Phrasal Compounding and Lexicalism: A Multiple Spell-Out Account[1]

1. Introduction

In this paper, I explore the issue of the syntax-morphology interface with a case study in phrasal compounding. It has been widely recognized in the literature since the seminal work of Lieber (1992) that the existence of this type of compounding across languages presents non-trivial difficulties for the so-called lexicalist theory because the input of what appears to be a lexical process (compounding) is clearly the product of syntactic derivation and this state of affairs poses an inverse ordering paradox for the general lexicalist grammatical architecture of the way the lexical component interacts with the syntactic component. Accordingly, research following Lieber (1992) has concentrated on what aspects of the lexicalist theory the phenomenon of phrasal compounding shows to be problematic with the view toward finding a more balanced architecture of the syntax-lexicon interaction that naturally accommodates this type of compounding across languages.

Though the significance of phrasal compounding for the theory of the syntax-morphology interface has been widely discussed in the literature, it is important to observe that there is not a single analysis that has been proposed to elucidate this very phenomenon. Thus, in their most recent survey of the status of the lexicalist theory within the generative framework, Lieber and Scalise (2006: 26) mention phrasal compounding as a strong challenge to the Lexical Integrity Hypothesis but conclude that there is "no good uni-modular analysis" for phrasal compounds.

The purpose of the present paper is a) to reassess the significance of phrasal compounding for the proper theory of the syntax-morphology interface and b) to propose a new analysis of the

[1] ACKNOWLEDGEMENTS

phenomenon within the framework of the Minimalist Program (Chomsky 1995, 2004, 2006). Following the general path set by Lieber (1992), I review major existing versions of the lexicalist hypothesis that have been proposed since the early 1970s and show in what ways the phenomenon of phrasal compounding makes a case against various aspects of this hypothesis. After showing that phrasal compounding poses non-trivial architectural and/or empirical difficulties for several versions of the lexicalist theory, I propose a new analysis of phrasal compounding within the derivational theory of syntax as part of my reply to Lieber and Scalise's remark cited above. Specifically, I argue that this pattern of compounding can be explained on a par with regular compounding of two simplex roots (as in *black board, nurse shoes, red coat,* and so on) as a natural consequence of the recent derivational theory of syntax known as *Multiple Spell-Out* that is proposed by Uriagereka (1999) and further articulated by Johnson (2003). I show that the proposed analysis provides a straightforward account of well-known syntactic characteristics associated with compounds in general such as the Anaphoric Island Constraint (Postal 1969). This result, therefore, provides empirical support for the non-lexicalist architecture of the syntax-morphology interface as in Distributed Morphology (Halle and Marantz 1993; Marantz 1997; Harley and Noyer 1999; Embick and Noyer 2007), according to which syntax is the sole generative component for all kinds of word formation.

The present paper is organized as follows. In the next section, I review basic facts concerning the phenomenon of phrasal compounding in English, Dutch, and Afrikaans and strengthen the argument first made by Lieber (1992) and further extended by Ackema and Neeleman (2000, 2004) that this phenomenon poses an important problem with the lexicalist architecture of the syntax-lexicon correspondence. In section 3, I demonstrate that the existence of phrasal compounding poses architectural difficulties for various, well-known versions of the lexicalist

theory as in Chomsky (1970), Anderson (1982, 1992), Kiparsky (1982)/Mohanan (1986), Di Sciullo and Williams (1987), and Bresnan and Mchombo (1995). In section 4, I show that the recent derivational theory of syntax known as Multiple Spell-Out provides a straightforward explanation for this type of compound and derives its well-known syntactic properties such as those that have heretofore been captured by the Anaphoric Island Constraint (Postal 1969). Section 5 is the conclusion.

2. Phrasal Compounding: An Overview of the Issue

In the first study to discuss implications of phrasal compounding for the proper division of labor between syntax and morphology, Lieber (1992) argues that this type of compounding poses an architectural paradox for the so-called lexicalist hypothesis. Phrasal compounds are a type of compounds that are headed by a simplex noun together with a phrasal non-head element. This type of compound is quite productive in Germanic languages such as English, Dutch, and German. The purpose of this section is to bring in a broad range of data on phrasal compounding from English, Dutch, and Afrikaans in order to highlight the general issue that this type of compound brings to bear on the issue of the syntax-morphology interface. Specific theoretical implications that phrasal compounding has for the proper theory of syntax-morphology interface, in particular, for several actual implementations of the so-called lexicalist theory, will be discussed in detail in section 3.

2.1. *Phrasal Compounding in English*

Lieber (1992: 11-14) points out examples of phrasal compounding in English as in (1a-d). Additional examples of the same kind are given in (1e, f) from Bauer (1983: 164).

(1) a. [$_{NP}$ the Charles and Di] syndrome

b. [$_{PP}$ over the fence] gossip

c. an [$_{VP}$ ate too much] headache

d. [$_{TP}$ God is dead] theology

e. [$_{CP}$ what do you think?] movement

f. [$_{MoodP}$ don't tell me what to do] look

Lieber (1992: 14) defines the Lexicalist Hypothesis as stating that "rules of morphology and rules of syntax cannot interact," intending the version of this hypothesis as in Chomsky (1970) and Lapointe (1980); see section 3.1 for more detailed discussion on Chomsky's position. Lieber argues that examples as in (1a-f) are counterexamples to the hypothesis so defined because the pronominal modifier of any syntactic complexity can successfully be combined with certain simple nominal heads such as *syndrome, gossip, headache,* and so on.

A related argument against this broadly defined version of the lexicalist hypothesis can be made on the basis of examples such as (2a-d), (3a-d), and (4a-c).

(2)	a.	a nice [$_{AP}$ easy-to-drive] car	a'.	This car is easy to drive.
	b.	[$_{AP}$ hard-to-imagine] behaviors	b'.	Certain behaviors are hard to imagine.
	c.	[$_{AP}$ difficult-to-solve] equations	c'.	These equations are difficult to solve.
	d.	a lousy [$_{AP}$ hard-to-drive] bike	d'.	My bike is hard to drive.

(3) a. He [$_{TP}$ I-don't-care]-ed his way out of his room.

b. She [$_{TP}$ I'm-from-New-York]-ed her way into the men's' room.

c. Patrick [$_{TP}$ I-don't-take-that-kind-of-crap-from-anyone]-ed his brother.

d. Traci [$_{TP}$ do-I-look-like-a-woman-who-does-windows]-ed her way out of a job.

(Carnie 2000: 91)

(4) a. He's an aggressive [$_{\alpha P}$ up-and-at-them]-***kind of*** guy.

b. He's an aggressive [$_{\alpha P}$ up-and-at-them]-***type of*** guy.

c. He's an aggressive [$_{\alpha P}$ up-and-at-them]-***y*** guy.

In (2a), for example, the pronominal modifier position that would normally be occupied by a simplex adjective in English is occupied instead by the internally complex adjectival phrase *easy-to-drive*. Crucially, this phrase is derived, in turn, from the predicative portion of the syntactically generated *tough*-construction, as shown in (2a'). The same pattern holds for the other examples in (2b-d). Two points can be made on these examples. One is that, under the standard lexicalist assumption in the literature that compounding is a word formation process in the lexical component, whatever morphological process derives a complex pronominal adjectival phrase as in (2a-d) from a corresponding syntactic base in (2a'-d') must be a process in the lexical component. Another point is that the *tough*-construction has been widely known to be the product of syntactic derivation (derived by operations such as null operator movement; see Chomsky 1977 and Browning 1987, among others). These points taken together mean that the compounding process in the lexical component must occur after the syntactic component. This inverse ordering, according

to Lieber (1992), poses an architectural paradox for any analyses of compounding as in lexicalist theories that assume that compounding is the product of the pre-syntactic generative lexicon.

Examples as in (3a-d), pointed out by Carnie (2000), can be construed as making the same case against the general underpinning of the lexicalist theory because these examples define clear cases in which complex sentential objects that obey regular compositional rules of syntax can still be embedded within a lexically derived morphological verb.

Finally, as illustrated in examples as in (4a-c), English has several nominal and adjectival affixes, such as *-kind of*, *-type of*, and *-y*, that can co-occur with any kind of syntactically derived objects. There is evidence that the complex object demarcated by αP in (4a-c) is a compounding nominal element rather than a phrasally modified element. One standard diagnostic that a particular combination of free morphemes forms a compound is that their relative order is fixed for compounds but free for syntactic concatenation. Compare examples in (5a, b) with those in (6a, b).

(5) a. big green car

b. green big car

(6) a. green company car

b. * company green car

Leaving aside well-known issues regarding non-canonical adjectival modification and contrastive focus (see Dixon 1982, Sproat and Shih 1991, and references cited therein for detailed discussion on these issues), the string of words, *big green car* and *green big car*, are both grammatical, as shown in (5a, b). By contrast, the difference in grammaticality between (6a)

and (6b) shows that the relative order of *green* and *company* is fixed; the adjective must precede the noun. This inflexibility of word order in (6a, b), therefore, shows that *company car* is a product of compounding, a process of derivational morphology in the lexical component within the lexicalist theory. With this in mind, consider examples in (7a-d).

(7) a. He's an aggressive guy.

b. He's an [$_{\alpha P}$ up-and-at-them]-*kind of* guy.

c. He's an aggressive [$_{\alpha P}$ up-and-at-them]-*kind of* guy.

d. * He's an [$_{\alpha P}$ up-and-at-them] aggressive *kind of* guy.

The contrast between (7c) and (7d) shows that when the αP and the adjective *aggressive* modify the head noun *guy*, the order between the two pronominal modifiers is fixed in the same way that the order between *green* and *company* is in (6a, b); the adjective must precede the αP. This inflexible word order, therefore, suggests that the apparent sentential modifier is a compounding element with the nominal head -*kind of*, just as *company* is with the nominal head *car* in (6a). Accordingly, under the general lexicalist assumption that compounding is a lexical process, examples as in (4a-c) pose non-trivial difficulties for the general lexicalist theory.

2.2. *Phrasal Compounding in Dutch and Afrikaans*

Ackema and Neeleman (2000, 2004: ch. 4.5) note that, in Dutch, certain derivational morphemes such as *achtig* 'like' and *loos* 'less' attach themselves freely to syntactically complex expressions, as shown in examples such as (8a-d).

(8) a. zo'n [$_{A}$ [$_{CP}$ war gaat dat heen] achtig] gevoel
such where go that to like feeling
'a somewhat worried feeling'

b. een [$_{A}$ [$_{CP}$ uit je bo]] achtig] gevoel
a out-of your head like feeling
'an out-of-your head like feeling'

c. een [$_{A}$ [$_{CP}$ ijs met slagroom] loos] bestaan
a with whipped cream less existence
'a life without ice cream with cream'

d. een [$_{A}$ [$_{CP}$ dames met schoothondjes] loze omgeving
a ladies with lap-dog-Dim-Pl less environment
'an environment without ladies with little lap dogs'

(Ackema and Neeleman 2000: 313, 314)

As Ackema and Neeleman point out, the list of examples of this sort is expandable infinitely. Given the general lexicalist assumption that compounding is a lexical process, examples as in (8a-d) indicate that the strict version of the lexicalist hypothesis, namely, that no syntactic phrase can be input for lexical processes, is hard to sustain. Ackema and Neeleman further point out that examples such as (9a-c) in Dutch are what they have simply made up on the fly, suggesting that compounding is not likely to be a solely lexical process.

(9) a. [$_{NP}$ [$_{CP}$ warom level wij?] problem]
why live we problem
'why we live problem'

b. [$_{NP}$ [$_{PP}$ uit je bol] muziek]
out-of your head music
'out of your head music'

c. [$_{NP}$ [$_{VP}$ blijf van mijn lijf] huis]
stay-away from my body home
'stay away from my body home' (Ackema and Neeleman 2004: 126)

Botha (1981) has independently noted the same problem with lexicalist theories that adopt the strict division of labor between syntax and lexicon/morphology. After developing a purely lexicalist analysis of synthetic compounding in Afrikaans, Botha concludes his paper by pointing out a large set of examples of phrasal compounding in this language as counterexamples to his own *No Phrase Constraint* developed earlier in his paper. The relevant constraint is defined as in (10). "WFRs" stands for Word Formation Rules.

(10) The No Phrase Constraint (Botha 1981: 18)
Morphologically complex words cannot be formed (by WFRs) on the basis of syntactic phrases.

Botha indicates that this constraint cannot be maintained in its strong form. Some examples, among many others, are given in (11a-c).

(11) a. [$_{NP}$ [$_{PP}$ uitt die ondo op die tafel] skottel]

out-of the oven to the table dish

'oven-to-table casserole'

b. [$_{NP}$ [$_{CP}$ moet ek dit alles aleen doen] uitdukking

must I do all alone do expression

'A 'must I do it all alone' expression'

c. [$_{NP}$ [$_{VP}$ saas laat in die bed] kinders

at night late in the bed children

'children who (habitually) go to bed late'

(Botha 1981: 74, 75)

The existence of these freely formed phrasal compounds in Afrikaans, therefore, poses non-trivial difficulties for the strictly defined version of lexicalism whereby rules of syntax cannot apply to morphologically derived objects.

2.3. *Section Summary*

To summarize this section, I have reviewed Lieber's (1992) seminal argument based on phrasal compounds that the strict version of the lexicalist theory, namely, that no rules of syntax can interact with rules of morphology, cannot be maintained. I have brought in additional data from English, Dutch, and Afrikaans to further strengthen this position.

3. Phrasal Compounding and Lexicalist Theory

It is an entirely different task to show that the existence of phrasal compounding is really problematic for existing versions of the general lexicalist theory, not the generally assumed architecture of the lexicalist theory, since so many variants of this theory have been presented in the literature since the early 1970s. The purpose of this section, therefore, is to review several well-known versions of this theory as in Chomsky (1970), Anderson (1982, 1992), Kiparsky (1982)/Mohanan (1986), Di Sciullo and Williams (1987), and Bresnan and Mchombo (1995), and show that these variants all have several shortcomings in face of phrasal compounding.

3.1. *Chomsky's (1971) Weak Lexicalist Theory*

Under the standard interpretation of the history of the theories of the lexicon-syntax interface from the early 1970s to the present within the framework of generative grammar, the Lexicalist Hypothesis comes in two varieties, strong and weak versions. The strong version of the Lexicalist Hypothesis (Lapointe 1980; Selkirk 1982; Chomsky 1995) holds that all word formation processes occur in the pre-syntactic/autonomous lexical component; see sections 3.3-3.5. The weak version of the Lexicalist Hypothesis, which has most often been associated with Chomsky (1970), maintains that certain (regular, productive) word formation processes occur in the pre-syntactic lexicon whereas other (irregular, non-productive) processes occur in the syntax in a way that is conditioned by a variety of criteria including productivity, derivation vs. inflection, and semantic and/or morphological idiosyncrasies. This is one 'standard' interpretation of Chomsky's position, for example, the interpretation given by Spencer (1991):

(12) Spencer's (1991) Interpretation of Chomsky's (1970) Weak Lexicalist Hypothesis

Chomsky argued that transformations should capture regular correspondences between linguistic form, and that idiosyncratic information belonged in the lexicon … derived nominalizations are morphologically, syntactically and semantically idiosyncratic…"

(Spencer 1991: 69)

Against this interpretation of Chomsky's work as the birthplace of the weak lexicalist theory, Marantz (1997) claims that Chomsky actually argued against a lexicalist treatment of derived nominalizations by showing that such a treatment would need to stipulate a uniform pattern concerning the unacceptability of the transitive use of internally caused change of state predicates like *growth* (Levin and Rappaport-Hovav 1995), as in **John's growth of tomatoes*, a pattern that would be naturally explained by the lack of (a certain type of) *v* in the syntactic approach to word formation as argued for in Marantz (1997). Most recently, this alternative interpretation is hinted at in Chomsky's own writing (Chomsky 2006), when he remarks (p. 12) that "possibly the functional category *v* determines the verbal character of the root R that is its complement, along lines suggested by Alec Marantz, in which case verbal phrases are of the form *v*-RP.' For the purposes of this paper, however, I follow Spencer's arguably "traditional" interpretation of Chomsky's work for the purposes of discussion.

According to Chomsky's (1970) version of the weak lexicalist theory, the compounding process would be a pre-syntactic process in the lexical component as it is well known that compounds exhibit various syntactic, semantic, and phonological irregularities (e.g., fixed word order, semantic drift, and stress shift). We have seen in the previous section, however, that, in the case of phrasal compounds, any type of syntactic objects of any arbitrary complexity can occur as the first member of such compounds. This means that compounding

formation processes would take the output of the syntactic derivation as its input. However, this ordering should be impossible under the theory within which Chomsky's (1970) lexicalist position was couched (i.e. the Extended Standard Theory), which posits the lexicon as an autonomous pre-syntactic component that interfaces with D-structure. This point is clarified in the following statement of the earliest version of the lexicalist theory such as Chomsky (1970) by Borer (1998); see section 5.3 for our discussion of Kiparsky's (1982)/Mohanan's (1986) theory of Lexical Phonology, which explicitly states this sort of ordering in the definition of the way syntax, morphology, and phonology interact.

(13) Borer's (1998) Statement of Chomsky's (1970) Weak Lexicalist Hypothesis

The way in which L[exical] I[ntegirty] H[ypothesis] is enforced in many of these models is by assuming that the W[ord] F[ormation] component, as a block of rules, is ordered with respect to the syntax. The WF component and the syntax thus interact only in one fixed point. Such ordering entails that the output of one system is the input to the other. This notion of the autonomy of the syntax and the WF component, and the restricted interaction between them, thus mimics the notion of autonomy developed for the interaction between the syntax and the phonology, where it is the output of the former which interacts with the latter. (Borer 1998: 152, 153)

The existence of phrasal compounding poses an inverse ordering paradox for Chomsky's version of the weak lexicalist theory because, due to the general grammatical architecture that his model is couched within, no lexical processes such as compounding should be able to apply to the output of syntactic processes. Thus, I conclude that Chomsky's weak lexicalist theory is not tenable in face of phrasal compounding, as originally noted by Lieber (1992).

3.2. *Anderson's (1982, 1992) Weak Lexicalist Theory*

Anderson (1982, 1992) develops a different version of the weak lexicalist theory from Chomsky's (1970) version that does not depend on the notion of productivity, irregularity, and so on. Anderson argues that inflectional morphology is treated in the syntax whereas derivational morphology is treated in the lexicon. He defines the inflectional, hence syntactic nature of any element as follows:

(14) Anderson's (1982, 1992) Definition of "Inflectional Morphology"

Inflectional morphology is what is relevant to syntax. (Anderson 1982: 587)

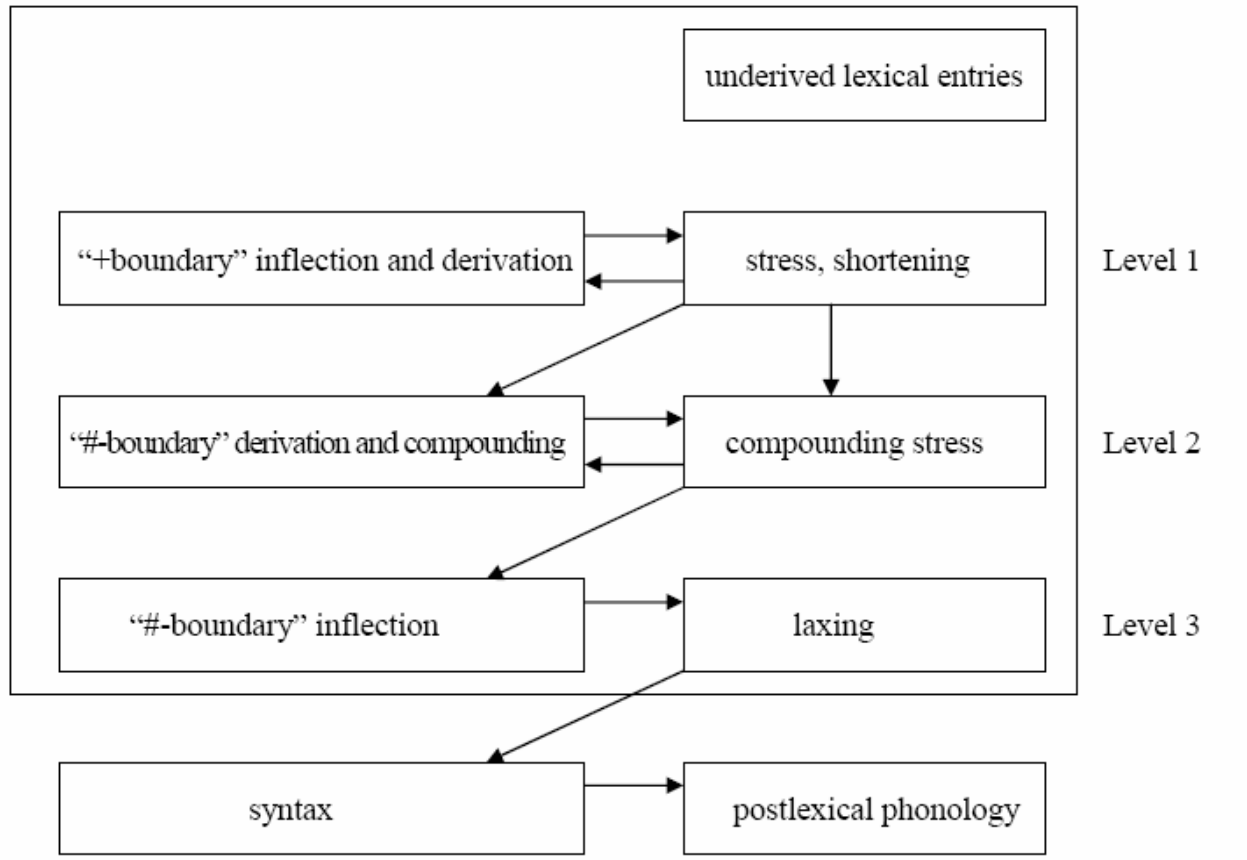
This definition thus allows any affixation that has relevant to syntax such as agreement, tense, and event structure to be treated in the syntax. As Di Sciullo and Williams (1987) point out, however, this definition does not work in the way Anderson intends. To take affixation, for example, if the inflectional nature of a particular affix is determined by its relevance to syntax, then almost all affixes could be considered as syntactic, a state of affairs that Anderson does not want. For example, Di Sciullo and Williams note (p. 69) that "this definition would seem to consign all nominalizing affixes, such as *–ion*, to inflection because nouns and verbs have different syntactic properties, and the affix makes the difference." In the case of phrasal compounding, however, it is not as clear what consequences Anderson's (1982) weak lexicalist theory has. However, Anderson (1992) is more explicit about his conception of the Lexical Integrity Hypothesis; he argues (p. 84) that "the syntax neither manipulates or has access to the internal structure of words." Therefore, to the extent that compounding is a derivational process, as it has been assumed under the standard lexicalist theory, the existence of phrasal compounding poses an architectural paradox for

Anderson's (1992) version of the weak lexicalist theory. The formation of a phrasal compound is relevant to syntax in the sense that a phrasal, non-head member of such a compound is syntactically generated, hence the compound should be created via the lexical process of compounding based on the syntactic output. Again, this ordering should be impossible under the lexicalist architecture of the grammar wherein the lexical component precedes/is postulated independently of the syntactic component.

3.3. *Kiparsky's (1982)/Mohanan's (1986) Lexicalist Phonology*

The existence of phrasal compounding also refutes one well-known version of the strong lexicalist theory known as Lexical Phonology (Kiparsky 1982; Mohanan 1986; see also Pesetsky 1979). This theory maintains that morphology and phonology interact in tandem with each stratum/cycle governing operations with certain characteristics. Specifically, affixational/inflectional processes with irregular phonological and morphological consequences occur in Stratum 1 while regular inflectional processes with transparent consequences occur in a later Stratum (Stratum 3 in Kiparsky/Stratum 4 in Mohanan). Kiparsky's (1982) model of Lexical Phonology is given in (15) below. See Mohanan (1986) for a further development of Kiparsky's original model, which I am not going to discuss here.

(15) Kiparsky's 1982 Model of Lexical Phonology in English (Kiparsky 1982: 133)



This model claims that word formation rules and lexical phonological rules are partitioned into an ordered series of levels/strata/cycles; recall Borer's (1998) statement on this point in (13). "+boundary" inflectional affixes in Level 1 include the umlaut of *tooth-teeth,* the ablaut of *sing-sang,* and other stem-changing morphology whereas "+boundary" derivational affixes include what have been called Level 1 affixes in the Level-Ordering Hypothesis of Siegel (1973) and Allen (1978) such as *-al, -ous,* and *-im,* as in *refusal, pious,* and *impotent.* "#-boundary" derivation in Level 2 involves what have been called Level 2 affixes in the Level-Ordering Hypothesis such as *un-, -ness,* and *-er* whereas compounding is a process of combining two independent root elements such as *black board, nurse shoes,* and *red coat.* Finally, "#-boundary" inflection in Level 3 deals with cases of affixation

involving the rest of the regular inflectional affixes such as plural *-s*, and past tense *-ed* in English. To illustrate this model, let us consider the derivation of words like *codifiers*. The base stem *code* is submitted to the phonological rules of Level 1, where the word formation rule attaches the Level 1 affix *-ify* to the stem. This derived stem is then assigned stress as *códify* in the same Level. The resulting object is submitted now to the phonological component of Level 2, in which the word formation rule attaches the agentive suffix *-er* to derive the complex form *codifier*. Finally, when the resulting object enters Level 3, the regular plural formation process applies to this object to yield the final output *codifier*. In this way, a set of phonological and morphological processes that apply to yirlf complex words are ordered in a series of strata/cycles/blocks. Kiparsky assumes that the derivation of all words should go through all these levels, even though relevant phonological and morphological processes may apply vacuously at any one of these levels.

This ordered block of rule application correctly predicts why forms such as **un[ept]* are ill-formed in contrast to *in[ept]*. As we have seen above, the prefix *un-* is a Level 2 affix. Thus, *un-* prefixation occurs in Level 2. To create the form **unept*, however, the bound morpheme *-ept-* must traverse the word formation process in Level 1 that would assign the appropriate Level 1 affix *in-* to the stem to create the grammatical form *inept*. The ill-formedness of **unept*, thus, follows as a natural consequence of the ordered series of morphophonological rule application.

One theoretical tenet of Lexical Phonology which is important for the purposes of this paper is what Kiparsky calls the *Bracketing Erasure Convention*; see Pesetsky (1979) for the original statement of this convention. This convention deletes all brackets at the end of each stratum/level of word formation and thus has the effect of rendering access to the previously available internal structure of complex words opaque in later strata/cycles. This convention, thus, derives the Lexical Integrity Hypothesis (see sections 3.4 and 3.5), namely, that word

formation processes in Level 2 and Level 3 cannot look into the morphological makeup of complex morphological objects created by word formation processes in Level 1 and Level 2, respectively. Lexical Phonology, therefore, makes an explicit prediction that no processes in a particular level should be able to apply to a complex object that is derived by word formation processes characteristic of earlier levels.

We have already seen above that this prediction is clearly falsified by phrasal compounds in English, Dutch, and Afrikaans. Under the model of Lexical Phonology shown in (15), compounding is a morphological process at Level 3. However, the input of such a process in the case of phrasal compounding is the output of fully productive syntactic processes that would apply after all strata.

3.4. *Di Sciullo and Williams' (1987) Atomicity of Words Thesis*

Di Sciullo and Williams (1987) develop the most comprehensive variant of the lexicalist theory that is conceptually very different from other instantiations of the theory as in Chomsky (1970), Anderson (1982, 1992), Kiparsky (1982), and Mohanan (1986). They maintain that morphology and syntax are two different domains of inquiry with two different primes (e.g., stems, affixes, roots vs. NPs, VPs, CPs) and operations (compounding, θ-identification vs. movement, quantification). Thus, for Di Sciullo and Williams (1987), the so-called lexicalist hypothesis/the lexical integrity hypothesis/the lexical atomicity "is not a principle of grammar but rather a consequence of the conception that grammar contains two subparts, with different atoms and different rules of formation" (p.2). Under Di Sciullo and Williams' conception of the organization of the grammar, the word "lexicon" takes an entirely different sense from the use of the same word as the generative component that stores words and their formation rules: the lexicon is the storage

house for *listemes*, "objects of no single specifiable type (words, VPs, morphemes, perhaps intonation patterns, and so on) that "fail to conform to interesting generalizations." (p. 3) . Assuming this strict division of labor between the word system and the phrase system, Di Sciullo and Williams maintain that morphology and syntax can still communicate with one another through a restricted range of shared vocabulary, specifically, the "topmost properties of words, the features and argument structure of the topmost words." (p. 45), as stated in their *Thesis of Atomicity of Words* defined in (16).

(16) The Thesis of the Atomicity of Words (Di Sciullo and Williams 1987: 48, 49)

> *Although syntactic rules can access the categorial status and argument structure of a lexical item, they will never depend on how that categorial status or argument structure was arrived at through morphological derivation or on the internal constituency of words. The rules of syntax can see that a word has such and such properties, but they cannot see how it came to have those properties. …Words are "atomic" at the level of phrasal syntax and phrasal semantics. The words have "features," or properties, but these features have no structure, and the relation of these features to the internal composition of word cannot be relevant in syntax.*

Williams (2007), the most recent update of Di Sciullo and Williams's version of the strong lexicalist hypothesis, maintains essentially the same position.

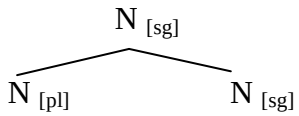
Let us now consider what Di Sciullo and William's version of the strong lexicalist theory could tell about phrasal compounding. Note that the argument against their lexicalist position cannot be made on the basis of relative productivity of compounding, as in Chomsky's weak lexicalist theory, because they provide extensive arguments in their book (see also Williams

2007 for additional arguments) that morphological objects and syntactic objects alike show productivity. Therefore, I provide an argument based on what they take to be top-most properties of the morphological word that serve as shared information between morphology and syntax.

Di Sciullo and Williams illustrate this cross-modular communication with compounding in English. Compounding involves the creation of what they call "morphological objects", which derive their agreement features from the percolation of the features of the right-hand head (Williams 1981). Crucially, it is this output information recorded on the top-most level of the compound (namely, the topmost N in (17a, b)) that is used for the purposes of the syntactic subject-verb agreement, as the contrast between (18a, b) shows.

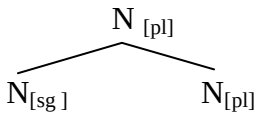
(17) English N + V compounds

a.



parts supplier

b.



part suppliers

(18) a. Parts-supplier is/*are mean to me.

b. Part-suppliers *is/are mean to me.

This agreement pattern correctly falls out from Di Sciullo and William's system because the feature specification for the non-head member of the compound is invisible from the perspective of syntax. Thus, this pattern illustrates one way in which syntax and morphology can communicate through a restricted range of shared vocabulary while still blocking the syntax from accessing the internal morphological composition of compounds in conformity with the thesis in (16).

The above exposition of the Thesis of Atomicity of Words, therefore, makes a prediction that syntactic operations cannot look into the morphological makeup of complex morphological objects but can only operate on their top nodes because the internal structure of such objects is informationally encapsulated from the perspective of syntax. The phenomenon of phrasal compounding, however, presents an empirical challenge to this thesis because it requires syntactic objects to be combined with a simplex nominal element in the morphological system. Syntactic processes should not be able to interact with other elements in the lexical process of compounding due to their Thesis of the Atomicity of Words. Therefore, phrasal compounding defines a clear case in which syntax and morphology access information from each other without replying on top-level properties of morphological objects, as argued for in Di Sciullo and William's (1987) theory.

3.5. *Bresnan and Mchombo's (1995) Lexical Integrity Hypothesis*

Bresnan and Mchombo (1995) develop a different version of the strong lexicalist theory than Di Sciullo and Williams's (1987) thesis and propose the following hypothesis concerning the lexicon-syntax interface.

(19) The Lexical Integrity Principle (Bresnan and Mchombo 1995: 181, 182)

...words are built out of different structural elements and by different principles of composition than syntactic phrases. Specifically, the morphological constituents of words are lexical and sublexical categories-stems and affixes-while the syntactic constituents of phrases have words as the minimal, unanalyzable units; and syntactic ordering principles do not apply to morphemic structures. As a result, morphemic order is fixed, even when syntactic word order is free; the directionality of 'headedness' of sublexical structures may differ from supralexical structures; and the internal structure of words is opaque to certain syntactic processes.

Since Bresnan and Mchombo contain an explicit answer to the implications of phrasal compounding for their Lexicalist Integrity Principle, it is important to review their analysis of this phenomenon in detail. Bresnan and Mchombo (1995: 228) counter that the mere presence of phrasally complex elements within compounds as discussed in section 2 is an insufficient ground to undermine their Lexical Integrity Hypothesis stated in (19). Specifically, they make the following argument:

(20) Bresnan and Mchombo's (1995) View on Phrasal Compounding with Respect to Lexical Integrity

In sum, we suggest that true phrasal recursivity is lacking in word structure. Where syntactic phrases appear to undergo morphological derivation, it is by virtue of their being lexicalized. Although lexicalization can be innovative, the non-syntactic status of lexicalized phrases embedded in word structure can be detected in properties such as lexical gaps, and can be confirmed by the other lexical integrity tests.

(Bresnan and Mchombo 1995: 194)

Bresnan and Mchombo essentially argue that phrasal compounds are not counterexamples to their Lexical Integrity Principle because they are lexicalized and stored in the lexicon. To support this idea, they note that phrases within phrasal compounds a) behave like quotations and b) are opaque to interpretive processes such as reference. Point a) is indeed true, as evidenced by the fact that any kind of phrase, foreign words or nonce words, can occur as the non-head phrasal member of such compounds as in *a non-fumar sign* and *But I'm not an in-your-face, rah-rah-rah-kind of guy*. The important point, however, is that this is not the exclusive property of compounds but is also observed in phrases and sentences as well. Therefore, the observation that phrasal compounds are different from phrases and sentences on the basis of their behavior as quotation-like elements is not an argument that phrasal compounds lack true syntactic recursivity. Point b) has been widely known since the seminal work of Postal (1969) (see section 4.3 for more on this). For example, indexicals as in *me-first generalization* do not behave as such in phrasal compounds (i.e. do not refer to the speaker) in contrast to indexicals in sentences like *John likes me*. This kind of opacity has been taken by Bresnan and Mchombo and many other lexicalist theorists such as Di Sciullo and Williams (1987) as evidence for the Lexical Integrity Hypothesis. However, as Lieber and Scalise (2006: 11) also independently point out, this conclusion is not necessarily warranted. It has been convincingly argued in recent work on the syntax-semantics interface as in Higginbotham (1985), Longobardi (1994), and Heim and Kratzer (1998) that only saturated nominal elements such as DPs can refer. That the first member of a compound is not a DP is is evidenced clearly by lack of determiner quantifiication, case, and other elements that would normally appear when the same nominals are used in syntatcic phrases; see also Levi (1978) for additional arguments to the same effect. Thus, the opacity of compound-

internal elements with respect to reference can be independently accounted for by the lack of determiner quantification without necessarily invoking the Lexical Integrity Hypothesis.

As far as I can see, however, the more serious problem with Bresnan and Mchombo's (1995) view on phrase compounding, lies in their claim included in (20) that examples of phrasal compounding are formed by the "potentially innovative lexicalizing of phrases". In other words, lexicalized phrases are atomic elements, hence are stored as an idiom in the lexicon. As stated above, to the extent that this analysis is tenable, phrasal compounds are not counterexamples to their statement in (19) because they are all listed in the lexicon rather than generated in the syntax on the fly. Two considerations suggest, however, that this analysis cannot be upheld in its entirety; see also Lieber and Scalise (2006: 11-12) for similar remarks on Bresnan and Mchombo's analysis.

Firstly, a question remains as to whether compounds that they call "innovative" can be all stored in the lexicon. Interpreted literally, their analysis could mean that all new cases of phrasal compounds that we have come across should be stored in the lexical component. Their proposed analysis, thus interpreted, is not tenable because we have seen in section 2 that the number of innovative compounds is infinite. Furthermore, Ackema and Neeleman (2004: 126) show that examples such as (21a-e), which are found by their ten-minute survey, contain "phrases which are unlikely to be listed, such as *animal-to-human, bragging-about-himself*, or *go-anywhere-at-any-time*."

(21) a. white-van-man

b. sit-on-the-sidelines-Euro policy

c. animal-to-human-communication

d. go-anywhere-at-any-time-access

e. bragging-about-himself-calligraphy (Ackema and Neeleman 2004: 126)

It is not clear whether it is theoretically desirable to have a theory of the syntax-lexicon interface where all these examples as well as other potential cases of phrasal compounds that will be created are freely formed and stored in the lexicon based on what is clearly the result of syntactic combinatorial processes. Ackema and Neeleman make the same point against Bresnan and Mchombo's analysis based on the examples in (9a-c) in Dutch; these examples, among many others, are what they have simply made up on the fly. The phrasally complex compounding pattern, therefore, provides a strong argument against Bresnan and Mchombo's lexicalist approach to compounding. Secondly, Bresnan and Mchombo's analysis of phrasal compounds as a result of innovative lexicalizing does not provide us with an answer to why expressions such as those reviewed so far in this paper (some of which we have never heard in our input) are correctly interpreted and produced on the fly by native speakers of English if they are all listed in the lexicon. If each new instance of phrasal compound is listed in the lexicon, it is not entirely clear what role syntax could play in the formation of such compound because the phrasal member of the compound obeys normal rules of syntax. Rather, given this observation, it seems more natural to think that phrasal members of such compounds are created freely in the syntactic component and used as input for the non-lexical process of compounding.

Based on these considerations, I conclude that Bresnan and Mchombo's version of the strong lexicalist theory also have a number of empirical shortcomings that need to be fixed in face of phrasal compounding. As we will see in the next section, however, the alternative analysis proposed below does relate in spirit to their lexicalization approach to phrasal compounding in that its formation involves some feedback from syntax to the "lexicon" as the source of remunerated lexical items. We will come back to this point in section 4.2.

3.6. *Section Summary*

To summarize this section, I have shown that several existing versions of the lexicalist theory have serious architectural and/or empirical shortcomings in the face of phrasal compounding. Examination of this phenomenon in the context of the proper balance between syntax and morphology a) creates an inverse ordering paradox for several variants of the theory as in Chomsky (1970), Anderson (1982, 1992), Kiparsky (1982), and Mohanan (1986), b) yields the wrong prediction that syntactic phrases cannot be included as elements to interact with the morphological process of compounding, as argued for in Di Sciullo and Williams (1987), or c) leads to the somewhat unmotivated claim that all innovative cases of phrasal compounds are listed in the lexicon, as in Bresnan and Mchombo's (1995) theory.

It is important to note that the observed array of problems with the lexicalist theory does not arise if we do not adopt the general lexicalist architecture of the lexicon-syntax interface in the first place. The inverse ordering paradox and the issue of cross-modular informational encapsulation cease to be a problem if we do not postulate the lexicon as a pre-syntactic/autonomous/independent generative component. Similarly, the undesired consequence of Bresnan and Mchombo's (1995) lexicalist approach can be avoided once we assume that all cases of phrasal compounding are

generated freely in the syntax on a par with sentences and phrases. Indeed, recent non-lexicalist theories as in Distributed Morphology (Halle and Marantz 1993; Marantz 1997; Harley and Noyer 1999; Embick and Noyer 2007) propose to eliminate the lexicon in the lexicalist sense and locates all types of word formation in the sole realm of generative syntax.

Since Lieber (1992), phrasal compounding has been repeatedly discussed in the literature to evaluate the validity of the lexicalist theory and to see precisely what aspects of such a theory need to be revised to accommodate the relevant phenomenon. I have shown that lexicalist theories cannot accommodate this phenomenon. Instead, non-lexicalist theories of the syntax-morphology interface seem to have right architectural properties that could potentially lead us to a deeper understanding of the phenomenon because it is free from the architectural problems that faced the lexicalist theory. It is important to remind ourselves, however, that this is an architectural issue pertaining to the syntax-morphology interface, hence is entirely separate from what is the right analysis of the phenomenon itself within a non-lexicalist framework such as Distributed Morphology. As Lieber and Scalise (2006: 20) object concerning Distributed Morphology (see also Spencer 2005 for a related remark), this framework "is untested with respect to the kind of data we have outlined… we would add that very little of what is published is explicitly concerned with derivational and compounding, as opposed to inflection." In the next section, I propose a new syntactic analysis to phrasal compounding that answers this objection.

4. Spelling-Out Phrasal Compounding

In this section, I propose a non-lexicalist, derivational analysis for phrasal compounding within the Multiple Spell-Out model of syntax, as proposed by Uriagereka (1999) and further elaborated by Johnson (2003). I show that the proposed analysis provides a straightforward

characterization of this phenomenon as the product of the syntactic derivation as a remunerated lexical item on a par with regular compounds such as *black board* and *red coat*. I further demonstrate that the current analysis naturally derives some well-known properties of compounds such as the Anaphoric Island Constraint (Postal 1969).

4.1. *Uriagereka's (1999)/Johnson's (2003) Multiple Spell-Out Model and Renumeration*

One central idea of the derivational theory of syntax within the Minimalist Program (Chomsky 1995, 2004, 2006; Epstein et al. 1998, Uriagereka 1999) is that phonological and semantic information is transferred to the syntax-external interpretive components in a piecemeal fashion; see Bresnan (1971) and Jackendoff (1972) for important earlier proposals that antecede this general idea. This hypothesis has come to be known as Multiple Spell-Out. Uriagereka (1999) presents one version of this general hypothesis from the viewpoint of keeping the simplest linearization procedure within Kayne's (1994) Linear Correspondence Axiom ("If α asymmetrically c-commands β, α precedes β.") (p. 252). Since this procedure can function only with uniformly right-branching configurations (or what Uriagereka "Command Units"), it cannot determine the relative ordering between the terminal nodes contained within two complex left-branching structures. To solve this issue, Uriagereka proposes that syntactic derivation Spells-Out one of these complex structures to the interface components before it merges with the other so that the relative ordering of the terminals within the Spelled-Out structure may be correctly fixed by the simplex linearization process stated above. When the ordering is fixed, Uriagereka assumes, the structure attains the status of "a giant lexical compound" whose set-theoretic status is no different from a simplex lexical item such as *book, paper*, and *desk*, and is later plugged in where it belongs in the entire derivational workspace.

This derivational system derives the well-known Left-Branch effects/Conditions on Extraction Domains (Cattell 1976; Huang 1982), which prohibit movement of any element from the non-complement position, as illustrated in (22a, b).

(22) a. * $[_{DP}$ Which book$]_i$ did $[_{DP}$ a critic of $t_i]$ meet you at the conference?

b. * $[_{DP}$ Which book$]_i$ did you go to class $[_{PP}$ before she read $t_i]$?

The extraction from the subject and the adjunct positions in (22a, b) is impossible because the DP/PP that contains the *wh*-phrase *which book,* as an internally complex left-branching structure, must be Spelled-Out early to the syntax-external interpretive components, leaving this portion as a closed/frozen domain. As a result, the movement of *which book* is architecturally prohibited. More generally, Uriagereka's (1999) derivational model includes a strong statement that complex specifiers and adjuncts in the traditional sense of X′-Theory (Chomsky 1981, 1986) must be Spelled-Out early for the purposes of linearization at PF before they merge with another left-branching structure, hence form closed domains for syntactic extraction.

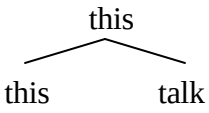
Johnson (2003) develops a slightly different version of the Multiple Spell-Out model proposed by Uriagereka (1999) from the perspective of the syntax-phonology interface with a case study in island effects. Specifically, Johnson argues that internally complex adjuncts and subjects (which he reanalyzes as XPs adjoined to TPs; see also Kayne 1994 for a related analysis from the perspective of his Linear Correspondence Axiom) are Spelled-Out mid-derivationally and renumerated as a syntactic subtree. This model thus provides a natural explanation of the left-branch effects as illustrated in the examples in (22a, b), as does Uriagereka's (1999) model. To illustrate Johnson's

Multiple Spell-Out model, consider phrases that contain VP adjuncts as in *flew after this talk*. The derivation for this example under Johnson's analysis is given in (23a-g) in a step-wise fashion.

(23) a. **Select:**

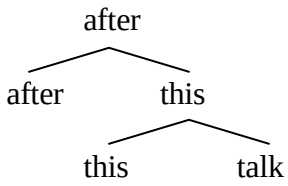
talk N = {*v*, flew, after, this}

b. **Merge**:



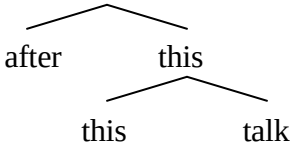
N = {v, flew, after}

c. **Merge:**



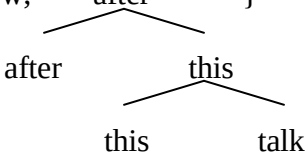
N ={*v*, flew}

d. **Remunerate:**

N = {v, flew, 

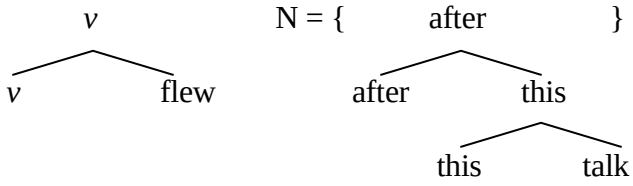
}

e. **Select:**

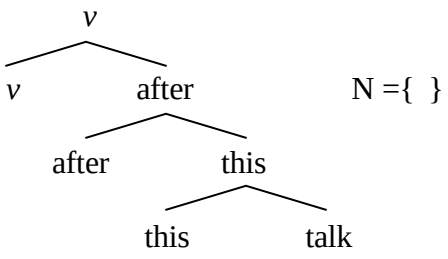
v N = {flew, 

}

f. **Merge**:



g. **Merge:**



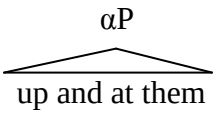
(Johnson 2003: 198, 199)

In this derivation, the adjunct PP *after this talk* is assembled in the order shown in (23a-c). This complex object then gets remunerated as a derived subtree as shown in (23d), and undergoes merge with the VP as seen in (23e-g). Johnson shows in detail that adjunct and subject phrases always require renumeration for the derivation to converge. Note that Johnson's (2003) version of the Multiple Spell-Out model does not entail that adjunct and subject XPs that are renumerated into the syntactic derivation should turn into a simplex lexical item. For the purposes of this paper, however, I assume that all and only internally complex left-branching configurations are Spelled-Out early and renumerated into the syntactic derivation as a derived simplex lexical item, along lines suggested by Uriagereka (1999).

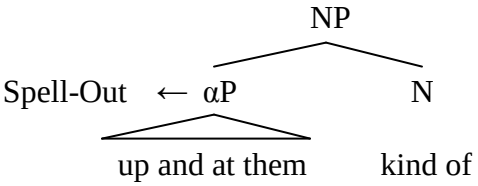
4.2. *Phrasal Compounds as Remunerated Lexical Item*

Having introduced the Multiple Spell-Out model, let us now consider the syntactic derivation of phrasal compounds. The relevant part of the derivation for the example in (4a), *up-and-at-them-kind-of*, is given in (24a-c). The Numeration = {up, and, at, them, kind, of}

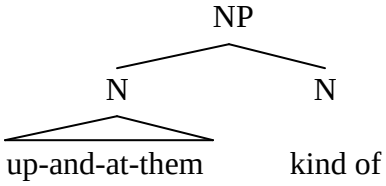
(24) a. **Assemble αP**



b. **Spell-Out αP**



c. **Remunerate αP**

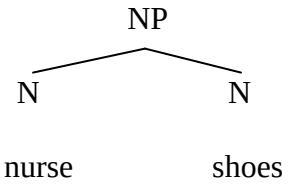


The derivation starts with assembling the αP *up and at them*. If this complex object merges with the nominal affix *kind of*, there is no asymmetric c-command relationship that can be established between the terminals contained within the αP and the nominal affix. The derivation thus Spells-Out the complex structure and remunerates it as a derived giant lexical item. This derived simplex item is plugged in where it belongs in the whole syntactic derivation and merged with

the nominal affix in the manner seen in (24c) to derive the phrasal compound *[up-and-at-them]-kind of*.

It is important to note that, after being Spelled-Out, the αP is remunerated as a simplex item. Thus, the output representation shown in (24c) is structurally identical to the representation for normal cases of simple compounding as in *nurse shoes*, as shown in (25).

(25)



Therefore, the proposed analysis allows for a straightforward reduction of the apparently problematic case of phrasal compounding to the regular case of compounding as seen in (25). The current analysis also directly solves a range of architectural difficulties that faced several versions of the lexicalist theory reviewed in section 3 because phrasal compounds are nothing but the product of independently available syntactic combinatorial processes.

It is important to recall in this connection Bresnan and Mchombo's (1995) claim that phrasal compounds involve the innovative lexicalizing of phrases in the lexical component. As we have seen in section 3.5, this analysis does not provide a natural explanation for the true productivity observed in the formation of new phrasal compounds. It also does not provide us with an answer to why phrasal compounds are correctly interpreted and produced on the fly by native speakers of English if they are all listed in the lexicon. The proposed analysis couched within the Multiple Spell-Out model naturally derives these results. Phrasal compounding is productive, i.e. can be created and understood by native speakers on the spot, because it is the product of the

combinatorial process of Merge in the syntax. Furthermore, as pointed out in the same subsection, their innovative lexicalization analysis led to the claim that any new instances of phrasal compounds are going to be listed in the lexicon, a position that was shown to be untenable given the infinite number of phrasal compounds. The current analysis directly solves this problem with their lexicalist theory by replacing their "innovative lexicalizing" as "syntactic renumeration", thereby avoiding the need to list all instances of phrasal compounds in the lexicon.

4.3. *The Anaphoric Island Constraint*

The present analysis of phrasal compounding makes one correct prediction regarding its interaction with syntactic processes. Recall that we have seen in section 4.2 that the Multiple Spell-Out system provides a straightforward explanation for the observation that extraction out of subjects and adjuncts results in ungrammaticality, as shown in (22a, b). This system, thus, correctly predicts that extraction from within a phrasal compound also results in total ungrammatical, thereby deriving the so-called *Anaphoric Island Constraint* first proposed by Postal (1969) and illustrated in (26a, b).

(26) a. * What do you think he is [$_{\alpha P}$ wake-up-and-eat-*t*]-kind of guy?

b. * From where do you think she [$_{TP}$ I'm-*t*]-ed her way into the men's room.

These examples are ungrammatical because the αP/TP, as a left-branching structure, is Spelled-Out early and forms a frozen lexical item that resists extraction.

The observed property of compounds has been widely acknowledged since Postal (1969). Lexicalist theories have taken this property of compounds as one of the crucial arguments for the

Lexical Integrity Hypothesis (Bresnan and Mchombo 1995), the Bracket Erasure Convention (Kiparsky 1982; Mohanan 1986), and the Thesis of the Atomicity of Words (Di Sciullo and Williams 1987). Now that lexicalist theories that embed these conditions have proven difficult to maintain in light of phrasal compounding, a new explanation is called for. The proposed analysis derives this property as an automatic consequence of the Multiple Spell-Out Hypothesis which has been independently argued for in the syntactic literature.

5. Conclusions

In this paper, I have investigated the issue of the proper division of labor between syntax and lexicon with a case study in phrasal compounding in English, Dutch, and Afrikaans. I have shown that examination of this type of compound poses non-trivial architectural and/or empirical difficulties for several existing variants of the lexicalist theory as in Chomsky (1970), Anderson (1982, 1992), Kiparsky (1982), Mohanan (1986), Di Sciullo and Williams (1987), and Bresnan and Mchombo (1995) because the formation of such a compound crucially requires application of regular/compositional syntactic processes to be followed by/interact with the lexical process of compounding. I have argued that the Multiple Spell-Out model of syntax, as recently proposed by Uriagereka (1999) and Johnson (2003), provides a straightforward reduction of this type of compounding as a special case of regular compounding as in *black board* and *nurse shoes*. To the extent that this analysis is tenable, the current investigation provides support for the recent, non-lexicalist architecture of the lexicon-syntax interface as in Distributed Morphology that attempts to localize all types of word formation within the sole realm of syntax and for the recent derivational approach to syntax.

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