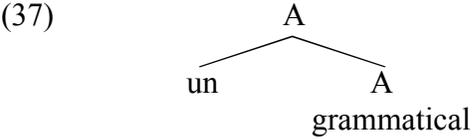
<sup>15</sup> Independent Spell-out does not account for the ISV in *dis-*. However, see Newell (2017).





In this type of account there is, like in SPE, no hierarchical structure in the phonology created at the syntax-phonology interface; there is no PWD, and therefore no ‘bracketing’ in the phonology. Whether two morphemes are pronounced as a close (co-syllabified) unit is determined by strictly linear phonological means.

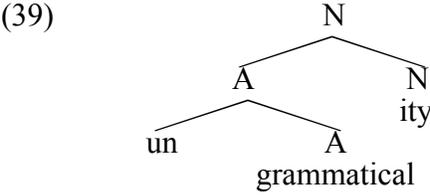
To use the example of *ungrammaticality*, we can retain a derivation like that proposed in (35). *un-* is clearly an adjunct (see Newell 2008), and therefore *un-* and *grammatical* may be interpreted simultaneously, in separate phases, before their merger. This entails that the features of the nasal in the prefix will be filled, and the prefix will be syllabified, before being merged in the syntax and subsequently linearized to the left of *grammatical* (37). When these morphemes are linearized no resyllabification will occur as each segment has already been fully integrated into the phonological structure (38).



(38) un + grammatical



The subsequent merger of *-ity* will give us the correct morphosyntactic structure of *ungrammaticality* (39). Under Newell’s analysis, the initial vowel of *-ity* is floating, just like the initial vowels of the suffixes in (36) and by extension all morpheme-initial vowels in affixes traditionally categorized as ‘Class 1’ (40). This floating vowel causes the merger of *grammatical* and *ity* in the linear phonological representation. There is no readjustment in (40b), but rather just the syllabification of the floating vowel in the preceding empty V-slot.



- (40) a. un + grammatical + ity
- |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | V | C | V | C | V | C | V | C | V | C | V | C | V | C | V |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| ∅ | u | n | ∅ | g | ∅ | ɪ | ə | m | æ | r | ɪ | k | ə | l | ∅ |
- i r i
- b.
- |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| C | V | C | V | C | V | C | V | C | V | C | V | C | V | C | V     |
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |       |
| ∅ | u | n | ∅ | g | ∅ | ɪ | ə | m | æ | r | ɪ | k | ə | l | ɪ r i |

The above derivation is similar to the one proposed in Marantz (1987) for Kihehe, but rather than arguing for readjustment due to the associativity of the linearization rule, here the Phonological Merger (Newell & Piggott 2014) of the suffix with its base is simply due to the regular rules of syllabification. Affixes syllabified with their bases will then affect stress patterns, as resyllabification of the base will entail refooting of the effected string, giving us the ‘Class 1 affix’ effect. Although it is easily apparent how the above account would extend to Kihehe, it is yet to be seen if it can account for Bracketing Paradoxes cross-linguistically.

### 4.3 Conclusions Regarding the ‘No Readjustments’ Solutions

This section has summarized two types of accounts that do not rely on readjustments of morpho-syntactic or phonological structure to account for Bracketing Paradoxes. Although neither can definitively account for all of the cases seen in this chapter, they have the advantage of not calling for operations that are specific to the explanation of Bracketing Paradoxes. Both Late Adjunction and Phonological Merger/Liaison have been argued for independently in the literature, and therefore a solution that relies upon these operations would not suffer the accusation of circularity.

## 5. General Conclusions

Bracketing Paradoxes are intriguing in that they are flies in the ointment of morpho-syntactic and phonological theories. They point out to us that we have got something wrong, or that we have missed a crucial component that makes either our phonological or syntactic modules (or both) work smoothly. Bracketing Paradoxes, as true paradoxes, should not exist. Each of the attempts to explain this phenomenon above has the same goal: to demonstrate that Bracketing Paradoxes are illusory. The correct analysis of Bracketing Paradoxes will successfully pierce the illusion once and for all.

We saw above that the direction one takes in trying to account for Bracketing Paradoxes has repercussions elsewhere in the grammar. Syntactico-semantic solutions, Pesetsky (1979), Williams (1981), Selkirk (1982), Kiparsky (1982), Pesetsky (1985) all pick out correct and interesting patterns in the data (the non-cohering behaviour of prefixes, the similar semantic interpretations, the non-projection of syntactic features of certain affixes), but each had some arguably fatal flaw; a violation of selectional restrictions, a departure from semantic compositionality, or predictions in the phonology and/or semantics that did not bear out. The phonological-rebracketing solutions, Strauss (1982), Booij & Rubach (1984), Guerssel (1985), Nespor & Vogel 1986, Sproat (1984, 1985, 1988) and Marantz (1984a,b, 1989), Lieber (1992) and Booij & Lieber (1993), similarly captured some correct generalizations (the strictness of selectional restrictions, the different behaviours of prefixes and suffixes, the compositionality of

semantic interpretation, the varying selectional restrictions of affixes in the syntax and in the phonology) but again were each questioned in the literature due to patterns that they did not predict; about the seemingly crucial syntactic behaviour of certain affixes (non-projection of features), the derivation-specific rebracketing tools being used, and the look-ahead nature of some of the proposed solutions. Likewise, the non-readjustment solutions of Newell (2005ab, 2008, 2018) manage to capture some new generalizations regarding Bracketing Paradoxes (the adjunct generalization, the non-necessity of rebracketing, the apparent utility of linear (non-hierarchical) phonological representations), but the capability of these accounts to generalize over all types of paradoxical constructions remains unproven; particle verbs, and perhaps reduplications, appear to be more syntactically complex than most Bracketing Paradoxes, and the determination and analysis of Level 1 vs. Level 2 morphology as strictly phonological cross-linguistically may or may not prove fruitful.

Overall, we can see that each new analysis brings out important aspects of Bracketing Paradoxes that warrant explanation, and everyone who works on them agrees that their elimination will be a great step forward in determining the correct functioning of our grammatical modules and their interfaces.

## References

- Allen, M. R. (1979). Morphological investigations. Ph. D. dissertation. UConn.
- Bauer, L. (2009). Typology of compounds. In Lieber, R. & P. Štekauer (eds). *The Oxford handbook of compounding*. OUP.
- Beard, R. (1991). Decompositional composition: The semantics of scope ambiguities and ‘bracketing paradoxes’. *Natural Language & Linguistic Theory*, 9(2), 195-229.
- Bermúdez-Otero, R., & Trousdale, G. (2012). Cycles and continua: on unidirectionality and gradualness in language change. In *The Oxford handbook of the history of English*.
- Biskup, P. (2006). Why Lexical Prefixes are not Late Merged Adjuncts in the Phase Model. Presented at the Workshop Cikháj.
- Bobaljik, J.D. (2002) Syncretism without paradigms: Remarks on Williams 1981, 1994. *Yearbook of Morphology 2001*. pp 53-85
- Bolinger, D. (1967). Adjectives in English: attribution and predication. *Lingua*, 18, 1-34.
- Booij, G., & Lieber, R. (1993). On the simultaneity of morphological and prosodic structure. In *Studies in lexical phonology* (pp. 23-44).
- Booij, G., & Rubach, J. (1984). Morphological and prosodic domains in Lexical Phonology. *Phonology*, 1, 1-27.
- Carnie, A. (1991). A domain based phonology: The evidence from Modern Irish. In *Proceedings of the Leiden Conference for Junior Linguists* (Vol. 3, pp. 59-76).
- Chomsky, N. & M. Halle. (1968) *the Sound Pattern of English*. New York: Harper & Row.
- Chomsky, N. (1965). Aspects of the theory of syntax. *Cambridge: MIT Press*.
- Cohn, A. C. (1989). Stress in Indonesian and bracketing paradoxes. *Natural language & linguistic theory*, 7(2), 167-216.
- De Clercq, K. & Vanden Wyngaerd, G. (2017). Why affixal negation is syntactic. In *Proceedings of the West Coast Conference in Formal Linguistics* (Vol. 34, pp. 151-158). Cascadilla Press.

- De Clercq & Vanden Wyngaerd, G. (under review) Negation and the Functional Sequence. ms. [goo.gl/kdy9EB](http://goo.gl/kdy9EB)
- den Dikken, M. 1995. Particles: On the Syntax of Verb-Particle, Triadic, and Causative Constructions. Oxford University Press, New York/Oxford.
- den Dikken, M. 1992. Particles. Ph.D. Dissertation, Holland Institute of Generative Linguistics, à Leiden.
- Embick, D. (2010). *Localism versus globalism in morphology and phonology* (Vol. 60). MIT Press.
- Fabb, N. (1988). English suffixation is constrained only by selectional restrictions. *Natural language & Linguistic theory*, 6(4), 527-539.
- Frege, G. (1892). Sobre sentido y referencia. *La búsqueda del significado: Lecturas de filosofía del lenguaje*.
- Guerssel, M. (1986). On Phonological Words, Level Ordered Morphology and Lexical Relatedness. in A Festschrift for Sol Saporta. Michael Brame, Heles Contreras & Frederick J. Newmeyer eds. Noit Amrofer. Seattle.
- Halle, M., & Vergnaud, J. R. (1987). Stress and the cycle. *Linguistic Inquiry*, 18(1), 45-84.
- Haugen, J. D., & Siddiqi, D. (2016). Towards a Restricted Realization Theory. *Morphological Metatheory*, 229, 343.
- Hoeksema, J. (1987). Relating word structure and logical form. *Linguistic inquiry*, 18(1), 119-126.
- Horn, L. (1989). *A natural history of negation*. University of Chicago Press.
- Jackendoff, R. (1995). The boundaries of the lexicon. *Idioms: Structural and psychological perspectives*, 133-165.
- Kang, B. M. (1993). Unhappier Is Really a "Bracketing Paradox". *Linguistic inquiry*, 788-794.
- Kaye, J., Lowenstamm, J., & Vergnaud, J. R. (1985). The internal structure of phonological elements: a theory of charm and government. *Phonology*, 2(1), 305-328.
- Kiparsky, P. (1982a). Lexical morphology and phonology. *Linguistics in the morning calm: Selected papers from SICOL-1981*, 3-91.
- Kiparsky, P. (1982b). Word-formation and the lexicon. Paper presented at the Mid-America Linguistics Conference. University of Kansas.
- Kitagawa, Y. (1986). More on bracketing paradoxes. *Linguistic Inquiry*, 17(1), 177-183.
- Kratzer, A., 1993. The event argument and the semantics of voice. Ms. Amherst.
- Kuno, S. 1997. *Binding theory in the minimalist program*. Ms., Harvard University, Cambridge, MA.
- Lasnik, H. 1998. Some reconstruction riddles. In *University of Pennsylvania working papers in linguistics* 5.1, ed. Alexis Dimitriadis et al., 83-98. Penn Linguistics Club, University of Pennsylvania, Philadelphia, PA.
- Lebeaux, D. 1988. *Language acquisition and the form of the grammar*. Ph. D. dissertation, University of Massachusetts, Amherst.
- Lieber, R. (1992). *Deconstructing morphology: Word formation in syntactic theory*. University of Chicago Press.
- Lieber, R. (1980). *On the organization of the lexicon* Ph. D. dissertation, MIT.
- Luedeling, A. (2001). *On Particle Verbs and Similar Constructions in German*. Stanford: CSLI.
- Marantz, A. (2013). Locality domains for contextual allomorphy across the interfaces. *Distributed morphology today: Morphemes for morris halle*, 95-115.
- Marantz, A. (1989). Clitics and phrase structure. *Alternative conceptions of phrase structure*, 99-

- Marantz, A. (1984a). Tagalog Reduplication is Affixation, Too. Paper presented at the LSA, Baltimore.
- Marantz, A. (1984b). The Non-Distinctness of Derivational and Inflectional Morphology. ms. Harvard.
- May, R. C. (1978). *The grammar of quantification*. Ph. D. dissertation, MIT.
- Merchant, J. (1995). An Alignment Solution to Bracketing Paradoxes. *Phonology at Santa Cruz*, 4.
- Mohannan, K. P. (1982). *Lexical phonology*. Ph.D. dissertation, MIT.
- Müller, S. (2003). Solving the bracketing paradox: An analysis of the morphology of German particle verbs. *Journal of Linguistics*, 39(2), 275-325.
- Nash, D. G. (1980). *Topics in Warlpiri grammar* Ph. D. dissertation, MIT.
- Nespor, M., & Vogel, I. (1986). Prosodic phonology (studies in generative grammar 28). *Dordrecht: Foris*.
- Newell, H. (2008). Aspects of the Morphology and Phonology of Phases. Ph. D. dissertation. McGill.
- Newell, H. (2005a). A late adjunction solution to bracketing paradoxes. In *The proceedings of NELS* Vol. 35, No. 2, p. 451.
- Newell, H. (2005b). Bracketing paradoxes and particle verbs: a late adjunction analysis. *Proceedings of ConSOLE XIII*, 249-272.
- Newell, H. 2016. under review. Lexical Levels are not Lexical, but Phonological.
- Newell, H. 2017. There Is No Word. Implications For The Phonology-Syntax Interface. GLOW 40. Leiden. March 14.
- Newell, H. (2018). ‘There are no Bracketing Paradoxes, or How to be a Modular Grammarian. Presented at GLOW 41. Budapest.
- Newell, H. & T. Scheer. (2007). Procedural First. Presented at the *38th Poznan Linguistic Meeting*.
- Newell, H., & G. Piggott. (2014). Interactions at the syntax-phonology interface: evidence from Ojibwe. *Lingua*. 150. p. 332-362.
- Ochi, M. (1999). Multiple Spell-Out and PF adjacency. In *Proceedings of the North Eastern Linguistic Society* 29. University of Massachusetts, Amherst.
- Pesetsky, D., 1985. Morphology and logical form. *Linguistic inquiry*, 16(2), pp.193-246.
- Pesetsky, D. (1979). Russian morphology and lexical theory. Manuscript, MIT.
- Plag, I. (1999). *Morphological productivity: Structural constraints in English derivation* (Vol. 28). Walter de Gruyter.
- Postal, P. (1997). Strong crossover violations and binding principles. *Paper presented at the Eastern States Conference on Linguistics '97*, Yale University.
- Raffelsiefen, R. (1999). Phonological constraints on English word formation. In *Yearbook of Morphology 1998* (pp. 225-287). Springer Netherlands.
- Ramchand, G., & Svenonius, P. (2002). The lexical syntax and lexical semantics of the verb-particle construction. In *Proceedings of WCCFL* (Vol. 21, pp. 387-400).
- Selkirk, E. O. (1982). The syntax of words (Linguistic Inquiry Monograph 7). Cambridge, MA.
- Scheer, T. (2004). *What is CVCV and why should it be?* (Vol. 68). Walter de Gruyter.
- Scheer, T. (2012). Chunk definition in phonology: prosodic constituency vs. phase structure. *Modules and interfaces*, 221-253.
- Siegel, D. C. (1974). *Topics in English morphology* Ph. D. dissertation, MIT.

- Speas, M. (1984). Navajo Prefixes and Word Structure Typology." MIT Working Papers in Linguistics, vol. 7.
- Spencer, A. (1988). Bracketing paradoxes and the English lexicon. *Language*, 663-682.
- Sproat, R. (1984). On bracketing paradoxes. *MIT Working Papers in Linguistics*, 7, 110-130.
- Sproat, R. W. (1985). *On deriving the lexicon* Ph. D. dissertation, MIT.
- Sproat, R. (1988). Bracketing paradoxes, cliticization and other topics: the mapping between syntactic and phonological structure. *Morphology and modularity*. Dordrecht: Foris, 339-360.
- Sproat, R. (1992). Unhappier Is Not a "Bracketing Paradox". *Linguistic Inquiry*, 23(2), 347-352.
- Strauss, S. L. (1982). On "relatedness paradoxes" and related paradoxes. *Linguistic Inquiry*, 13(4), 694-700.
- Stepanov, A. (2001). Late adjunction and minimalist phrase structure. *Syntax*, 4(2), 94-125.
- Uriagereka, J. 1999. Multiple Spell-Out. In *Working minimalism*, ed. S. D. Epstein & N. Hornstein, 251-282. Cambridge, MA.: MIT Press.
- Vendler, Z. (1968). *Adjectives and nominalizations* (No. 5). Mouton.
- Vinka, M. (1999). Predicative and non-predicative verb particle constructions. In *Proceedings of WCCFL* (Vol. 18, pp. 570-585).
- Williams, E. (1981). On the notions "Lexically related" and "Head of a word". *Linguistic Inquiry*, 12(2), 245-274.
- Wurmbrand, S. (1998). Heads or phrases? Particles in particular. *Phonology and morphology of the Germanic languages*, 267-295.
- Wurmbrand, Susi. 2000. The structure(s) of particle verbs. Ms., McGill University.
- Yip, M. (1977). The Integrity of lexical nodes - a Study of Particle Movement. General Paper. MIT.
- Zimmer, K. (1964) *Affixal Negation in English and other languages: An investigation of restricted productivity*. Supplement to 'Word : Journal of the Linguistic Circle of New York. Monograph no. 5.
- Zuraw, K., Kristine, M. Y., & Orfitelli, R. (2014). The word-level prosody of Samoan. *Phonology*, 31(2), 271-327.