

CHAPTER 3 ON A THEORY OF ROOT ALLOMORPHY

Root allomorphy is a subset of relationships traditionally called irregular morphology.

Root allomorphy comes in two varieties⁷. The first is suppletive allomorphy where the two forms cannot be derived from each other by some sort of phonological process.

Some examples of suppletive allomorphy are in (3.1).

- (3.1) *go/went*
good/better/best
bad/worse
person/people

The other type of allomorphy is what I call irregular allomorphy, in which there is some common phonology between the two forms. This commonality is usually attributable to some type of historically regular phenomena (such as i/j umlaut) which has since fallen out of the language.

- (3.2) *eat/ate*
mouse/mice
receive/reception
sleep/slept

In DM, as discussed in chapter 2, since root allomorphy always involves a root, these relationships are not captured the same way that suppletion of functional morphemes is (i.e. competition). Rather, these relationships are always considered the application of a readjustment rule.

⁷ I will use the terms suppletive and irregular as contrastive. In actuality, suppletion is usually considered a subset of irregular morphology. I am using the term *irregular* to mean irregular morphology minus suppletive morphology.

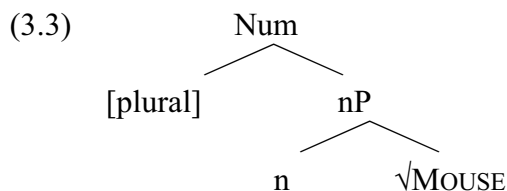
The ultimate purpose of this chapter to show an analysis of root allomorphy that uses the same mechanisms used for allomorphy of functional morphemes. This chapter will also aim to do four other things: 1) offer an explanation for data that is otherwise unexplained in DM (i.e. the blocking of inflection in the non-head position of nominal compounds); 2) show that DM does not need two different “grammars” for morphology (one set of operations for roots and one for functional morphemes) as described in Chapter 2, reducing the number of operations proposed by DM and make for a more economic model of the grammar; 3) greatly reduce the number of null morphemes that are predicted by DM—a prediction which is a potential criticism; and finally, 4) show a functional application of MINIMIZE EXPONENCE, the ultimate purpose of this dissertation.

To those ends, I propose that, in order to satisfy MINIMIZE EXPONENCE, the functional heads projected above the root fuse with that root. This results in the root and the formal features being in the same node. Because of this fusion, VIs can be specified for both a root and formal features, allowing *eat* and *ate* to be different VIs that compete with each other for insertion.

3.0.1 Licensing and readjustment in DM

For the purposes of refreshing the reader’s memory, in this section I quickly review some of the aspects of DM presented in Chapter 2. The purpose of this section is to show root allomorphy in action in DM and then to showcase some of the concerns about the traditional DM analysis that will be addressed in this chapter.

Consider the typical derivation of root allomorphy in DM. As an example, consider the derivation for *mice*, a form showing what I have called irregular root allomorphy. The syntax results in the complex head found in (3.3):



Were *mice* a regular form, the node containing the feature [plural] would be realized by the VI *-s*. Since the root, $\sqrt{\text{MOUSE}}$, is a noun, its VI would be licensed for insertion by the feature little-*n*, which is itself realized by a null morpheme. The root itself would be realized as *mouse*. Linearization of the morphemes would result in *mouses*. However, since *mice* is irregular, there are a number of key differences to this derivation. First, instead of the affix *-s*, the null allomorph of [plural] is conditioned by the presence of the root $\sqrt{\text{Mouse}}$. *Mouse* is inserted, again having been licensed by little-*n* (still realized by a null morpheme). Then, a readjustment rule is conditioned by *mouse* being c-commanded by [plural]. This readjustment rule changes the phonology of *mouse* to *mice*.

In addition to the marked complexity of the derivation of a relatively innocuous word like *mice*, a strange interdependence occurs in the derivation. The null plural morpheme is licensed by the presence of *mouse* and the readjustment of *mouse* to *mice* is licensed by the presence of [plural].⁸ What follows will be an alternative analysis of root allomorphy that is ultimately less complex.

⁸ This interdependence is the effect of both the application of readjustment rule and the secondarily licensed affix and is actually a prediction of the DM grammar. Since both readjustment of a root and a secondarily

3.1.0 Roots in the grammar

Recall from chapter 2, VIs realizing abstract morphemes are specified for formal features such as [past] or [1st]. Thus, an example of a typical specification of a VI is (3.4).

(3.4) Vocabulary Entry for *-ed*

[past] → *-ed*
 /*-d*/

VIs must be specified for the morphosyntactic features that they realize. These features encode the meaning of the syntactic node in the semantic computation. The VIs that realize roots are also so specified. Thus, the VI for *cat* is likely specified for realizing the core meaning of *cat*, which according to DM would be a root ($\sqrt{\text{CAT}}$). Earlier work in DM (Halle and Marantz 1993, 1994, Halle 1997, Marantz 1997, Harley and Noyer 1999, 2000) suggests that roots came in only one variety and the syntax was not sensitive to the different ways that root could be realized. Pfau (2000), on the other hand, suggests that roots are in fact individually distinguished from the beginning of the syntactic computation in order to account for specific types of speech errors (word substitution, etc) within the framework of DM. This change to DM has largely been accepted and in general, in relevant analyses, roots are treated as being specific to the concept they refer to (see Embick and Marantz 2006 for example). That is, the numeration not only

licensed affix are possible the grammar predicts any combination of one or both of those to happen, seen in the table below.

regular root and regular affix	<i>walk</i>	<i>-ed</i>
regular root and irregular affix	<i>hit</i>	<i>-∅</i>
irregular root and regular affix	<i>slep</i>	<i>-t</i>
irregular root and irregular affix	<i>mice</i>	<i>-∅</i>

includes the formal features to be manipulated by the syntax, but the formal concepts that will later be interpreted by the Encyclopedia as well. Following that assumption, *cat* is likely specified to realize a formal instantiation of the concept of cat-ness, which can then be manipulated by the syntax. Thus, a VI for *cat* might look like (3.5.a)

(3.5.a.) Vocabulary Entry for *cat*

$$\sqrt{\text{CAT}} \quad \rightarrow \quad \begin{array}{l} \textit{cat} \\ /kæt/ \end{array}$$

The VI seen in (3.2) can only be inserted into a terminal node containing the very specific root $\sqrt{\text{CAT}}$. Just as the *-s* that realizes [present] can't be inserted into a node containing [past], *cat* can't be inserted into a node containing $\sqrt{\text{DOG}}$. However, a VI such as (3.5.b) would be perfectly able to be inserted into such a node:

(3.5.b.) Vocabulary Entry for *dog*

$$\sqrt{\text{DOG}} \quad \rightarrow \quad \begin{array}{l} \textit{dog} \\ /dag/ \end{array}$$

Thus, the VIs in (3.5.a) and (3.5.b) compete against each other for insertion, deciding the winner based on which better matches the contents of the target node. (3.5.a) wins a competition into the node containing $\sqrt{\text{CAT}}$ while (3.5.b) wins the competition for insertion into a node containing $\sqrt{\text{DOG}}$. Neither would win a competition to be inserted into a node containing $\sqrt{\text{DUCK}}$.

3.1.1 Licensing Insertion

While in English zero derivation from one “grammatical category” such as verb or noun is not uncommon (meaning the words like *pen*, *ink*, and *table* move easily between verb and noun without overt morphology), we are all at least intuitively aware that some words must be verbs while others must be nouns. For example, for the most part, *thrash* must be a verb and *technique* must be a noun.

- (3.6) a) *Dave techniqued his writing skills.⁹
 b) *Dave also awaited the thrash.

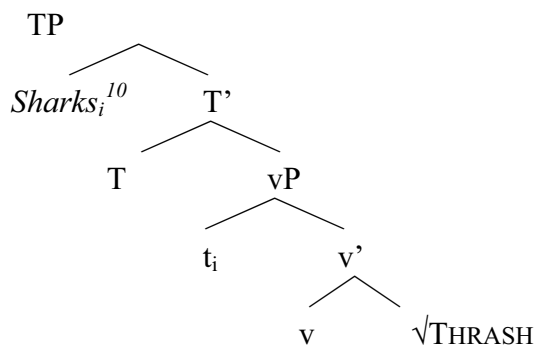
Thus, there has to be some way in which VIs restrict their insertion to nodes where the root receives the appropriate category. Currently in DM (Harley and Noyer 2000), the hypothesis is that VIs are licensed by the immediate syntactic environment through secondary exponence—for example, the immediately C-commanding functional head. Thus, *thrash* might have an entry such as (3.7).

- (3.7) Vocabulary Entry for *thrash*
- | | | |
|----------|---|-------------------------|
| √THRASH* | → | <i>thrash</i>
/θræʃ/ |
|----------|---|-------------------------|
- *must be c-commanded by [v]

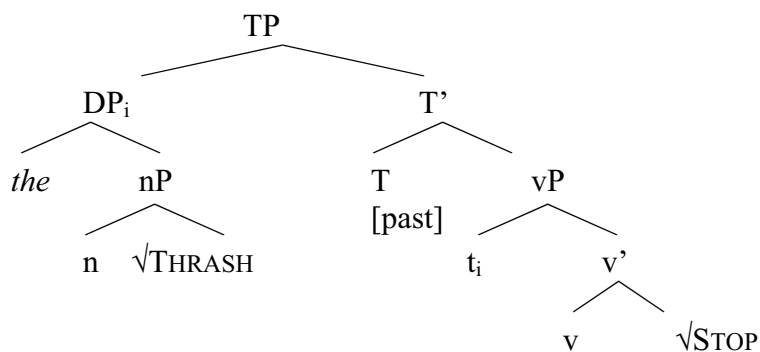
This type of specification allows the insertion of *thrash* into (3.8) where the root is dominated by vP, but blocks it from insertion into (3.9) where the root is dominated by nP.

⁹ Given that zero derivation of nouns from verbs is so productive in English, this sentence becomes grammatical given enough context. Assume no context for now.

(3.8) Sharks thrash.



(3.9) *The thrash stopped.¹¹



This formulation of licensing (through secondary exponence), whereby the VI checks the functional element c-commanding the target node rather than checking the rather than the target node itself is a side-effect of having VIs that realize roots not participate in competition. However, in the Pfau (2000) model of DM where the roots can compete, there is another way to capture the “noun”-ness or “verb”-ness of a given VI.

¹⁰ As a simplification tool, I will be using italicized words (rather than triangles) to indicate summarized sections of trees.

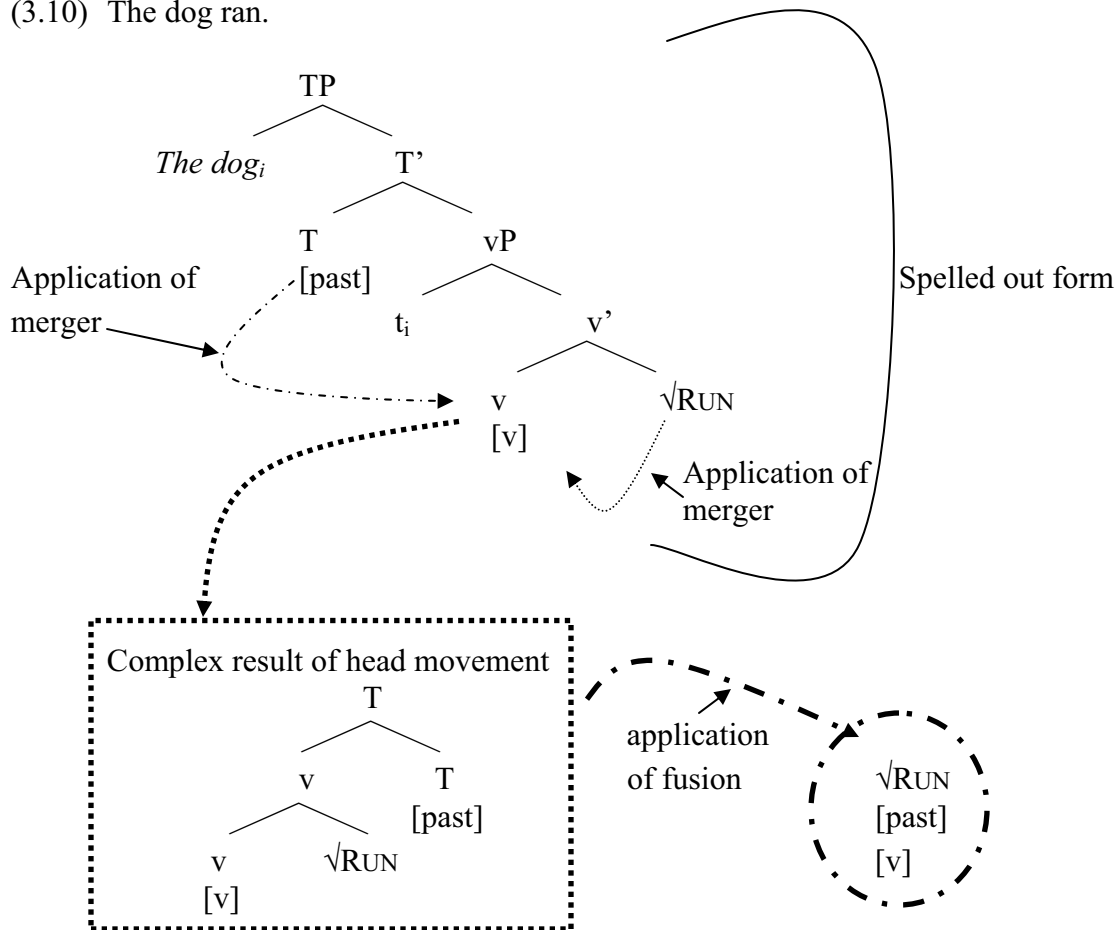
¹¹ The tree shown here assumes *stop* to be unergative, just for ease of presentation. It was the only verb that even began to make sense with *thrash* as a noun.

I propose that this is possible because of the applications of morphological merger and fusion to roots and the functional heads c-commanding them. In particular, I propose that the functional verbalizing element—little *v* (Kratzer 1996)—carries an interpretable feature¹², [*v*], whose syntactic content is something along the lines of “I am a verb”. Similarly, the nominalizing head—little *n* (Harley and Noyer 2000)—carries the feature [*n*]. Furthermore, I propose that the root nodes themselves acquire these features through several applications of morphological processes. First, the root undergoes “head movement” (i.e. morphological merger) to adjoin to the functional heads above it. The resulting complex head then undergoes the process of fusion to incorporate all the features of the complex head (including the root) into one simplex head.

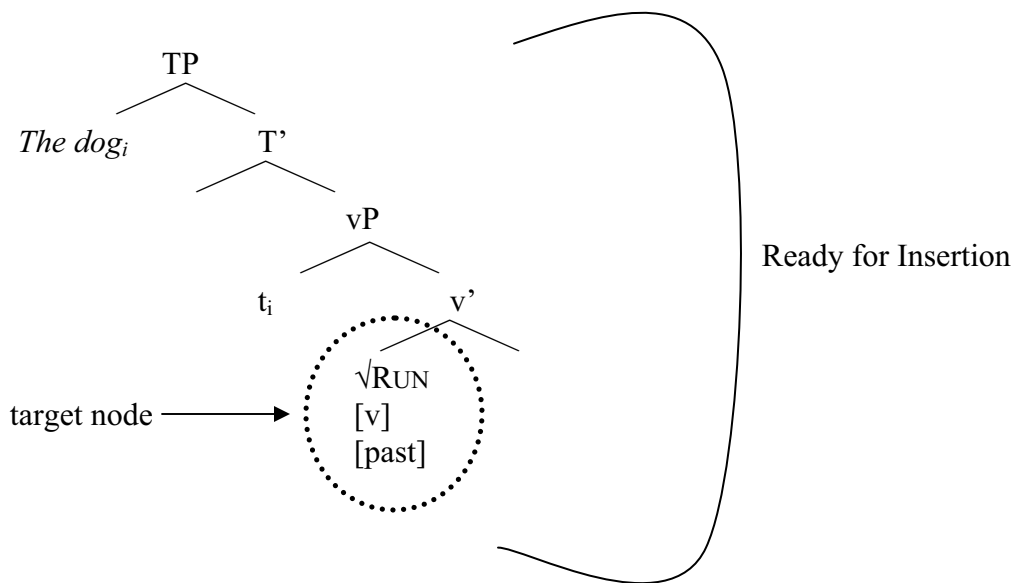
If we assume an application of morphological merger (called merger under adjacency) to the tense head and the verb as proposed by Bobaljik (1994), then the resulting head after fusion contains a root, a functional verbal element, and a tense feature.

¹² or more likely a bundle of features—I will refer to it as one feature until the distinction becomes important in chapter 4.

(3.10) The dog ran.

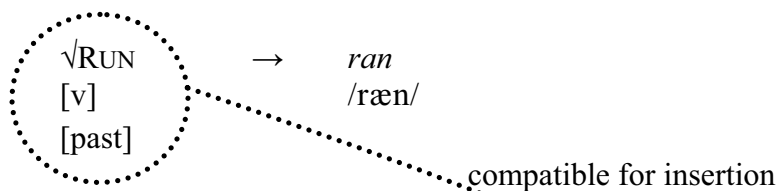


(3.11) Resulting form

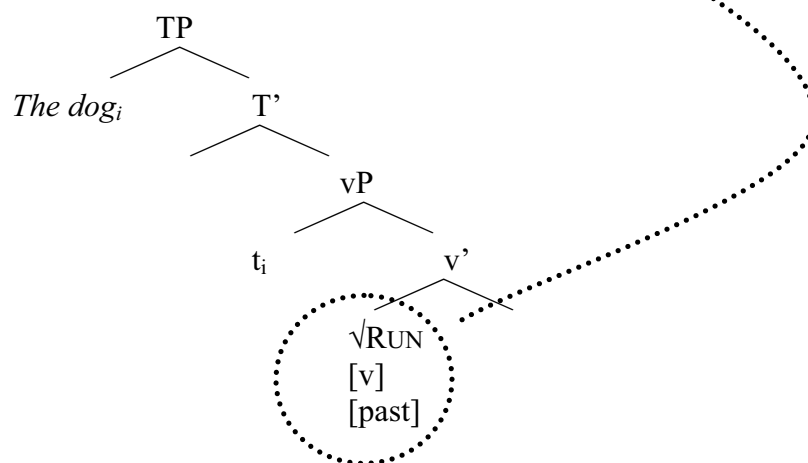


As seen in (3.10), the applications of head movement and fusion to the complex verbal structure results in a single simple node containing the formal features of the entire structure. The VI instead looks directly at the target node in the usual way to discover whether that node can satisfy the “functional” or grammatical requirements of that VI. For example, the VI in (3.12) can be inserted into the node created in (3.10, copied as 3.13) because the features it is specified for are a subset of those appearing in the node.

(3.12) Vocabulary Entry for *ran*



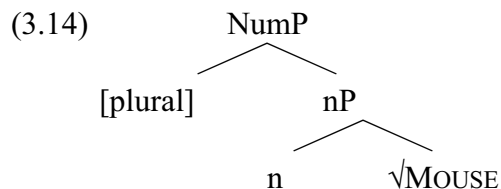
(3.13) Resulting form



The example VI for *ran* requires two different functional features, [past] and [v]. While the specification for [v] identifies it as a verb, the specification for [past] sets it apart from *run*. Thus, similar to how *dog* will compete with *cat* for insertion into a node, *run* will compete with *ran* for insertion into (3.13), with *ran* winning the competition due to its more complete specification. Thus, the competition of roots enabled by Pfau's proposal of specific roots allows for another analysis of root allomorphy within DM.

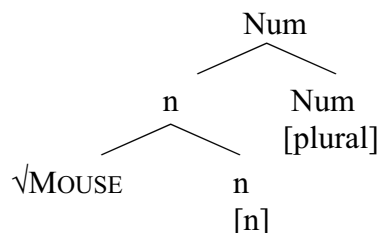
3.1.2 Alternative Analysis of Root Allomorphy

The processes of morphological merger and fusion described above apply to an account of root allomorphy. As an example, I show a derivation and insertion of the word *mice* using a fusion-based analysis. Recall the structure that results from the syntax above (3.1, repeated here as 3.14):



If we assume head-movement, all those heads move to one terminal node where they make up a complex head.

- (3.15) Complex head resulting from head movement
(features contained in that head shown in square brackets)



The process of fusion is applied to complex heads such as that in (3.15) resulting in a simplex head. After the application of fusion, the resulting head is simplex and contains all the features previously in the complex head.

- (3.16) [plural]
[n]
√MOUSE

This node, containing the root and several grammatical features, is now the target node for insertion. As we saw above with the VI for *ran* being specified for the feature [v] (indicating that it is a verb) and the feature [past], there is a specific VI for *mice* which is specified for the feature [past] and differs from the one for *mouse* in that it is more specified for number.

- (3.17.a) Vocabulary entry for *mouse*.

√MOUSE → *mouse*
[n]¹³ /maws/

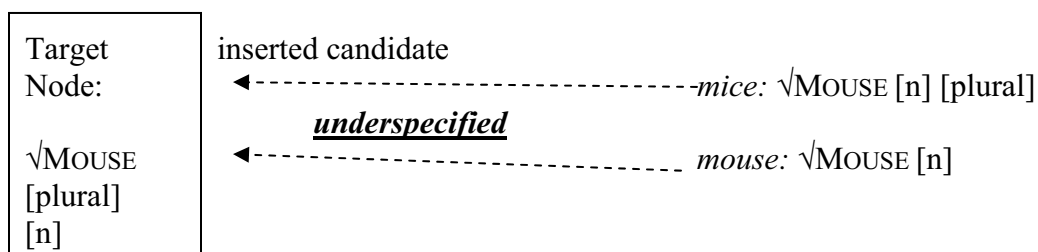
¹³ This specification means that *mouse* may only appear as a noun. *Mouse* may be underspecified for this feature if it can be used as a zero-derived verb. I use this specification for ease of presentation.

(3.17.b) Vocabulary entry for *mice*

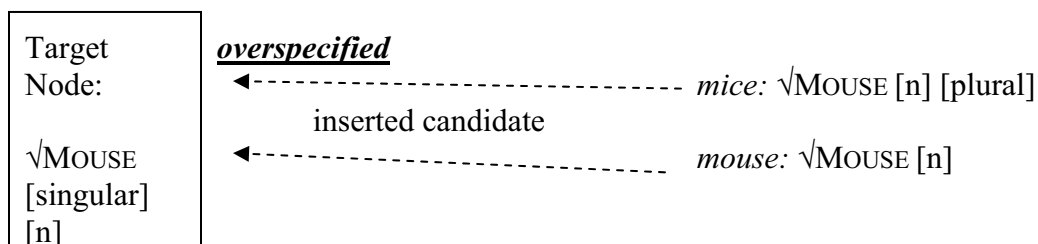
$\sqrt{\text{MOUSE}}$ \rightarrow *mice*
 [plural] /majz/
 [n]

With the VI specifications in (3.17) we can show the following distributional patterns of the *mouse/mice* pairs: a) Since *mice* is the best specified of the two for the feature [plural] (*mouse* being underspecified for number), it will win competition into a node containing the [plural] feature (3.18.a). b) *Mice* would not win competition into a node containing [singular] since it is specified for the conflicting feature [plural], thus, *mouse*, being unspecified for number will be inserted into the singular environment (3.18.b). c) *Mice* would not win competition into one that contains neither feature (which hypothesis is the case in “general” constructions such as compounds like *mouse-trap*) since it is overspecified, thus again the underspecified *mouse* will win the competition (3.18.c)

(3.18.a) Competition for insertion into *two mice*



(b) Competition for insertion into *a mouse*



Consider now the set of words *speech*, *speak*, and *spoke*. In previous incarnations of DM, the fact that these words were all linked to the same core meaning would be captured by postulating one VI that had a series of readjustment rules stipulated for it. Once we propose that root VIs are competing, there are three different VIs, one for each form. The feature specifications of all three VIs mention the same root, $\sqrt{\text{SPEAK}}$, but contain different functional material (3.21-3.23). Thus the common meaning shared among the three VIs is attributed to the fact that they are all specified for the same root rather than being phonological derivatives of one VI.

(3.21) Vocabulary Entry for *speak*

$\sqrt{\text{SPEAK}}$	→	<i>speak</i>
[v]		/spik/

(3.22) Vocabulary Entry for *spoke*

$\sqrt{\text{SPEAK}}$	→	<i>spoke</i>
[v]		/spowk/
[past]		

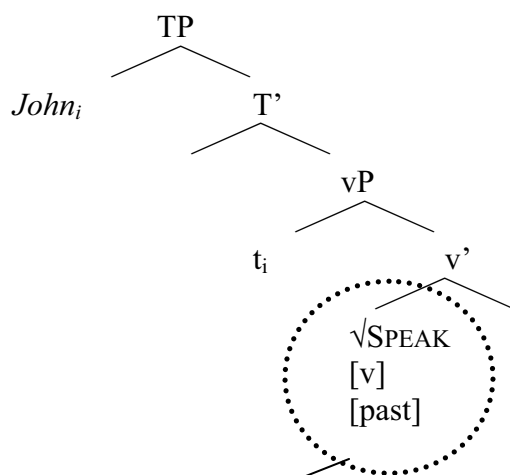
(3.23) Vocabulary Entry for *speech*

$\sqrt{\text{SPEAK}}$	→	<i>speech</i>
[n]		/spitʃ/

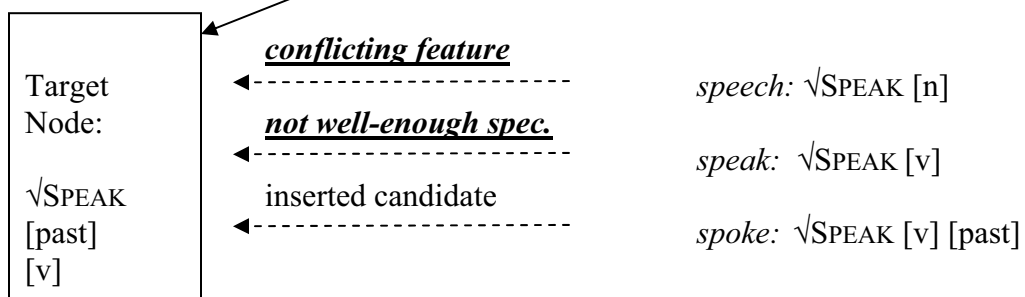
Since there are three different VIs, they can each participate in competition separately. In particular, they can all compete against each other. The VIs compete with each other for insertion into a target node, with the best-specified form winning the competition. For example, as seen in the sentence *John spoke* (3.24 and 3.25), *spoke* will win the competition into a past tense environment because it is better specified than *speak*. In the sentence *The speech began* (3.26 and 3.27), *speech* wins competition for insertion

because both *speak* and *spoke* are specified for conflicting features ([v] and in the case of *spoke* [past]).

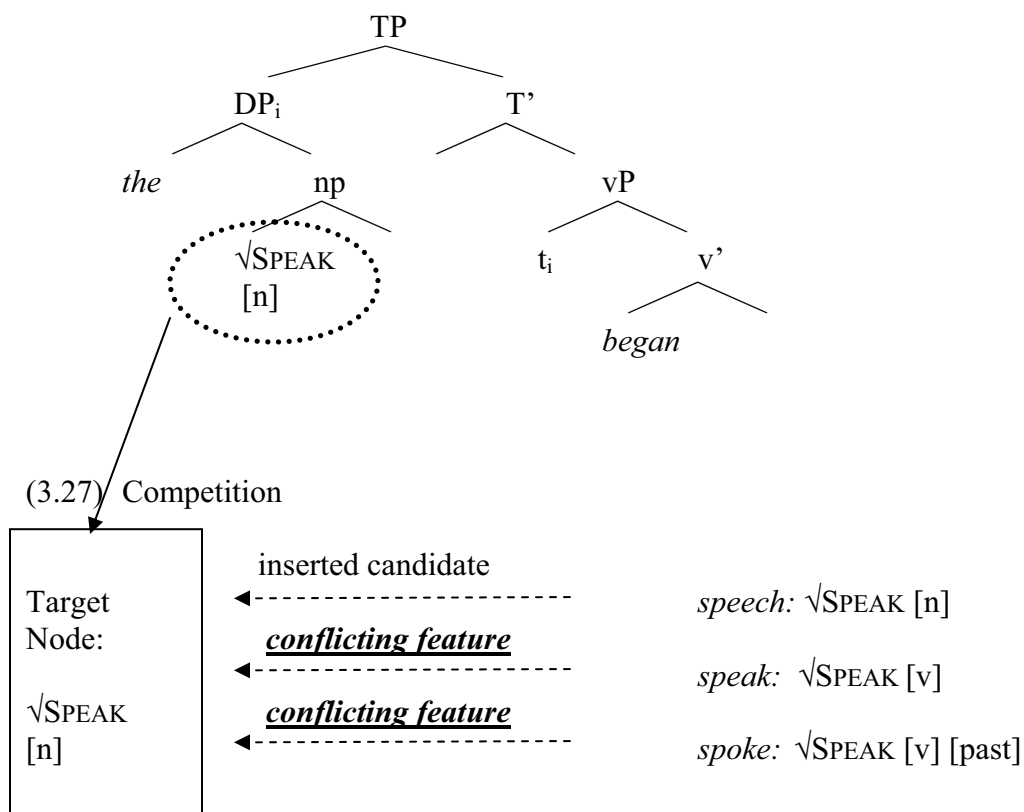
(3.24) John spoke.



(3.25) Competition



(3.26) The speech began.



As the example with *speak*, *spoke*, and *speech* shows, proposing that a) roots are contentful rather than general (Pfau 2000), b) functional nominalizing and verbalizing heads carry formal features, c) that those features come to adjoin to the root through head movement, and d) that those features fuse with the root to result in a simplex head with both content material and functional material allows us to argue that content morphemes such as *mouse* and *mice* compete with each other.

3.2. Differences between This and the Traditional DM Grammar.

The changes I have proposed above in section 3.1 make for a different model of DM than the one originally proposed by Halle and Marantz (1993, 1994). While the core fundamentals—i.e. syntactic structure of morphology, late insertion, the majority of morphological processes—remain unchanged, there are two key differences to this model that merit discussion. Proposing that *mouse* and *mice* are separate VIs eliminates the function of readjustment rules, whose job in traditional DM it is to change the unmarked form of a root VI into its marked form. In the model of DM sketched here, *mouse* and *mice* are separate VIs coincidentally linked to the same root. In addition, licensing a VI for insertion based on its “category” has historically been considered a part of that VIs *secondary exponence* (Harley and Noyer 2000). In the analysis here, that grammatical material is now part of a VI’s *primary exponence*. In this section, I will detail the effects that this has on the model of the grammar and suggest that the exclusion of readjustment rules and the limitation of the scope of secondary exponence proposed here are positive adjustments to the model of the grammar.

3.2.1 Readjustment Rules

As discussed above, readjustment rules are no longer necessary in this model of the grammar. Since *mouse* and *mice* are separate VIs that compete with each other for insertion, there is now no need for there to be a rule that changes *mouse* into *mice*. An immediate upside to this treatment of root allomorphy is that it unifies the treatment of functional morphemes and content morphemes. In traditional DM, there are in essence two different grammars to account for allomorphy. Allomorphy of functional items (such

as *el, la, los,* and *las* in Spanish) is captured through competition, the underlying assumption that a language's inventory of functional morphemes is entirely suppletive. On the other hand, root allomorphy is captured through the insertion of an unmarked VI whose phonology is readjusted given a particular conditioning environment. In the model of the grammar proposed here, all morphologically conditioned allomorphy is essentially suppletive and all VIs, even those realizing roots, compete in the same fashion for insertion. At the simplest level, the root allomorphy grammar proposed here and the one assumed by traditional DM differ in one key way: the grammar proposed here eliminates the need for the ubiquitous use of readjustment rules and relies only on competition, making it a simpler model of the grammar—one that contains fewer mechanisms and reduces the computational load.

As a side benefit, the particular aspect of the grammar that is discarded—readjustment rules—was already suspect. Though DM is a minimalist model of the grammar, and as such is a derivative of the GB tradition, readjustment rules are transformational. Further, despite the claim of some researchers such as Marantz (1997) and Halle (1997) (see also Embick and Noyer 2006) who claim that one rule can apply to a whole class of verbs, they are largely idiosyncratic and language specific. This means that a grammar has to have a major component that is composed of a long list of memorized readjustments. This adds to both the computational load of the grammar and to the memory load on the grammar. By proposing that each allomorphic pair is a set of memorized words, we don't alleviate the load on memory—each VI - readjustment rule pair is replaced with a VI-VI pair—but we do relieve the computational load of the

grammar. In this model, there isn't the computational load of readjusting roots; instead, there is the already extant load of choosing the VI to be inserted.

However, this reintroduces the problem that Marantz (1997) appealed to in his justification of readjustment rules: learnability. Marantz proposed that readjustment was a solution to a central learnability concern with root allomorphy: how a learner of a language can learn that two VIs are linked to the same root. To put it into context, how does a learner ever learn that *mouse* and *mice* are linked to the same root? The mutual exclusivity constraint (proposed by Markman and Wachtel 1988) on the acquisition of language mandates associating new words with new concepts. A learner's purposefully ignoring that constraint in the case of *mice/mouse* but not in the case of *car/truck* is difficult to explain. Marantz argued that suppletion was limited to functional morphemes, whose fundamental presence in the grammar is mandated by the language acquisition device itself—they do not have to be 'acquired' in the same way as roots. The learner can learn that in one context, 'be' is spelled out by the VI 'is' while in another it's the VI 'are' because the underlying grammatical structure has already informed them that this functional morpheme is present. This way the learner only has to memorize the formal specifications of a given functional morpheme. Never do they have to learn that two separate VIs are linked to the same root, avoiding that particular problem. Rather, the learner learns one VI corresponding to one root and then later acquires a readjustment rule to change that VI to its allomorphs.

This proposal immediately made the somewhat strange prediction, which Marantz acknowledges, that all clearly suppletive alternations must be of functional allomorphs—

they must not be linked to roots. Thus, it predicts that pairs like *go/went* and *bad/worse* are actually functional morphemes (not linked to a root) because they are instances of true suppletion and suppletion is limited to functional morphemes. Marantz claimed that all suppletive pairs that appear to be linked to roots would be limited to pairs such as *go/went* which aren't really "full verbs" but are better treated as light verbs, making them functional.

The existence of content morphemes that are undeniably suppletive would be counter evidence to Marantz's claim. One such form in English is *person/people* (cf. *mea* 'kill.sgO' ~ *sua* 'kill.plO' in Yaqui¹⁴; in Hopi, *tiyo* 'boy' (sg.) ~ *tootim* 'boy' (pl.) and *wiuti* 'woman (sg.)' ~ *momoyam* 'woman (pl)'¹⁵). Thus, Marantz's claim that suppletion is only for functional morphemes, while ideal for addressing the learnability problem, is falsified by the data. Therefore, while the model of the grammar I propose here essentially removes Marantz's solution to that problem without proposing a new one, Marantz's solution already ran into the problem that there is in fact suppletion of content morphemes. This proposal, however, does have the effect of discarding the strange prediction that forms like *bad/worse* and *go/went* are not linked to roots. Rather, I propose here that suppletion is all that is necessary for all allomorphy, which reduces the number of mechanisms necessary to capture allomorphy.¹⁶

¹⁴ Yaqui example provided by Heidi Harley

¹⁵ Hopi example provided by Jason Haugen

¹⁶ Another "function" readjustment rules is to capture the historic relationship between related forms. For example, the phonological process of i/j umlaut is what created the pairs *foot/feet* and *goose/geese*. Readjustment rules capture this relationship. However, a historical change such as i/j umlaut does not entail a synchronic change, removing that justification for the existence of readjustment rules.

3.2.2 Licensing

Recall from chapter 2 that in the pre-Pfau model of DM, VIs which belong to only one “class” (such as noun) are licensed by the c-commanding functional head according to the proposal by Harley and Noyer (2000). My proposal here evacuates the need for such licensing¹⁷ as the licensing functional head fuses with the root and the root VI can select for its features. One of the inherent problems in using secondary exponence to license a root morpheme in an environment is that is strictly less local than it could be.

An example of words that have “lexical class” requirements that is the pair *speak/speech* as discussed above. Recall that if we hypothesize the following VIs for *speech* and *speak* licensing falls out naturally without requiring that the VI be able to look at the node above the target node for licensing.

(3.28) Vocabulary Entry for *speak*

√SPEAK	→	<i>speak</i>
[v]		/spik/

Vocabulary Entry for *speech*

√SPEAK	→	<i>speech</i>
[n]		/spitʃ/

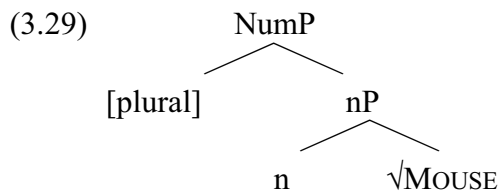
Since the licensing of *speech* as a noun or *speak* as a verb in the model I propose here requires only looking at the node targeted for insertion rather than the part or all of the entire derivation, the model proposed here requires a significantly lighter computational

¹⁷ Licensing itself is argued to be a part of *secondary exponence*, a feature of DM I allude to here (the selection of the zero morpheme for [plural] due to its adjoining to *mice* is an application of secondary exponence) and discuss in detail in Chapter 2. In suggesting that licensing of nouns, verbs, etc is no longer necessary, I do not mean to suggest that secondary exponence as a whole is not necessary. Rather, it is necessary for many reasons as discussed in Chapter 2.

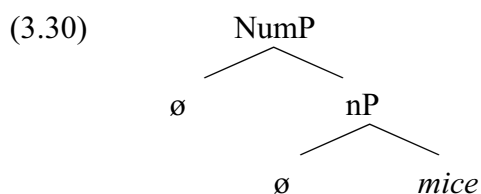
load than secondary exponence model. For each content morpheme that has a distribution limited to its “lexical class”, this model proposes a lighter computational load than a model of DM that requires licensing. Given the sheer magnitude of a language’s inventory of content morphemes, the savings of computational load is drastic.

3.2.3 Null heads

A side effect of removing secondary exponence as the means for licensing class specific root morphemes is the drastic reduction of the number of null morphemes that DM is forced to propose. The original model of DM (Halle and Marantz 1993, 1994) proposes a large amount of null heads. Recall the derivation for *mice* (3.1) (repeated here as 3.29)



In DM, the structure after insertion is that in (3.30) wherein, $\sqrt{\text{MOUSE}}$ is realized by *mice* (conditioned by the c-commanding elements), [plural] is realized by \emptyset (an unpronounced head), and *n* is also realized by \emptyset .

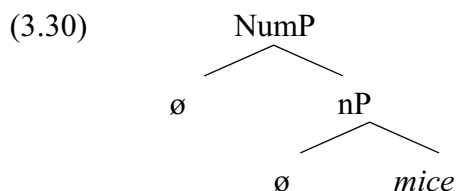


In just this one little complex, for one overt VI, there are two null VIs. Such would be the case for all irregular forms similar to *mice* where there is no “overt” realization of an

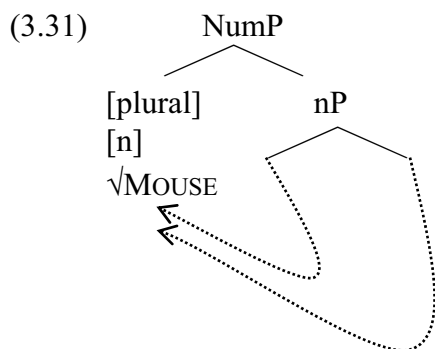
element that conditions a readjustment rule. This by itself is a large number of null morphemes. However, if you employ the traditional licensing through secondary exponence, those functional licensers are also overwhelmingly realized as null heads. Since the vast majority of “free” content morphemes would involve these null licensers (regardless of whether they are required by the VI or not) the number of these null morphemes in a given derivation is substantial and in the grammar as a whole would be enormous. DM is not unique in proposing null morphemes. What makes DM different is that it predicts a huge number of null morphemes in two cases where other theories of the grammar (such as Lexicalist models) don’t have to – licensers (such as *n*) and morphemes such as [past] or [plural] that are realized as zero when a readjustment rule changes the root (as is the case with *mice* or *drove*).¹⁸ While many models of grammar predict null heads, these particular null heads are unique to DM and create a perceived fault in the predictions of the grammar.

DM is susceptible to criticism because it predicts so many more null morphemes in a given derivation than do other models of grammar. The fusion analysis given here removes that particular criticism of DM as licensing heads and heads that condition readjustment rules are not realized by zero in this model but are instead fused with the root and are realized by the same VI that realizes the root. Recall (3.30) (repeated here)

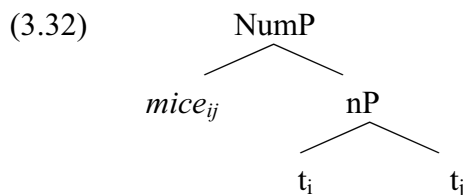
¹⁸ Note that DM does not always change a functional head to zero when a readjustment rule is applied. In forms like *slept*, *better*, *went*, *houses*, etc, it is proposed that the root morpheme changes but the functional morpheme is still present and in its default form.



In the pre-Pfau model of DM, the licenser (n) and the head that conditions the application of the readjustment rule (num) are realized as zero. However, in the fusion account of root allomorphy proposed here, the root and [n] both move to [plural] and fuse (3.31)



Therefore, whereas the traditional DM account contains one overt head and two null morphemes, the fusion account sketched here contains only one overt head and two traces.



Thus, the fusion analysis simplifies the grammar by reducing the number of null morphemes in the inventory of a given language that has to be predicted by DM. Taken as a whole, the three central changes to DM—the rejection of readjustment rules, not

using secondary exponence to license root VIs, and the reduction of zero morphemes—all drastically simplify the DM grammar. The reduction of both the computational load and the memory load¹⁹ entailed by the grammar makes the grammar more economical. Further, the removal of readjustment rules discharges the last of the “transformational” rules in DM, bringing it more in line with recent GB tradition. Overall, the new model of DM proposed here is simpler and more attractive to the Minimalist community as a whole.

3.3 Expansion of the fusion analysis.

The combination of head movement, Bobaljik-style merger under adjacency, and fusion results in a tidy description of how the [past] feature fuses with the root $\sqrt{\text{RUN}}$ to be realized by the word *ran*. However, even a cursory look at the details of the mechanics proposed in section 3.1.2 will show the prediction that formal features should always fuse with the root, ultimately resulting in only suppletion as a morphological tool. It seems that the current proposition actually removes the great strength of DM—that it predicts lexical decomposition as a function of the syntax.

For example, recall the different VIs presented for *speech*, *speak*, and *spoke* (repeated here as 3.33.a-c).

¹⁹ The memory load is reduced in two ways: a) fewer null morphemes and b) two different types of memorization—readjustment rules and Vocabulary inventory—are reduced to just one—Vocabulary inventory.

(3.33.a) Vocabulary Entry for *speak*

√SPEAK → *speak*
[v] /spik/

(3.33.b) Vocabulary Entry for *spoke*

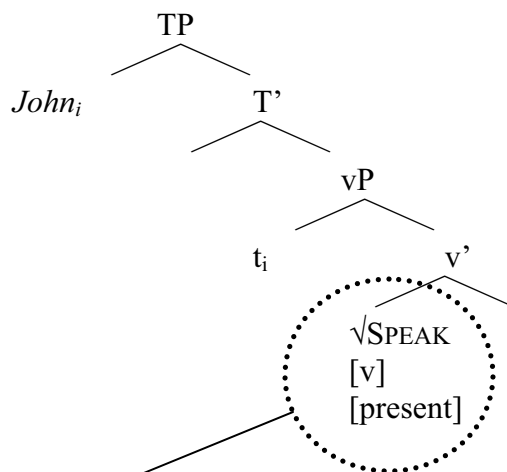
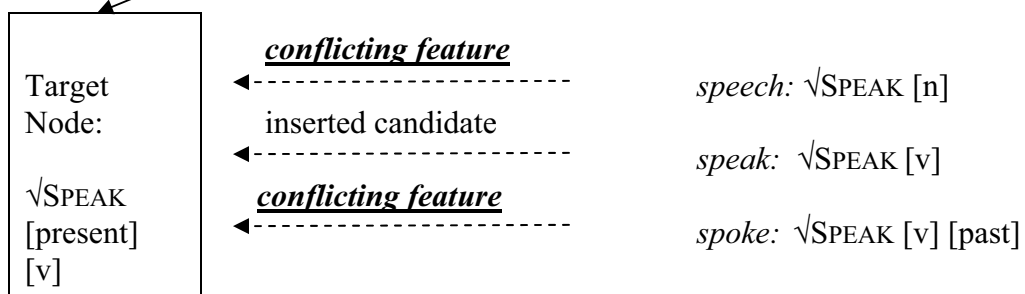
√SPEAK → *spoke*
[v] /spowk/
[past]

(3.33.c) Vocabulary Entry for *speech*

√SPEAK → *speech*
[n] /spitʃ/

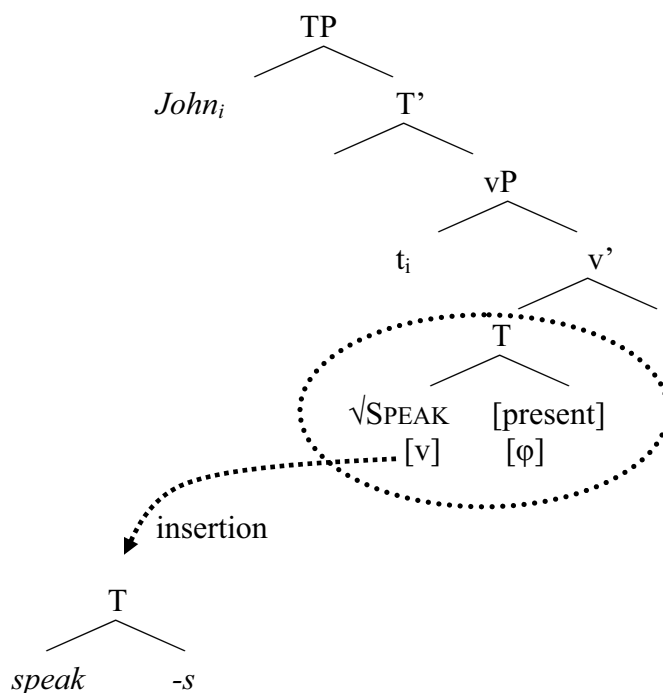
These three VIs very well predict that *speech* will appear in a nominal environment and *spoke* will appear in a past tense environment. However, it also predicts that *speak* will appear in *all other verbal environments*. In English, this is fine for most cases, except third person singular. For example, in the derivation of *He speaks*, the present tense and the phi-features are overtly spelled out by the affix *-s*. However, in an account where fusion applies to all complex heads, specifically fusing tense with the root, the tense should never be spelled out by its own head. The sentence should be **He speak*.

(3.34.a) John speaks.

(3.34.b) Competition results in insertion of *speaks*.

In order to maintain the decomposability of the form *speaks*—and for that matter all other concatenative morphology—the derivation must result in a complex head that has not been fused to a simplex form. Thus, the derivation for *John speaks* must actually be a tree such as seen in (3.35).

(3.35) John speaks.

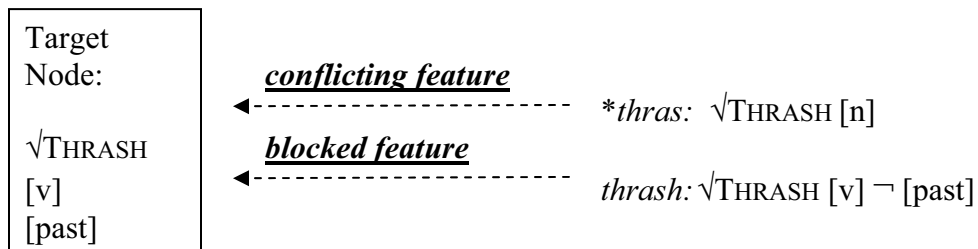


If we make the reasonable assumption that there is always fusion, then we cannot have affixed forms such as *speaks*. Thus, we have to assume that complete fusion fails most of the time, which gives us complex forms. However, if we say that \sqrt{SPEAK} can fail to fuse with [present] in order to result in *speaks* we must also predict that it can fail to fuse with [past] and result in **speaked*. Thus, the application of fusion has to be blocked in order to trigger regular concatenative morphology, but must be allowed in order to trigger suppletion.

3.3.1 The \neg specification.

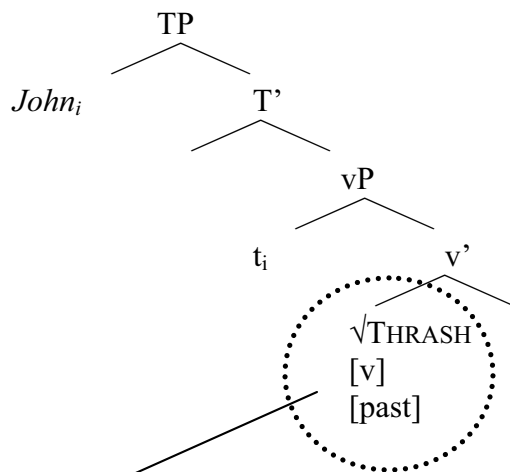
The immediate problem described above is that, as outlined above, regular forms like *trash* are going to be inserted into a node where the [past] feature had fused with the

(3.37) Competition

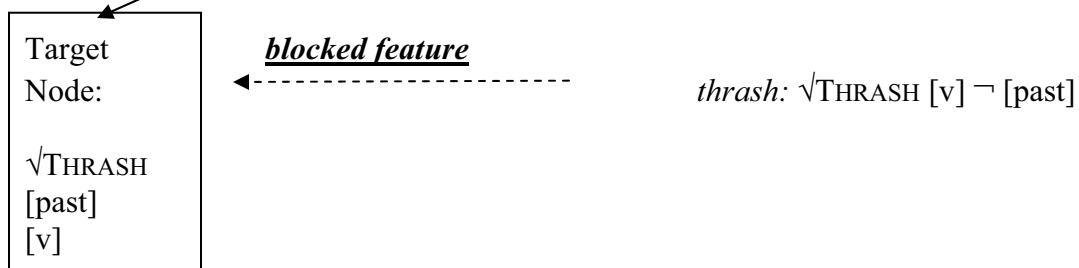


With this type of notation, the insertion of a regular word like *thrash* or *walk* cannot occur into a node that has fused with the past tense.

(3.38.a) John thrashed.



(3.38.b) Competition



The only possible VI in the inventory of English that can realize the target node in (3.38.b) is the past tense affix *-ed*, which is specified only for the feature [past]. Crucially, in addition to discharging but not realizing the feature [v], inserting *-ed* also discharges the root without realizing it. What sets content VIs apart from functional VIs is that they realize a root. The “special”-ness of roots is that they contribute the extra-grammatical meaning to an utterance. In other words, a sentence doesn’t properly convey a message if all the roots are discharged by functional morphemes without overt realization. Thus this “special”-ness of roots is captured by a constraint on insertion that a root must be realized by the VI which discharges it.

Since there is no VI that is specified for the root $\sqrt{\text{THRASH}}$ and is not blocked from the feature [past], no VI can be inserted into the derivation and thus the derivation crashes. The only derivation containing both the feature [past] and the root $\sqrt{\text{THRASH}}$ that will converge will be one where the root and the [past] feature have failed to fuse, thus resulting in insertion of both *thrash* and *-ed*.

3.3.2 Enter MINIMIZE EXPONENCE

The constraint MINIMIZE EXPONENCE proposed in Chapter 1 enters play at this point in the analysis of root allomorphy. Up until now, fusion of the root with the functional material accounts nicely for root allomorphy and proposes a simpler model of DM. However, to this point I have not shown what motivates this fusion. Whereas the model of grammar proposed here is more economical in the sense that it reduces the computational load entailed by readjustment rules and secondary licensing, I have

proposed the ubiquitous application of the morphological process of fusion, which makes the computational load of this grammar *heavier*—i.e. now a given derivation is littered with applications of fusion, which entail more computation for every derivation. I will show that this addition of the process of fusion to the derivation, while more computationally intensive actually satisfies a larger economy constraint at the cost of extra computation. That constraint, of course, is MINIMIZE EXPONENCE.

Returning to the *speak* trio, *speak*, like all verbs in English, is likely specified for incompatibility with some feature in the complex of [3rd person], [singular] and [present], since all verbs in most standard English dialects have third singular present overtly spelled out with the affix *-s* (i.e. there are no strong verbs where there is an irregular form for third person singular present). For ease of presentation, I will indicate that this incompatibility with the notation \neg [3sg], despite the fact that this notation simplifies a more complex phenomenon. Thus, the three words are specified as follows:

(3.39.a) Vocabulary Entry for *speak*

$\sqrt{\text{SPEAK}}$	\rightarrow	<i>speak</i>
[v]		/spik/
\neg [3sg]		

(3.39.b) Vocabulary Entry for *spoke*

$\sqrt{\text{SPEAK}}$	\rightarrow	<i>spoke</i>
[v]		/spowk/
[past]		

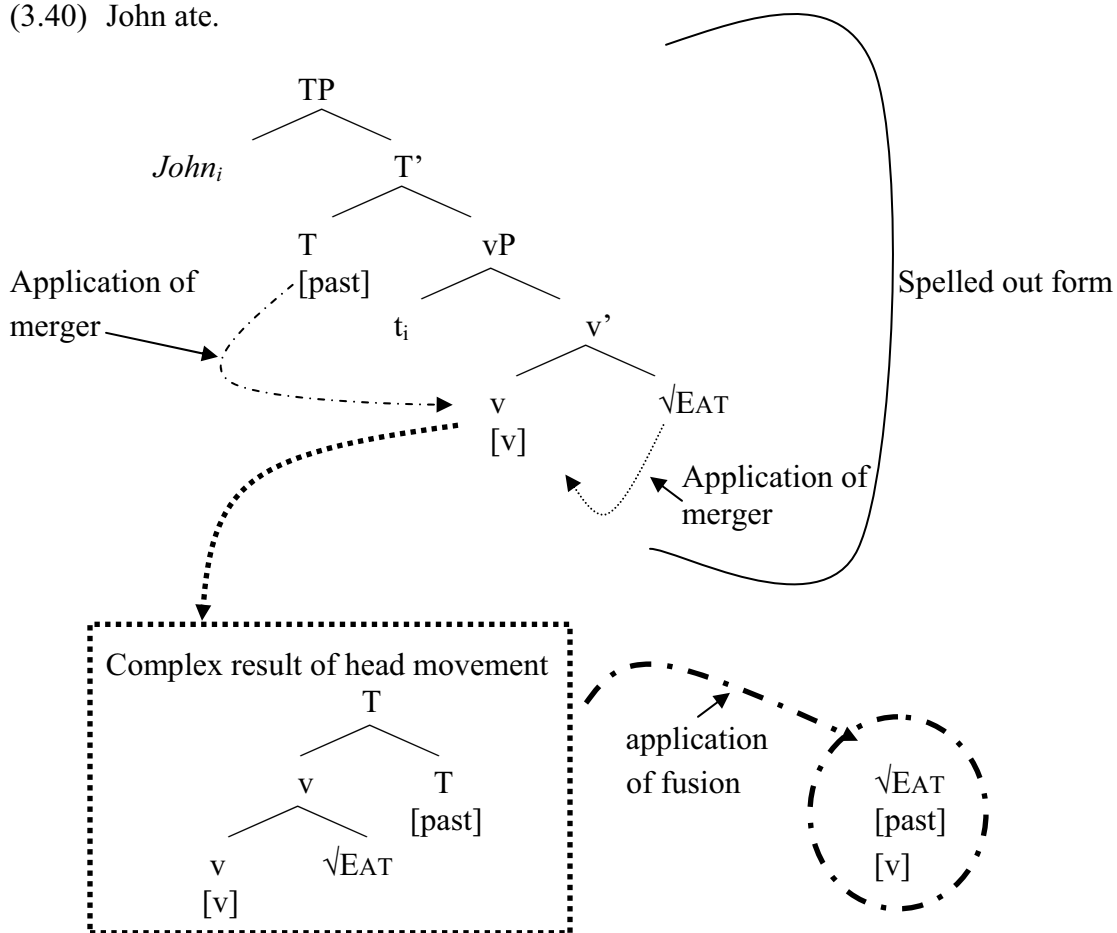
(3.39.c) Vocabulary Entry for *speech*

$$\begin{array}{l} \sqrt{\text{SPEAK}} \\ [\text{n}] \end{array} \quad \rightarrow \quad \begin{array}{l} \textit{speech} \\ /spitʃ/ \end{array}$$

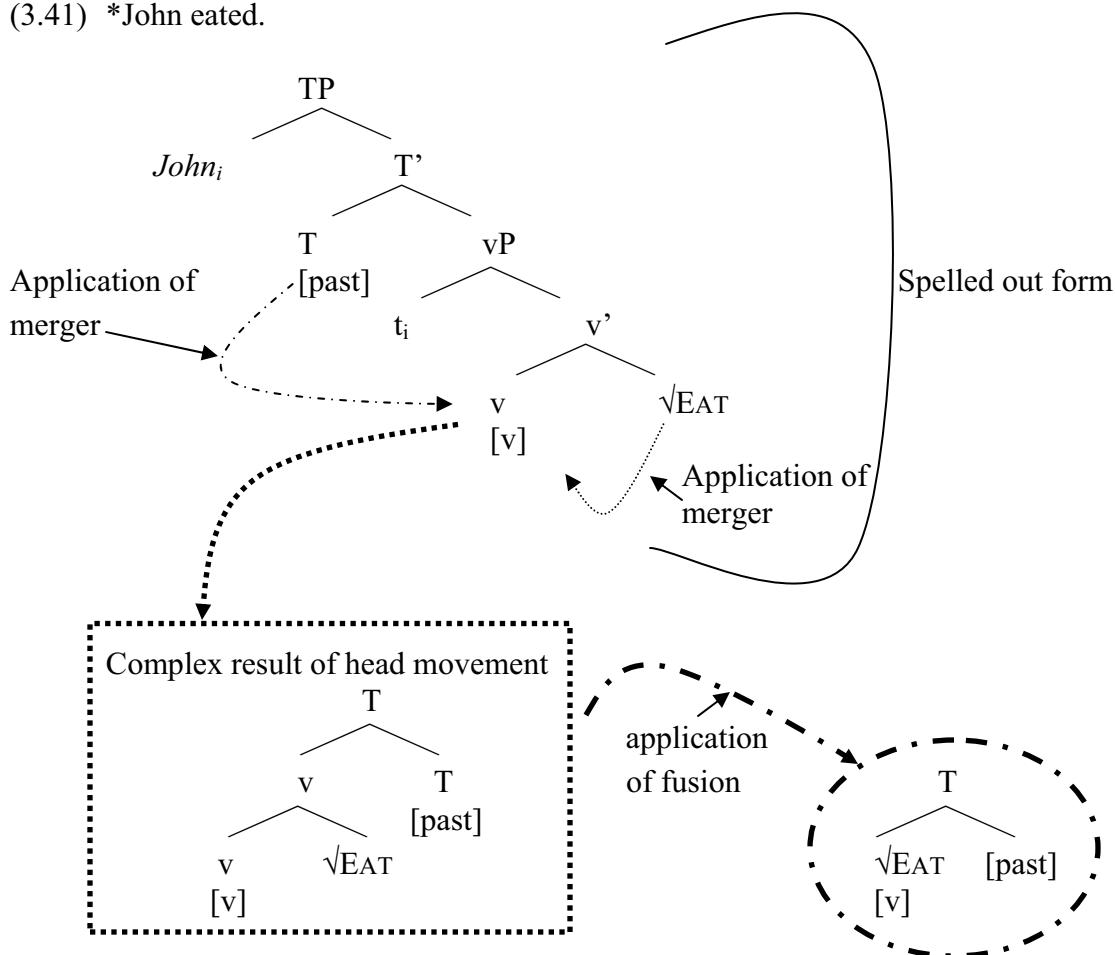
These specifications will result in exactly the distribution that we see with the three forms. However, this analysis relies entirely on there being two different derivations competing for convergence—the one where the [3sg] feature has fused and the one where it has failed to fuse. It follows then that there must be those two derivations, one fused and one unfused, for all utterances.

Imagine the two following possible derivations for *John ate*. In the derivation in (3.48), [past] has fused with the $\sqrt{\text{EAT}}$, meaning that the VI candidate that will win competition will be *ate*, which is specified for [past]. However, in (3.40), the node containing $\sqrt{\text{EAT}}$ has not fused with the feature [past]. That means that even if *eat* is specified for \neg [past], that specification will not stop *eat* from being inserted because the past tense is in another node. Both *eat* and *-ed* would be inserted, meaning that the same set of formal features could result in two possible utterances, **John eated* and *John ate*.

(3.40) John ate.



(3.41) *John eated.



Since **John eated* is ungrammatical, it cannot be the case that two derivations for the same feature set exist in parallel. Since a derivation with $\sqrt{\text{EAT}}$ fusing with [3sg] will crash because there is no VI compatible with the derivation, the trouble is that there is no as-yet-formulated way that explains why **John eated* crashes.

I propose that this is where MINIMIZE EXPONENCE, an economy constraint on the grammar that prescribes that the most economical derivation is the one that is realized by the fewest Vocabulary Items, is used to choose the most economical derivation (and thus the one that will converge) between the two possible derivations of the same set of formal features. In other words, the most economical utterance is the one that realizes all the

formal features that need to be realized using the fewest words possible. Recall from Chapter 1, the definition of MINIMIZE EXPONENCE (repeated here as 3.42)

- (3.42) MINIMIZE EXPONENCE: The most economical derivation will be the one that maximally realizes all the formal features of the derivation with the fewest morphemes.

The need to use as few words as possible and the need to express all the formal features are both satisfied by using fusion. In that way, more than one formal feature is realized by just VI, reducing the time and energy needed to utter one sentence. The logical extension of this is that the ideal language would maximize the number of forms like *ate* which capture both roots and formal features. However, that would mean a much larger inventory of stored words, which is also inefficient. Thus the compromise is to have fused forms for the most frequently used roots while leaving less frequent forms to regular morphological processes. We see this effect of MINIMIZE EXPONENCE on the Vocabulary cross-linguistically, lending credence to my proposal of its existence.

Thus, fusion is motivated by an effort to reduce an utterance to the fewest pronounced morphemes (null morphemes and morphemes with overt morphology are indistinguishable to this constraint). What blocks complete fusion of all functional material with the content material it c-commands is the limitations of the Vocabulary inventory of a given language as seen above and elaborated below.

To show Minimize Exponence in action, we return to the ungrammaticality of **eated*. The two derivations, *John ate* and **John eated*, can be evaluated for economy based on the constraint MINIMIZE EXPONENCE. In *John ate*, $\sqrt{\text{EAT}}$ and [past] are realized by only one VI. In **John eated*, $\sqrt{\text{EAT}}$ and [past] are realized by two VIs, *eat* and *-ed*.

Thus, as far as MINIMIZE EXPONENCE is concerned, *John ate* is the more economical derivation and the one that converges. On the other hand, consider the word *climb*. Since there is no **clomb*, a word that is specified for $\sqrt{\text{CLIMB}}$ and [past], and *climb* is presumably specified for \neg [past], *climbed* is the most economic derivation possible since one where $\sqrt{\text{CLIMB}}$ and [past] are realized by fewer VIs (i.e. only one) is not possible.

In this way, MINIMIZE EXPONENCE will force fusion to occur wherever it can without resulting in a crash. Thus, the fusion we see in this chapter is actually driven by the need to make the utterance contain as few morphemes as possible. Though fusing the complex nodes that result from head movement involves more of a computational load, the utterances ultimately created by a grammar containing MINIMIZE EXPONENCE are more economical measured in the amount of energy consumed producing them rather than in deriving them.

3.4 Inflection in Compounds

The MINIMIZE EXPONENCE analysis presented here offers a new analysis of a classic observation about irregular root allomorphy. Jespersen (1909) observes that in addition to traditional synthetic and analytic compounds, English contains a variety of compounds that exhibit a unique behavior. Since the non-head member of these compounds is always a noun, these compounds are usually called *nominal compounds*.

The unique behavior of these nominal compounds is that, normally, inflection is not allowed in the non-head (left) member of the compound, even if the interpretation of the compound would require that inflection. For example in (3.43, adapted from Sproat

1985), a *coat-rack* is specifically designed to hold more than one coat, yet it cannot be called a **coats-rack*.

(3.43)	<i>dog-lover</i>	<i>*dogs-lover</i>
	<i>rat-chaser</i>	<i>*rats-chaser</i>
	<i>log-cutter</i>	<i>*logs-cutter</i>
	<i>hand-made</i>	<i>*hands-made</i>
	<i>finger-bowl</i>	<i>*fingers-bowl</i>
	<i>coat-rack</i>	<i>*coats-rack</i>

This seems to be the effect of some constraint on the grammar of English that disallows inflection in the non-head member of a nominal compound. However, a number of researchers have observed that when the non-head member of the compound is an irregular (i.e. it undergoes some sort of root allomorphy), the compounding of an inflected form is allowed. (see 3.44, adapted from discussion in Thomas-Flinders 1981 via Sproat 1985 and from Kiparsky 1982). For example, while a head infested with fleas must be *flea-infested* and never **fleas-infested*, the same head infested with lice can either be *louse-infested* or *lice-infested*. Similarly, a group of people jumping into a pool leading with their heads cannot be jumping **heads-first*, but those same people could jump *feet-first* (example adapted from Sproat 1985).

(3.44)	<i>feet-first</i>
	<i>lice-infested</i>
	<i>teeth-marks</i>
	<i>alumni club</i>
	<i>dice pool</i>
	<i>people eater</i>

Kiparsky's (1982) analysis for this data was couched within his model of Lexical Phonology and Morphology (LPM). He proposed that morphological operations happen

at several levels. The first incarnation of his proposal included a Lexical level and a grammatical level. His recent revisiting of LPM made it compatible with Optimality Theory (LPM-OT) and proposed three different levels: the stem, the word, and the phrase (Kiparsky 2003).

In both of his theories, this pattern where irregulars behave one way and regulars behave another is captured by level-ordering. In LPM, Kiparsky proposed that the rule that inflected irregular forms occurred before the compounding rule, which itself happened before the rule inflecting regular forms.

(3.45) Ordering of operations:

1. Inflect irregular forms
2. Compound
3. Inflect regular forms.

Since *louse* is inflected to *lice* before compounding, *lice-infested* is permissible.

However, since compounding happens before regular forms are inflected, compounding bleeds the regular inflection. Once *rat* has compounded with *infested* to form *rat-infested*, *rat* is no longer a valid target for the operation that adds *-s*. This means that **rats-infested* is blocked but *lice-infested* is permitted.

In LPM's modern incarnation, LPM-OT, which doesn't use rules but rather uses constraint hierarchies, the prohibition of regular inflection in compound but the permission of irregular inflection arises because the processes occur at different levels of the grammar, which have different constraint rankings.

There have been many objections to the use of level ordering analysis of this phenomenon, especially given that many models of the grammar reject either the idea of

level ordering or the particular levels that Kiparsky proposed. One such objection is that regular inflection is not always prohibited from these structures. Hammond (1984) observed that the inflection is allowed in compounds where the plural form is interpreted as a group meaning (3.46, adapted from Hammond 1984). For example, an *admissions committee* isn't necessarily in charge of several *admissions*, but rather the process of *admissions*.

(3.46) *systems analyst*
parks department
admissions committee
numbers racket
reservations desk

Similarly, *pluria-tantum* forms permit inflection of the non-head member of the compound (3.47, adapted from discussion in Sproat 1985). For example, in addition to *pant-pocket* being a legal compound, so is *pants-pocket*.

(3.47) *pants-pocket*
alms-giver
odds taking

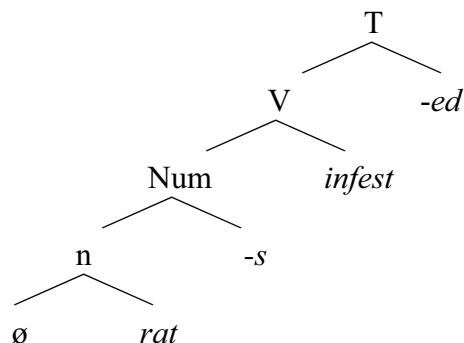
To complete the picture of the data, it is important to show that while regular inflectional morphology is blocked in English nominal compounds, regular derivational morphology is allowed.

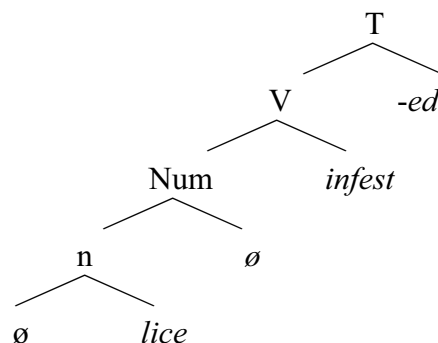
(3.48) *grammaticality judgment*
grading session
participation grade
marketing suggestion
cooler unit
shifter knob
copier service
unhappiness factor

An analysis of this pattern within the framework of DM is difficult for a number of reasons. The first is that DM contains no generative lexicon. Thus, the analysis where by compounds are created in a level-ordered lexicon is unavailable. By DM principles, if one structure (regular inflection) is disallowed and another (irregular inflection) is allowed, that must be indicative of different syntactic structure in the two forms.

However, in DM, the structures for **rats-infested* and for *lice-infested* are largely identical. The first difference between the two is that in **rats-infested* the plural is realized by an overt VI while in *lice-infested* the plural morpheme is realized by a null morpheme. According to the tenets of DM, a VI without phonology is no different from one with overt phonology. Thus, this cannot contribute to a difference in grammaticality. The only other difference is that, in *lice-infested*, there has been the application of a readjustment rule. Again, the application of a readjustment rule should not affect the grammaticality of a syntactic structure.

(3.49.a) **Rats-infested*



(3.49.b) *Lice-infested*

The next important problem for the framework of DM is that it makes no distinction between “inflectional” affixes and “derivational” ones. From the point of view of DM, both are just the overt realization of terminal syntactic nodes with VIs that happen to be bound rather than free. Since DM doesn’t recognize a difference between these two different types of affixation, referring to this difference is not a possible way to explain the grammaticality difference between derivational morphology being allowed in these structures but inflectional morphology being disallowed. Again, with the exception of the specific functional heads involved, the structure of *cooler-unit* and **rats-trap* should be identical.

The inclusion of the economy constraint MINIMIZE EXPONENCE to the framework of DM makes possible an analysis of the banning of inflection within English nominal compounds. In section 3.4.1, below, I detail that analysis.

3.4.1 MINIMIZE EXPONENCE analysis

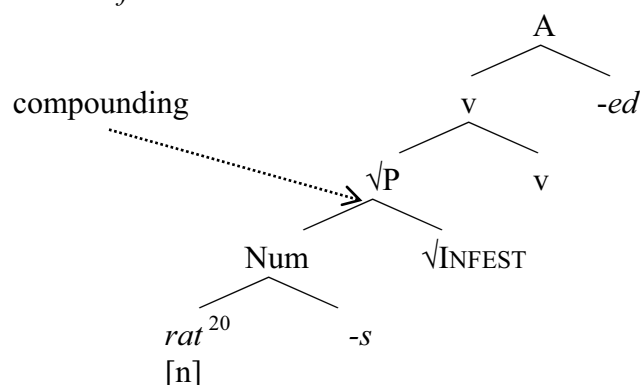
Compounding, in all of its forms, is an application of Merge in the syntax that creates a phrase that is later adjoined into one “word” by an application of morphological merger. In particular, compounding is an application of morphological merger to a pair of nodes α and β , where α is a phrase (X^n , $n>0$) and β is a root, dominated by the phrase (or \sqrt{P}). The \sqrt{P} resulting from Merge can then be sister to functional heads such as little-n or little-v in order for the compound as a whole to participate in the syntax and receive argument structure or undergo affixation.

The difference between the phrases that undergo compounding and those that undergo affixation is the difference of labeling in the syntax proper (before spellout). In particular, what will become compounds after spellout are dominated by a root phrase whereas affixation is dominated by the functional head. Thus the application of Merge that generates a compound merges X^n ($n>0$) to any $\sqrt{}$ and projects $\sqrt{}$ whereas affixation merges $\sqrt{}$ to X^0 and projects X where X is a functional head.

I argue that nominal compounds are an application of morphological merger in English that adjoins a noun (n^n , $n>0$) to a root under a projection of that root. More specifically, nominal compounds are the joining of the feature $[n]$ to a root. Since the feature $[n]$ is imbedded in the case of a regularly inflected form but, as a result of fusion, is not imbedded in irregular forms, morphological merger can target an irregularly inflected form but not a regular.

If nominal compounds are the result of an application of morphological merger to two adjacent heads where one is a root and the other bears the feature [n], we can see why regular inflection is blocked in forms like **rats-infested* (3.50).

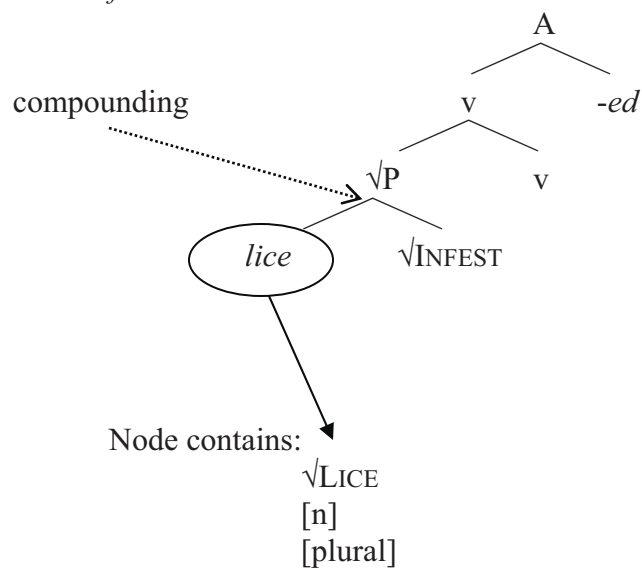
(3.50) **Rats-infested*



In such forms, even after fusion, the feature [n] is imbedded below the inflection (in this case Num). Since feature [n] is not adjacent to the root, compounding cannot target the two nodes and merge them into one form (the root is adjacent to the feature [plural] in (3.50)).

However, in forms with irregular inflection such as *lice-infested*, the root **√LICE**, the n-head, and the num-head have all fused to make one node. This means that the [n] feature is no longer embedded and is now adjacent to the root **√INFEST**. This adjacency of the [n] feature to the root allows compounding to target that structure.

²⁰ Shown after fusion.

(3.51) *Lice -infested*

Regular forms such as *rats* are two VIs composing a phrase dominated by *-s*, whereas irregular forms like *lice* are only one VI (with no complex structure after fusion). The VI for *lice* realizes both the root and the feature **[n]**. Thus, before insertion, the feature **[n]** is adjacent to the dominating root.

Similarly, pluria-tantum cases and cases like *admissions committee* and *systems analyst* are the effect of a root that has fused with an **[n]** feature compounding with another root. For example, on this analysis, *pants*, *scissors*, *odds*, and *alms* are each really just one Vocabulary Item (they refer to one thing) despite what appears to be surface morphology. That is the VI for *scissors* is (3.52).

(3.52) Vocabulary Entry for *scissors*

$\sqrt{\text{CUTTING APPARATUS}}^{21}$ [n] [plural] ²²	→	<i>scissors</i> /sɪzəz/
-------------------------------------------------------------------------	---	----------------------------

Similarly, an *admissions committee* is in charge of the process of admissions not several admissions, the *numbers racket* involves the process of gambling, not dealing with several numbers. Nouns like *admissions* and *numbers* are really simplex forms, not complex ones containing inflection. Some may not even be linked to the same root as the apparent stem (such as is the case with *numbers racket*). Rather, they are just one node with just one corresponding VI.

(3.53.a) Vocabulary Entry for *numbers*

$\sqrt{\text{GAMBLING}}$ [n] [plural]	→	<i>numbers</i> /nʌmbəz/
---------------------------------------------	---	----------------------------

(3.53.b) Vocabulary Entry for *scissors*

$\sqrt{\text{CUTTING APPARATUS}}$ [n] [plural]	→	<i>scissors</i> /sɪzəz/
------------------------------------------------------	---	----------------------------

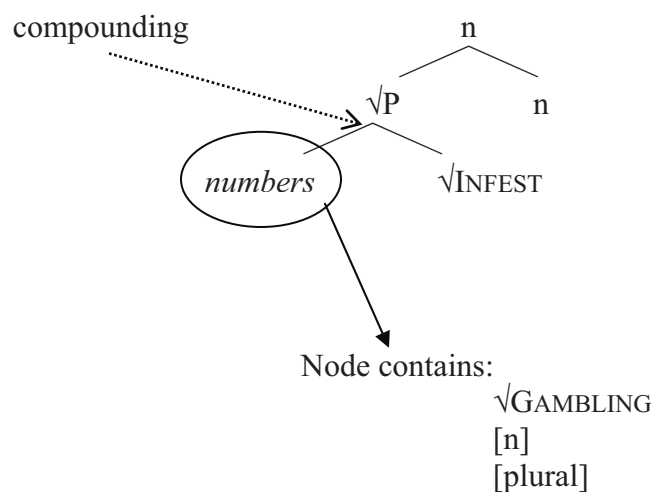
²¹ I use this root to illustrate that the root is really about the referent not about the word. An unfortunate effect of the language being studied and the metalanguage being the same is that it is sometime not clear that the concept and the word are not the same thing.

²² we can assume that all these forms and *pluria tantum* forms are specified for [plural] because they cause plural agreement.

(3.53.c) Vocabulary Entry for *admissions*

√ADMISSIONS	→	<i>admissions</i>
[n]		/ædmɪʃnz/
[plural]		

Since *pluria-tantum* forms such as *scissors* and “group” forms such as *admissions* are one VI, they are inserted into a node where the root has fused with all the dominating functional material, including [n] and [plural], above them just as *lice* is inserted into a node where the root has fused with those features. That being the case, again in forms like *pants-pocket* and *numbers-racket* the feature [n] is adjacent to the dominant root in the compound so the application of morphological merger is legal (3.54).

(3.54) *Numbers racket*

Having addressed the banning of regular inflection in nominal compounds and the admission of irregular inflection, *pluria-tantum* forms, and “group” nouns, we can address why forms with derivational morphology are allowed despite the ban of having

morphology dominating the root. Recall that the targeting restriction of nominal compounds is that the application of compounding must target the feature [n]. Since all nominalizing heads contain the feature [n], we expect the derivational morphology should be allowed in compounding exactly when *the most dominant derivational morpheme is a nominalizing head*. When the non-head member of a nominal compound is dominated by a nominalizing head, the maximal projection of that head, and thus the feature [n] is directly adjacent to the root and thus can be the target of morphological merger.

This is exactly what we see in the data (3.48 repeated here as 3.55)

(3.55) *grammaticality judgment*
grading session
participation grade
marketing suggestion
cooler unit
shifter knob
copier service
unhappiness factor

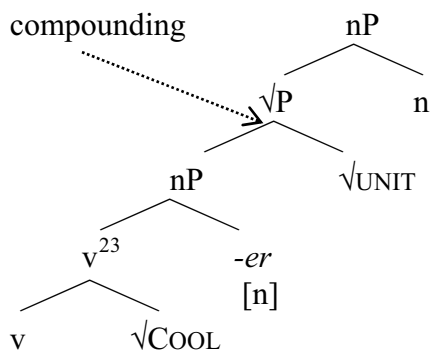
As shown in (3.55), the derivational morphology allowed in the non-head position is not unbounded. Rather, the dominant derivational morpheme is always a nominalizing element, as seen in (3.56).

(3.56)
 -ity
 -ing
 -ion
 -er
 -ness

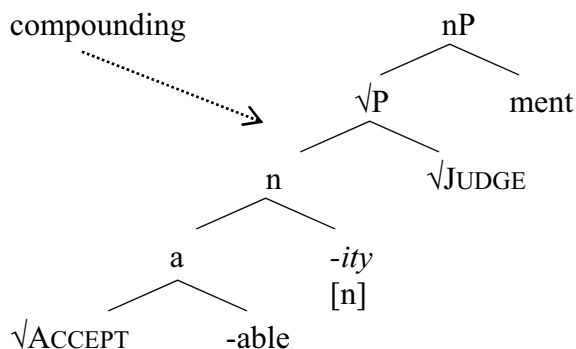
Since each affix is a nominalizer, each realizes the feature [n]. Thus, each of the derived words in the non-head position of a nominal compound is dominated by the feature [n].

This allows them to be the target of nominal compounding (since the feature [n] is not embedded).

(3.57) *cooler unit*



(3.66) *acceptability judgment*



To summarize, nominal compounding is an application of morphological merger that targets a root and the feature [n] and adjoins them. In the case of regular inflection in the non-head member (such as **rats-catcher*), that feature [n] is inaccessible to the application of merger because the [n] feature is imbedded. However, as a result of the fusion driven by the economy constraint MINIMIZE EXPONENCE, in irregular forms such

²³ This head here probably fuses. I have shown it unfused so the derivation is clear.

as *teeth-marks*, *pluria-tantum* forms such as *pants-pocket*, and “group noun” forms such as *parks service*, the [n] feature is no longer embedded and is now adjacent to the dominating root. Compounding can now apply, resulting in grammaticality. Finally, in the case of derivational morphology, the compounding is grammatical because, even without fusion, the [n] feature is already adjacent to the root targeted for compounding.

Recall the two reasons that the blocking of regular inflection in nominal compounds was problematic for Distributed Morphology: 1) the structures of regular inflection and irregular inflection were identical and 2) there is no difference between derivational morphology and inflectional, so there was no good way to block one and not the other. The analysis here solves both those problems and provides an analysis for this phenomenon within DM. 1) I propose here that the structures of **rats-infested* and *lice-infested* are in fact not identical. Where *rats* has failed to fully fuse (thus the overt realization of [plural]), *lice* has fully fused. 2) The blocking of **rats-catcher* versus the grammaticality of *cooler unit* is not due the difference between derivational morphology and inflectional morphology, but rather is due to the embeddedness of the feature [n]. Thus, DM can maintain that there is no difference between derivational and inflectional affixes.

3.5 Summary

The purpose of this chapter was to present an alternate analysis to lexical categories and root allomorphy within the framework of Distributed Morphology. The traditional analysis of lexical categories in DM is to have the content VI licensed for insertion

through secondary licensing (targeting the immediately c-commanding functional head). The traditional DM analysis of root allomorphy employs the use of readjustment rules (again conditioned by c-commanding functional heads) to change the phonology of one VI to another VI. In the analysis presented in this chapter, I argued that licensing is a local process of targeting features actually in the node targeted for insertion. I argued that the root and the formal features come to occupy the same terminal node through the application of the process of fusion. I extended this analysis to an analysis of root allomorphy. This extension allows words like *eat* and *ate* to be separate VIs that compete with each other for insertion rather than one being the result of the application of a readjustment rule.

This proposal has a number of effects on the DM model of grammar. The first is that it limits application of secondary licensing, removing lexical categorization from the list of responsibilities of secondary exponence. Since secondary licensing is inherently less local and thus less efficient than primary licensing, this is taken to be a strength of this proposal. The other important effect of this proposal was to evacuate the need for readjustment rules in the DM grammar. Since VIs linked to the same root now compete with each other for insertion, readjustment rules are no longer needed to alter the phonology of irregular forms. As readjustment rules only serve the purpose of changing the phonology of irregular morphemes, since they aren't needed for that function any longer, the DM grammar doesn't need them at all. Since readjustment rules entail both long distance relationships and extra computational load, another strength of this dissertation is that it proposes a model of DM without readjustment rules.

In the current model of DM, functional morphemes and content morphemes in many ways participate in two different grammars. Whereas functional VIs participate in competition, content VIs did not, relying on readjustment rules and secondary exponence (never primary exponence) to license their insertion. The proposal here, in abolishing the need for both secondary licensing and readjustment rules and in elaborating on a theory of competition of roots, shows that it is possible for the model of the grammar to use just one process for insertion of both functional and content VIs. As this simplifies the model of the grammar, this is again taken as a strength.

This chapter also served to showcase MINIMIZE EXPONENCE. As proposed in chapter 1, the purpose of MINIMIZE EXPONENCE is to capture the conflict between the need to be maximally contrastive and maximally efficient at the same time. The realization of MINIMIZE EXPONENCE here is the ubiquitous fusion of functional heads in complex head arrangements. The effect of this fusion is that the features of those heads are realized without each needing to be realized by its own VI. The efficiency in the grammar comes from there being fewer VI items to be pronounced without loss of contrast (any ambiguity is then only a result of a given language's inventory). Thus, fusion is one possible tactic available to the grammar to satisfy this central conflict. As an added effect, a large portion functional heads that are realized as null morphemes in DM instead fuse with other heads to be realized by overt morphemes. This drastically reduces the number of null heads predicted by DM.

Finally, I proposed an analysis for the blocking of regular inflection in nominal compounds in English (e.g. **rats-infested*). For DM, this phenomenon has been difficult

to analyze due to the tenets of the framework. There were two central problems for DM: 1) in DM the structures *lice-infested* and **rats-infested* are identical with the exception of the application of a readjustment rule; and 2) DM recognizes no difference between inflectional and derivational morphology (and derivational morphology is allowed in such structures). The analysis shows here that the structures of **rats-infested* and *mice-infested* are not identical: one involves more fusion driven by MINIMIZE EXPONENCE. The grammaticality of the constructions reduces to the embeddedness of the feature [n] (which meant that derivational morphology is allowed as long as a nominalizer was the dominant morpheme in the non-head member).

Taken as a whole, this chapter does three things. It showed an alternative analysis for root allomorphy. It proposed refinements to DM. It showed that that an analysis of nominal compounds is possible in DM.