Chapter 3

The Nuclear Stress Rule

3.1 Introduction

In this chapter, I propose a new version of the Nuclear Stress Rule (NSR). The main objective of this chapter is to provide a framework for phrase level stress which is able to derive the facts about sentence stress in Ondarroa Basque, to be discussed in the following chapter. §3.2 summarizes the version of the NSR for English proposed in Halle and Vergnaud 1987 (H&V). This work provides the basic framework for the computation of stress at the phrase and compound levels, and introduces several concepts that will be crucial in the new version of the NSR proposed later on in this chapter. In §3.3, I present Cinque's (1993) version of the NSR. As we will see, this version presents certain advantages over H&V's. In particular, Cinque shows that syntactic structure is important in determining the position of primary stress in phrases and compounds. Cinque shows that the following generalizations hold across several languages and constructions:

(1) a. In a head-complement structure, the complement is prosodically more prominent than the head.

b. In a specifier-$\overline{\text{X}}$ structure, $\overline{\text{X}}$ is prosodically more prominent than the specifier.

Cinque claims that a maximally simple version of the NSR can account for these generalizations (and similar ones in compounds), once we make certain assumptions about the structure of phrases and compounds. In §3.4, I argue for a different version

of the NSR which, unlike Cinque's, makes direct reference to syntactic structure. As will become clear later, this version of the NSR is heavily inspired in Liberman and Prince's (1977) analysis of stress in compounds, although the formalism used is substantially different from the one labeled tree notation used in that work. This new version of the NSR covers the same range of data as Cinque's, and does not need any of the extra assumptions about syntactic structures made by Cinque.

3.2 Halle and Vergnaud 1987

H&V propose the following formulation of the NSR for English:

(2) *H&V: the Nuclear Stress Rule*

a. Parameter settings on line N ($N \geq 3$) are [−BND, +HT, right].

b. Interpret boundaries of syntactic constituents composed of two or more stressed words as metrical boundaries.

c. Locate the heads of line N constituents on line $N + 1$.

These are cyclic rules which apply to syntactic constituents larger than the word. Before we see how this version of the NSR deals with the data, there are several clarifying points that need to be made. First, the parameter settings in (2a) apply to line 3 and higher ones in the grid. This is due to the fact that, in their analysis of English stress, word level stress is dependent on line 3 of the grid, i.e. the vowel with primary stress in a word is the one that has a grid element on line 3. Second, their theory of the metrical grid is different from the one used in this thesis. This is seen clearly in (2a). However, it can easily be translated to Idsardi's (1992) formalism:[1]

[1]The reader is referred to H&V for details of this version of the metrical grid. The most important difference between this formalism and Idsardi's is that the latter does not assume that a constituent is necessarily defined by both a left and a right boundary. One of them is enough. Another important difference reflected in (2a) is that Halle and Vergnaud (1987) allow for constituents whose head is not the leftmost or rightmost element in the constituent. In the case of the NSR, feet created by the NSR are always headed by the leftmost or rightmost grid element, a consequence of the parameter setting +HT, 'head terminal', in (2a).

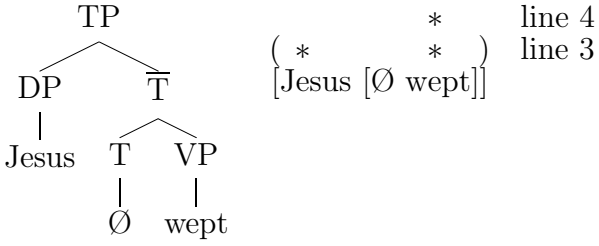
(3) *H&V: the Nuclear Stress Rule*

a. Interpret boundaries of syntactic constituents composed of two or more stressed words as metrical boundaries.

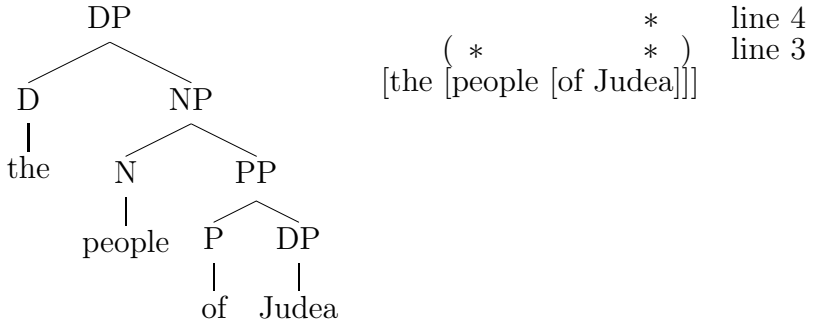
b. Constituents are right-headed on line N ($N \geq 3$).

This version of the NSR applies straightforwardly to simple cases such as the following:[2]

(4) a. ^{2}Jesus ^{1}wept.



b. the ^{2}people of ^{1}Judea

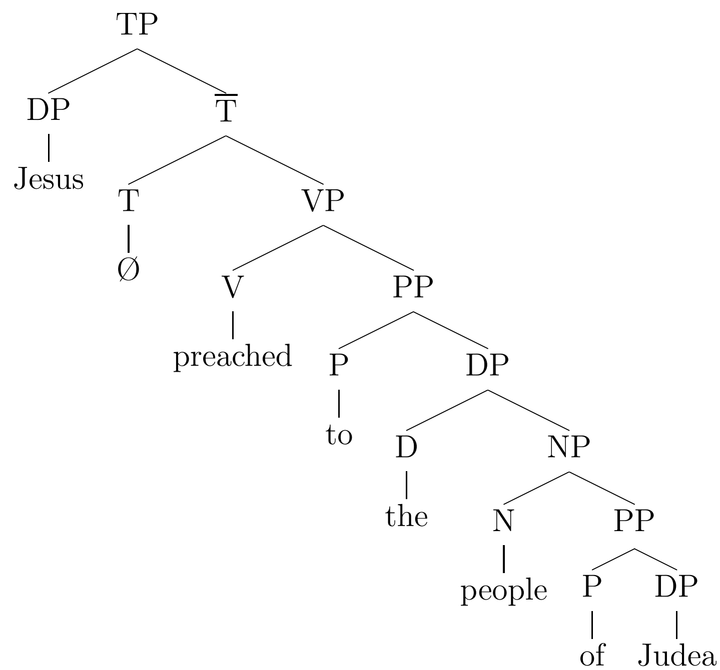


In both cases, only constituents containing two stressed words are considered. For instance, $\overline{\text{T}}$ in (4a) is ignored, since it contains only one stressed word (*wept*); the other subconstituent, T, is phonologically empty and thus is not stressed. Similarly, the PP and the higher DP in (4b) are ignored, since the words *of* and *the* are not stressed. In both cases, there are only two stressed words in the whole phrase, and thus the NSR only applies in one cycle, assigning higher prominence to the rightmost stressed word.

[2]Following standard notational conventions, levels of stress are indicated by placing natural numbers on top of the stressed vowels. Number 1 represents the highest level, and n is understood as representing a higher level of stress than $n + 1$.

H&V's version of the NSR makes correct predictions in these simple cases. They, however, note that something must be added for more complex cases where these small phrases are part of a larger constituent, as in the following:

```
        2      3                   4          1
(5)   Jesus preached to the people of Judea
```



The NSR first applies in the cycle corresponding to *the people of Judea*, giving it the metrical grid shown in (4b) above. Next it applies to the VP *preached to the people of Judea* resulting in the following grid:

```
(6)                                        *      line 5
       (                                   * )    line 4
          *                ( *             * )    line 3
       [preached to the people of Judea]
```

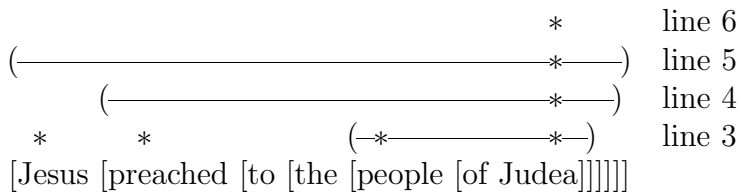
Finally, it applies to the whole sentence, resulting in:

```
(7)                                               *      line 6
       (                                          * )    line 5
              (                                   * )    line 4
                 *                ( *             * )    line 3
       [Jesus preached to the people of Judea]
```

In the rest of this thesis, in order to simplify exposition, I will use the following convention. Rather than giving the grid that is computed in each separate cycle in a

separate representation, I will conflate all of them into a single representation. The example above would be represented as:

(8)



In (5), the NSR applies on three cycles. For ease of exposition, horizontal lines have been added to reflect what constituent the NSR applies to in each cycle: in the first cycle, it applies to *[people of Judea]*, resulting in projection from line 3 to 4; in the second cycle, it applies to *[preached to the people of Judea]*, resulting in projection from line 4 to 5, and so on.

The problem with (8) is that it does not reflect the fact that *Jesus* is more prominent than *preached*, and that the latter is more prominent than *people*. That is, this version of the NSR only derives correctly primary stress in a given phrase, but not other levels of stress. In order to solve this problem, H&V propose the following convention on the application of the NSR:

(9) *Stress Equalization Convention (SEC)*

When two or more constituents are conjoined into a single higher level constituent, the grid columns of the metrical heads of the constituents are equalized by adding grid elements to the lesser column(s).

The basic idea behind the SEC is that sister subconstituents count as equally prominent when the NSR applies to the constituent containing them. Thus, the NSR never applies vacuously: the SEC ensures that there are at least two grid elements inside every phrase the NSR applies to.[3]

The addition of the SEC results in the correct grid for the example above. In the first cycle, *the people of Judea*, the SEC does not apply, and the resulting grid is as derived in (4b) above. The input to the stress rules in the next cycle is as follows:

[3]The only exception is sentences with only one stressed word, for obvious reasons.

```
(10)                              ∗     line 4
        ∗           (–∗———————∗–)    line 3
       [preached to the people of Judea]
```

Since the grid column for *preached* and the highest one for *to the people of Judea* are not of the same height, the SEC equalizes them:

```
(11)    ⋆                         ∗     line 4
        ∗           (–∗———————∗–)    line 3
       [preached to the people of Judea]
```

For ease of exposition, in (11), a star (⋆) is used for grid elements introduced by the SEC, rather than the usual asterisk. At this point, the NSR applies, projecting the rightmost grid element to the next line:

```
(12)                              ∗     line 4
       (–⋆————————————————————∗–)    line 4
        ∗           (–∗———————∗–)    line 3
       [preached to the people of Judea]
```

In the final cycle, the highest grid columns in the subject and in the VP are equalized by the SEC, and then the NSR assigns more prominence to the VP, i.e. to *Judea*:

```
(13)                                        ∗          line 6
       (–⋆——————————————————————————————∗———)    line 5
        ⋆    (–⋆————————————————————————∗——)     line 4
        ∗      ∗            (–∗—————————∗–)      line 3
       [Jesus [preached [to [the [people [of Judea]]]]]]
```

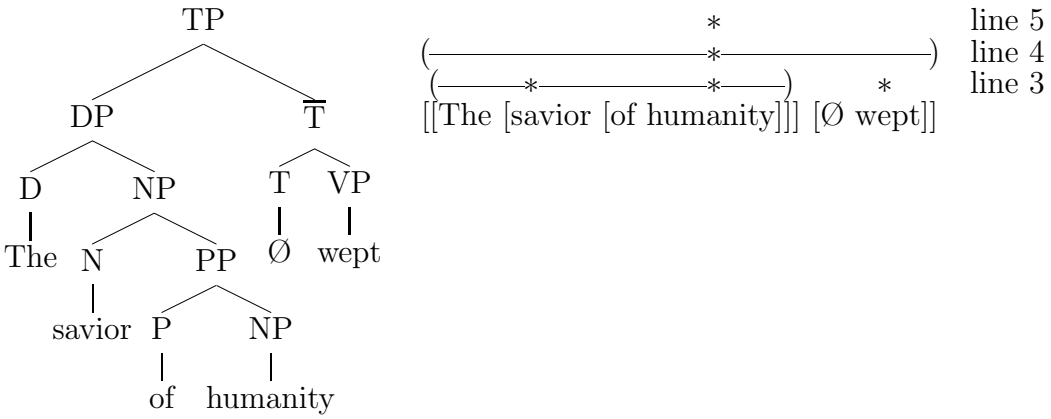
In all the three cycles, the NSR assigns more prominence to the rightmost word, so that in the end, the rightmost word in the sentence has primary stress. What is important to note is that the SEC ensures in each cycle that the correct lesser stresses are derived: application of the SEC in the second cycle ensures that *preached* is more prominent than *people* (cf. 11), and its application in the third cycle ensures that *Jesus* is more prominent than *preached* (cf. 13). Thus, the NSR, together with the SEC, derives a representation for the sentence which is in accord with speakers' intuitions about the relative prominence of its constituent words.

The addition of the SEC has another advantage which is not discussed explicitly by H&V. It has to do with complex left branches. If the SEC did not exist, H&V's

NSR would predict that complex left branches would be more prominent than they really are. Consider the following example, and its corresponding grid if the SEC did not exist:

(14) *Complex left branches*

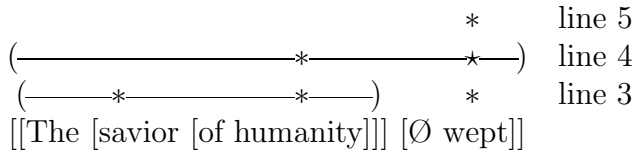
3 2 1
The savior of humanity wept.



Since the NSR applies cyclically, it predicts that complex constituents are more prominent than simpler ones, simply because the NSR applies to the former more times than the to the latter. This is clearly the wrong result, as exemplified in (14). Although it is true that *humanity* is more prominent than *savior*, it is not the case that the most prominent stress is on *humanity*.

However, if we add the SEC, the correct prediction is made:

(15) *Complex left branches and the SEC*



In this case, the SEC ensures that the stress on *wept* is prominent enough so that it can 'compete' in the last cycle, even though the constituent containing it, $\overline{\text{T}}$, is simpler than its sister, the subject DP.

3.3 Cinque 1993

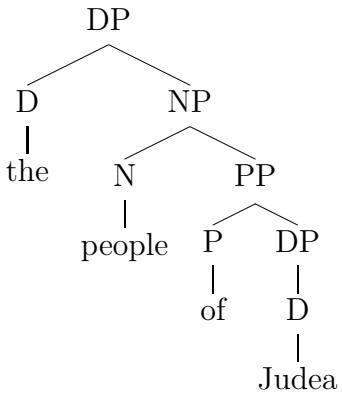
Cinque (1993) proposes a new formulation of the NSR which, he argues, has several advantages over previous ones. Two properties distinguish it from previous ones:

(i) it is 'minimal', in the sense that it only uses the minimal machinery necessary to derive stress in phrases, and (ii) it is not language-particular. In this section, I discuss Cinque's proposal, and argue that it has certain shortcomings. In particular, as discussed by Cinque himself, property (i) relies on certain crucial assumptions about syntactic structures which are not independently motivated. These problems with Cinque's theory will motivate a new version of the NSR in §3.4 which covers the same range of data as Cinque's, but which does not need these assumptions.

3.3.1 The NSR in Phrases

Cinque's basic idea is that, once we assume a rich enough syntactic structure, such as standard $\overline{\text{X}}$-Theory, stress rules which determine headedness at the phrase level are not necessary. Consider, for instance, one of the DPs discussed in the previous section, and its syntactic structure according to $\overline{\text{X}}$-Theory:[4]

(16) the ^{2}people of ^{1}Judea



There is a clear asymmetry between the two stressed words in this phrase: *Judea* is more deeply embedded than *people*: the former is dominated by more phrasal nodes than the latter. This means that the cycle applies more times to constituents containing the former than to constituents containing the latter. Cinque's basic idea is that this can be used to derive the correct stress contour for this phrase, and, in

[4]I assume that proper names in English are generated directly in D. This assumption is not crucial. For instance, we could assume that they surface in D via N-to-D movement, following Longobardi 1994, or that they are generated and remain in N, with an empty D.

fact, for all phrases. If we apply the stress rules to all constituents, including those that contain only one stressed word, the prediction is that the word which is more deeply embedded than the rest will be the most prominent one. In simple cases such as (16), this prediction is borne out, as will be shown below.

Cinque's formulation of the NSR is as follows:

(17) a. Interpret boundaries of syntactic constituents as metrical boundaries.[5]

b. Locate the heads of line N constituents on line $N + 1$.

c. Each rule applies to a maximal string containing no internal boundaries.

d. An asterisk on line N must correspond to an asterisk on line $N + 1$.

The only crucial rule which makes this version of the NSR different from previous ones is (17a): *all* syntactic boundaries are interpreted as metrical boundaries. Recall that, in H&V's NSR, only constituents that have more than one stressed word are considered. It is this rule that results in the prediction that highest prominence is assigned to the most deeply embedded constituent. Consider the simple example in (16) under Cinque's NSR: since all syntactic boundaries are interpreted as metrical boundaries, the first cycle applies to the DP containing only *Judea*, and then to the PP *of Judea*:

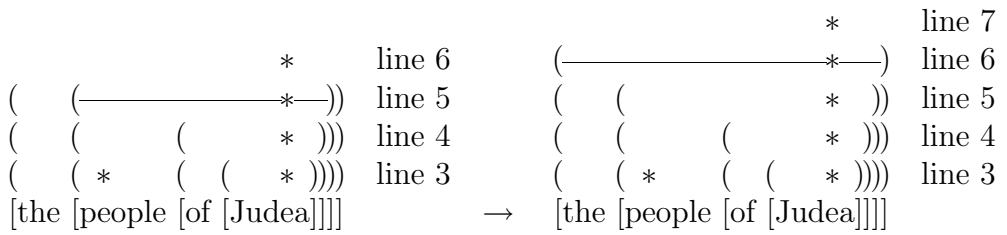
(18)

```
                                                        *        line 5
                        *         line 4      (   (      (------*-)))  line 4
(   ( *    (  (---*-))))  line 3      (   ( *    (   (   * ))))  line 3
[the [people [of [Judea]]]]          →   [the [people [of [Judea]]]]
```

In the next cycle, the NSR applies to the constituent containing both stressed words (*people* and *Judea*). However, since the NSR has already applied twice to constituents containing *Judea*, its column in the grid is higher than the one for *people*. In particular, on line 5, there is only a grid element corresponding to *Judea*, not to *people*. Hence, *Judea* ends up having more prominence than *people*, as desired:

[5]Note that these are phrase level boundaries, not word level ones. This is simply a consequence that the algorithm applies to phrase level categories.

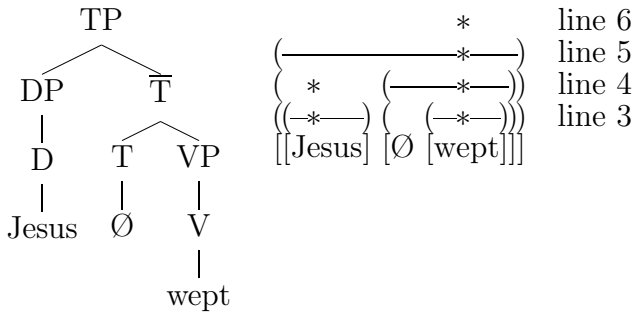
(19)



Thus, there are two important differences between Cinque's and H&V's versions of the NSR. In the latter, only constituents containing more than one stressed word are considered, and certain rules determine that the rightmost one is more prominent. In the former, all constituents are considered, and, Cinque claims, this is enough to determine prominence, at least in simple cases.

Let us consider one more simple example: the intransitive sentence *Jesus wept*, from (4) above:

(20) $\overset{2}{\text{Jesus}}$ $\overset{1}{\text{wept}}$.



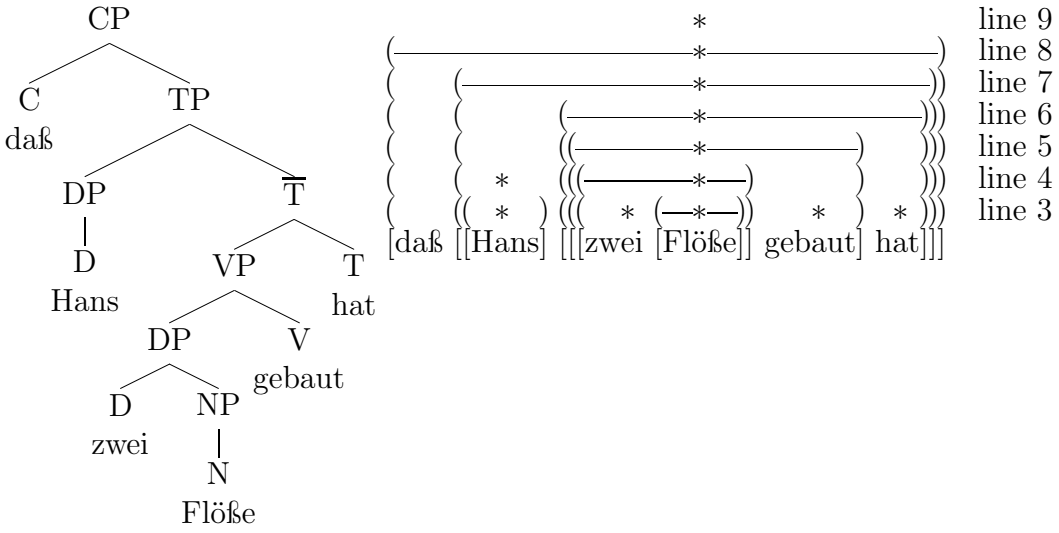
In this example, *wept* receives more prominence for the same reason that *Judea* does in the previous example: *wept* is more deeply embedded than *Jesus*. The former is contained in VP, $\overline{\text{T}}$, and TP, and the latter is contained in DP and TP. This means that the stress rules apply to *wept* more times than it does to *Judea*, which results in higher prominence on the former.

To sum up so far, Cinque's version of the NSR accounts for a number of simple cases, and it does so without any rule stipulating which member of a metrical constituent is the head. In this sense, it has a clear advantage over H&V's NSR, where such rules are needed. Cinque goes on to claim that this version of the NSR is universal, or that at least it can account for the phrasal stress facts of languages that in other theories require language particular versions of the NSR. A language that

Cinque considers at length is German, which is sufficiently different from English in its syntax to make significant predictions.

Consider the following transitive sentence, and the structure which Cinque assumes for it:[6,7]

(21) ...dass Hans zwei **Flöße** gebaut hat.
...that Hans two rafts built has
...that Hans has built two rafts.

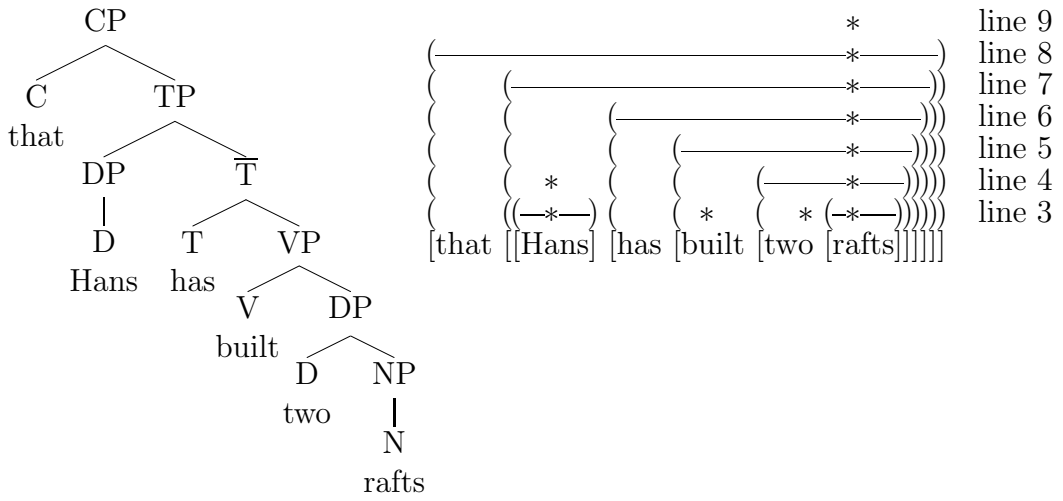


As shown in this example, Cinque's NSR makes the right prediction: sentence prominence is assigned to the noun *Flöße*, since it is contained in the the most deeply embedded constituent in the sentence. In order to understand the advantages that this theory has over H&V's, it is useful to compare this German sentence with its English equivalent:

(22) ...that Hans has built two **rafts**.

[6]Note that this sentence must be embedded, since it starts with the complementizer *daß* and is not V2. Matrix V2 sentences are discussed below.

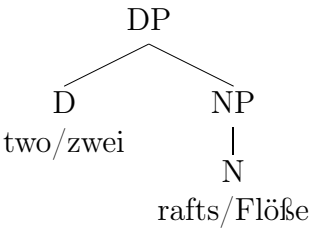
[7]In this example, and in the ones below, the word containing the most prominent stress is given in bold-face.



As in the German example, sentence prominence is predicted to be on the noun *rafts*. If we adopted H&V's theory, we would be forced to propose two different versions of the NSR, one for English (i.e. 3), and a different one for German. If we applied H&V's NSR for English to German, we would obviously make the wrong prediction. In Cinque's theory, these facts in these two languages are analyzed in a uniform way: sentence prominence is on the most deeply embedded constituent. Apparent surface differences in the distribution of stress are reduced to independently motivated differences in the syntax of these two languages.

It is important to note that this property of Cinque's analysis relies strongly on certain basic features of $\overline{\text{X}}$-Theory. A crucial step in the derivation of sentence stress in the examples above is the first cycle within the VP, which applies to the NP containing *rafts/Flöß e*. The structure that $\overline{\text{X}}$-theory assigns to the DP *two rafts/zwei Flößе* is as follows:

(23)



In this structure, the noun *rafts/Flößе* is embedded in an NP which contains nothing else but that noun. This is due to one of the basic hypotheses of $\overline{\text{X}}$-Theory, namely, that complements (and specifiers) are phrases. Thus, in a structure of the form

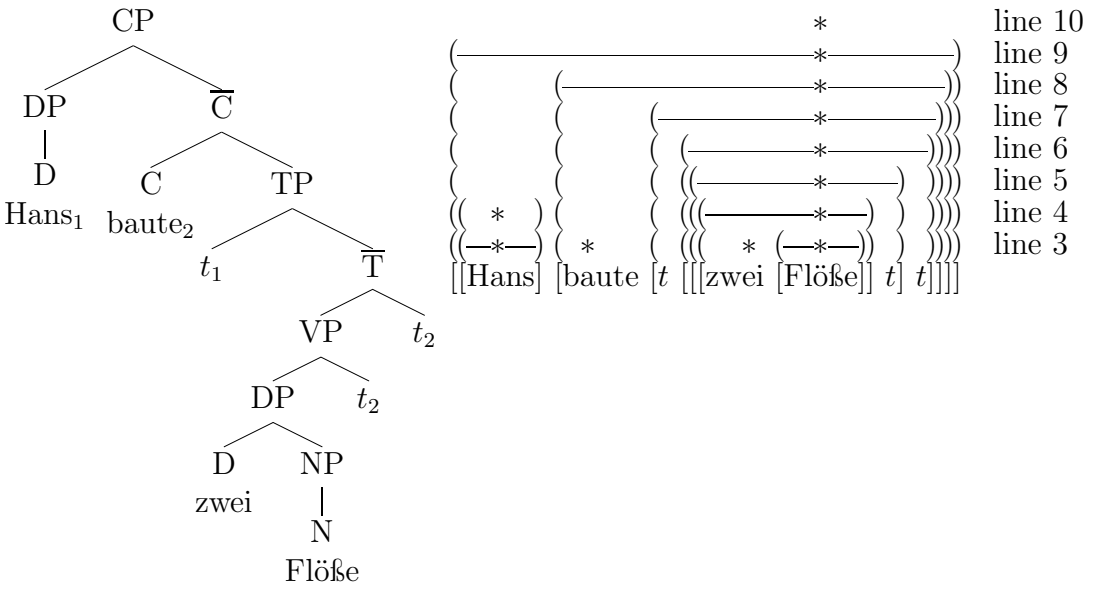
[X Y], where X is the head, Y cannot the complement of X unless Y is phrasal. That means that a DP like the one above has minimally the structure shown above. Consequently, the noun is more deeply embedded than the determiner within the DP, which, eventually, results in the noun being assigned sentence prominence.

More generally, Cinque's prediction is that any word in the complement of a head X counts as more deeply embedded than X, and thus receives higher prominence than X. This seems like the right prediction, since it is borne out in all the examples we have seen so far. For instance, a basic difference between the German and English counterparts of the sentence we discussed above is that the VP is right-headed in the former, but left-headed in the latter. In both cases, the NSR assigns higher prominence to the complement of V, as predicted by Cinque's theory.

As noted by Cinque, this prediction is in fact borne out by a large number of cases that have been discussed in the literature (see Cinque 1993, §8, for relevant references). This raises the question of what predictions are made under other theories of phrase structure. This is a topic that is dealt with in §3.3.3.

Further support for Cinque's theory comes from matrix sentences in German. As is well-known, matrix sentences in this language are subject to a V2 condition: the tensed verb must be placed after the first XP in the sentence. Following the standard analysis of this fact in the literature (references?), Cinque assumes that it is the consequence of the tensed verb moving to from T to C, and some XP moving to the specifier position of C. In the following, it is the subject *Hans* that appears in first position:

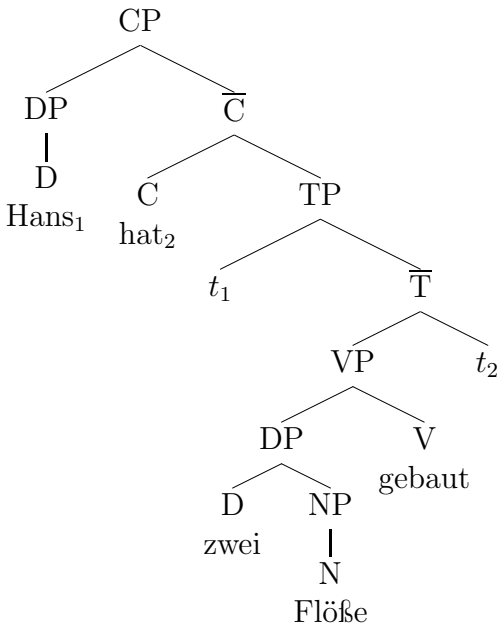
(24) Hans baute zwei **Flöße**.
Hans built two rafts
Hans built two rafts.



In this example, as in the one above, sentence prominence is correctly predicted to be on the noun *Flöße*. If we did not take into account the basic structural difference between V2 and non-V2 clauses, the difference between their stress patterns would be puzzling. In V2 clauses, stress is on the rightmost word, and in non-V2 clauses, it is not. Under H&V's theory, we might account for these data by assuming that, as in English, stress is rightmost, but that some additional rules exclude verbs from the computation of sentence prominence.[8] That this is the correct generalization is confirmed by V2 sentences in which some verb remains within TP, as is the case in sentences with compound tenses:

(25) Hans hat zwei **Flöße** gebaut.
Hans has two rafts built
Hans has read two books.

[8]What exactly this rule would look like is not important for the point made in the text. A possibility would be to adopt H&V's rule for stress in compounds for German sentences, by stipulating that the right boundary of a constituent composed of two or more words is displaced to the left of the head if the head is the last word in the constituent.



In this example, as in the ones above, sentence prominence falls on the last word, excluding verbs. However, in H&V, this fact must be stipulated. The advantage of Cinque's theory is that this fact is explained: in all cases, sentence prominence is assigned to the most deeply embedded constituent.

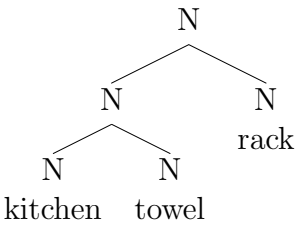
3.3.2 Stress in Compounds

Cinque claims that his theory of phrase stress can also be applied successfully to English compounds, once we assume a sufficiently rich structure for them. In most two-membered compounds, stress is on the first member (see Chomsky and Halle 1968):

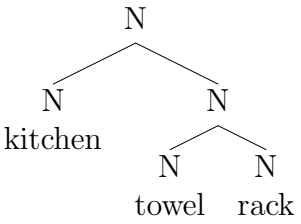
(26) a. $\overset{1}{\text{kitchen}}\ \overset{2}{\text{towel}}$
b. $\overset{1}{\text{towel}}\ \overset{2}{\text{rack}}$
c. $\overset{1}{\text{teachers}}\ \overset{2}{\text{union}}$

In Chomsky and Halle 1968, the compound stress rule basically states that primary stress in a compound is assigned to the leftmost word in each cycle. This rule can handle simple compounds like the ones above, but it cannot account for certain structure-dependent effects that are observable in more complex compounds:

(27) a. ^{1}kitchen ^{3}towel ^{2}rack



b. ^{2}kitchen ^{1}towel ^{3}rack

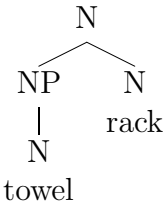


Although (27a) can be accounted for by assigning higher prominence to the leftmost constituent in each cycle, (27b) cannot be accounted for in this way. What these examples show is that the syntactic structure of compounds is relevant in determining their stress. In previous analyses of compound stress (e.g. Chomsky and Halle 1968, Liberman and Prince 1977, H&V), right and left-branching compounds are treated as basically subject to different stress rules. For instance, in Liberman and Prince 1977, the rightmost element in a compound is more prominent if it branches; otherwise, the leftmost element is more prominent.

However, Cinque claims, treating these two kinds of compounds in terms of different rules misses an obvious generalization. As can be seen in the examples in (27), the most prominent word is always contained in the more complex branch. This fact can be stated straightforwardly in terms of depth of embedding. For instance, in (27a), both *kitchen* and *towel* are more deeply embedded than *rack*. Similarly, in (27b), both *towel* and *rack* are more deeply embedded than *kitchen*. However, depth of embedding apparently does not help in determining which word in the complex branch is more prominent, since both words are as deeply embedded as the other, given the structure in (27). The same problem arises in two-membered compounds, such as the ones in (26)

Rather than amending the NSR, Cinque proposes that the structure of compounds is more complex than standardly assumed. In particular, he challenges the assumption that compounds have a symmetric structure, where both the head and the modifier are of the same $\overline{\text{X}}$ level (X^0). He claims that while the head is a X^0 level category, the modifier is phrasal (i.e. XP). The basic idea is that headedness in $\overline{\text{X}}$-theory is expressed in asymmetries of this type. Thus, the structure of a two-membered compound such as *towel rack* is as follows:

(28) $\overset{1}{\text{towel}}\ \overset{2}{\text{rack}}$



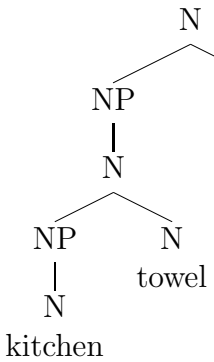
In this structure, *towel* is more deeply embedded than *rack*, and thus applying Cinque's NSR to it gives the correct result:

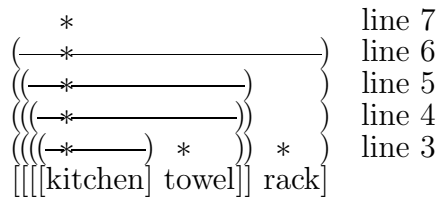
(29)
```
    *              line 5
(—*———)            line 4
((–*—)  *  )       line 3
[[towel] rack]
```

Since compounds are always right-headed, this predicts that stress is always leftmost in two-membered compounds, which is true for most cases.[9]

The same correct result is also derived for three-membered compounds:

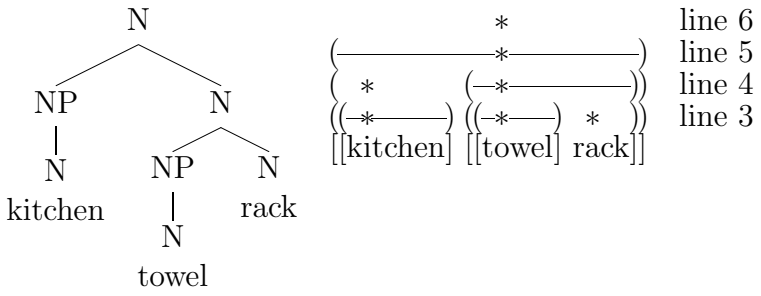
(30) a. $\overset{1}{\text{kitchen}}\ \overset{3}{\text{towel}}\ \overset{2}{\text{rack}}$





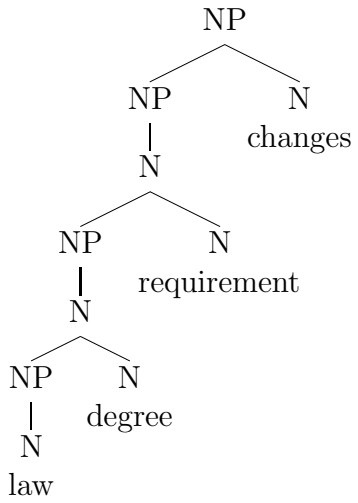
[9]There are well-known exceptions to this generalization. See, among others, Halle and Vergnaud 1987, Selkirk 1984, Cinque 1993. I leave this as a question for furture research.

b. ^{2}kitchen ^{1}towel ^{3}rack

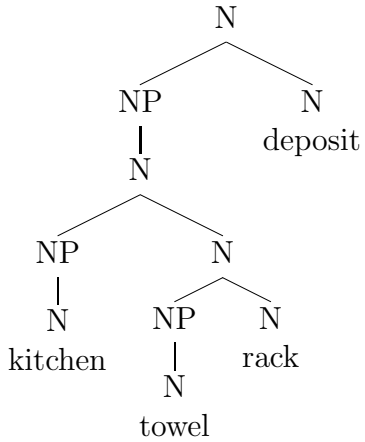


Cinque's analysis also makes the correct prediction in the following more complex examples, where primary stress in all cases is on the most deeply embedded word:

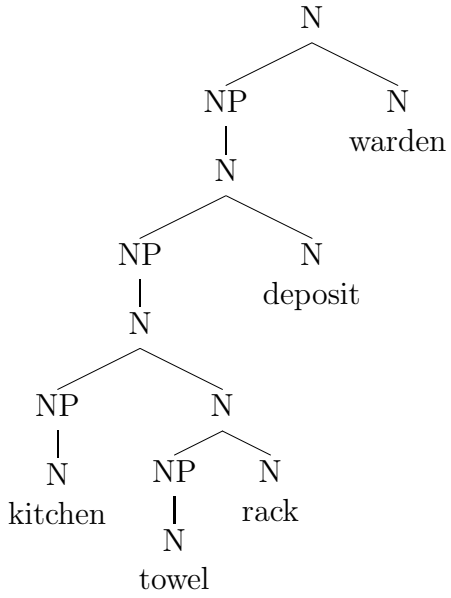
(31) a. **law** degree requirement changes



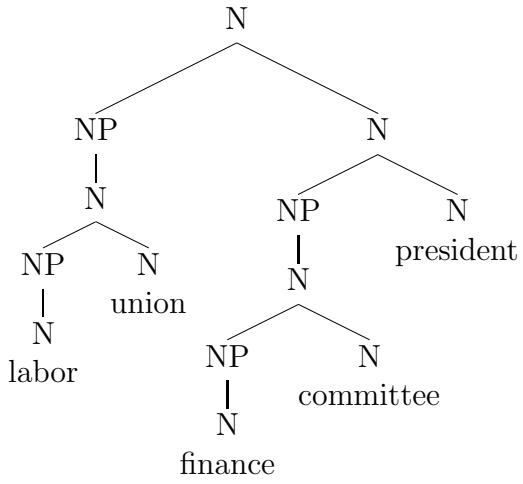
b. kitchen **towel** rack deposit



c. kitchen **towel** rack deposit warden



d. labor union **finance** committee president



As we will see in the next section, Cinque's final version of his theory about the structure of compounds is somewhat different from what we have seen above. However, the basic idea remains unchanged: certain $\overline{\text{X}}$-theory concepts are applicable at the word level, and this permits the NSR to apply correctly to compounds.

3.3.3 The NSR and Syntactic Structure

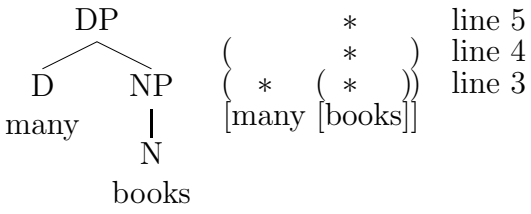
In the previous sections, we have seen that Cinque's version of the NSR has certain advantages over H&V's. In particular, it does not need rules to specify what element

in a foot is the head, and it can account in a uniform way for stress patterns in different construction types and in different languages. Cinque's basic insight is that the NSR is to a large extent determined by the syntactic structure of phrases, so that apparent differences in the stress patterns of different constructions/languages are reduced to independently motivated differences in their syntax.

In this section, I point out certain problems with Cinque's analysis, some of which were noticed by Cinque himself. I argue that these problems show that, while structure sensitive, the NSR cannot be as simple as in Cinque's version. Cinque's formulation of the NSR crucially relies on certain assumptions about syntactic structures which are not independently motivated. The issues raised in this section will motivate a new version of the NSR in §3.4 which makes direct reference to syntactic structures, and which does not need these extra stipulations.

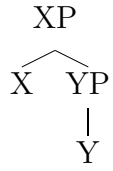
The first objection to Cinque's NSR was already noted in 3.3.1. Consider the following DP, with the metrical grid assigned to it in Cinque's theory:

(32) $\overset{2}{\text{many}}\ \overset{1}{\text{books}}$



As was noted in §3.3.1, in order to derive the correct stress pattern in this phrase, the analysis relies on the distinction between word level and phrase level categories that is stipulated in $\overline{\text{X}}$-Theory. In particular, since, in this theory, complements (and specifiers) are stipulated to be phrasal, *books* in this example is contained in an NP which is the complement of the D head. Thus, the noun is more deeply embedded than the determiner, and receives higher prominence. More generally, a phrase XP containing a head X and a complement YP has minimally the following structure:

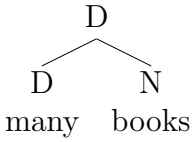
(33) *Complements are phrases in $\overline{X}$-Theory:*



As long as this stipulation is maintained, any word in the complement of a head X counts as more deeply embedded than X, and thus receives higher prominence than X. This seems like the right prediction, since it is borne out in all the examples we have seen so far. This raises the question of what predictions are made under other theories of phrase structure. In particular, we need to ask whether we can obtain the same result within Chomsky's (1995) Bare Phrase Structure (BPS).

In BPS, syntactic structure is built by a single operation, *Merge*.[10] Merge is a recursive operation which takes two syntactic objects and forms a new syntactic object. In the newly formed object, one of its members is designated as its *label*. For instance, the phrase *many books* is formed by merging the two lexical items it is composed of. The resulting object has *many* as its label, and can be represented as follows:

(34) many books



A basic constraint on phrase structure posited in BPS is the *Inclusiveness Condition*: properties of a syntactic objects are only those that are inherited from the lexical items it is composed of. This amounts to saying that syntactic objects can only be created by Merge.

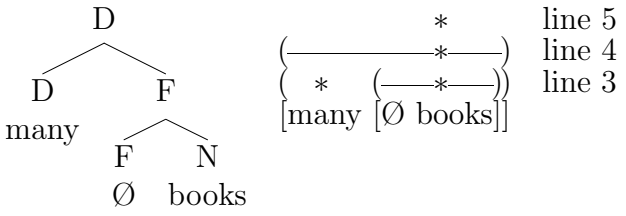
Thus, BPS imposes very restrictive conditions on possible syntactic structures. In particular, a structure like (33) is not possible: the structure $[_{\mathrm{YP}}\ \mathrm{Y}\ ]$ cannot be formed by merge, since it contains only one subconstituent. Furthermore, given the

[10] Another operation which builds structure is Move, which is a combination of Merge and Agree. See Chomsky 2000, 2001 for details.

inclusiveness condition, YP cannot have any property that Y does not have. In $\overline{\text{X}}$-theory, it is stipulated that Y and YP are different: Y is a word level category, and YP is a phrase level category. In Cinque's analysis this is precisely what introduces an asymmetry between X and Y and what is ultimately responsible for complements being more prominent than heads.

It seems then that Cinque's theory of nuclear stress and BPS are not compatible, since the asymmetries that are needed to derive the correct stress patterns are not possible in BPS. One way of maintaining both theories would be to examine all the problematic cases and show that they involve more structure than meets the eye. Consider the DP *many books* again. Several authors have proposed that DPs contain functional projections between D and N (e.g. Ritter 1993, Cinque 1994). If we posit an empty functional head in this DP, it is possible to derive the correct stress pattern under Cinque's theory:

(35) $\overset{2}{\text{many}}\ \overset{1}{\text{books}}$



In this structure, the empty functional projection introduces the necessary asymmetry that makes *books* more deeply embedded than *many*.

As long as we can posit enough empty structure in all the problematic cases, Cinque's theory can be made compatible with BPS. However, rather than examining all possible cases, I would like to point out a more serious problem for Cinque's theory. As I argue in §3.4, the solution to this new problem also solves the problem with complements.

In §3.2, we saw that H&V's version of the NSR has a problem with complex specifiers. The hypothesis that the NSR applies cyclically makes the incorrect prediction that complex branches attract stress, simply because the NSR applies more times to them than to simpler branches. We exemplified this problem with the following

sentence:

(36) *H&V and complex left branches*

```
          3            2       1
The savior of humanity wept.
                      *                 line 5
(---------------------*----------------) line 4
 (-----*--------------*-----)      *     line 3
[[The [savior [of humanity]]] [Ø wept]]
```

The noun *humanity* is more deeply embedded than *wept*, which means that the former is incorrectly predicted to be more prominent than the latter, since the NSR applies more times to it. As shown in §3.2, H&V solve this problem by introducing the SEC, which ensures that sister constituents count as equally prominent as each other when the NSR applies to the constituent that contains them:

(37) *Complex left branches and the SEC*

```
                                   *     line 5
(---------------------*------------⋆---) line 4
 (-----*--------------*-----)      *     line 3
[[The [savior [of humanity]]] [Ø wept]]
```

The SEC ensures that *wept* is as prominent as *humanity* when the NSR applies to the constituent containing both. Since H&V's NSR assigns higher prominence to the rightmost word, the result, as desired, is that primary stress is on *wept*.

The same problem arises in Cinque's theory:

(38) *Cinque 1993 and complex left branches*

```
                         *                       line 8
(------------------------*---------------------) line 7
((-----------------------*-----)               ) line 6
((     (-----------------*-----))        *     ) line 5
((     (         (-------*-----))) (-----*-----)) line 4
((     ( *       (  (----*-----)))) (  (--*--))) line 3
[[The [savior [of [humanity]]]] [Ø [wept ]]]
```

However, the problem is more serious than in H&V's theory. Cinque's basic hypothesis is that depth of embedding correlates with prosodic prominence. Phrases with complex specifiers, such as the one above, are clear counterexamples to this hypothesis. Furthermore, this problem cannot be solved by adopting the SEC. The SEC is

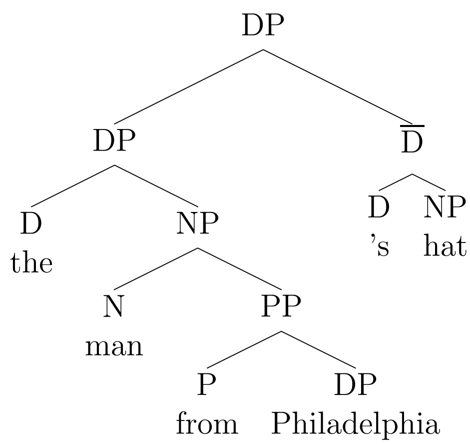
designed precisely to remove the effects of depth of embedding. In particular, if we added the SEC, the metrical grid in the cycle which applies to *savior of humanity* would be as follows:

(39)
```
( ⋆                     ∗       )  line 5
( ⋆       (———————∗——————))  line 4
( ∗       (   (———∗———)))  line 3
[savior [of [humanity]]]
```

At this point, line 5 has a foot that contains two grid elements. Since Cinque's NSR crucially relies on there being only one grid element in each foot, it cannot deal with representations of this type. Thus, Cinque's theory is not compatible with the SEC.

In general, specifiers are not more prominent than their sisters. This generalization can be exemplified further with genitive phrases, which, I assume, are specifiers of D (see Abney 1987):[11]

(40) the man from Philadelphia's **hat**



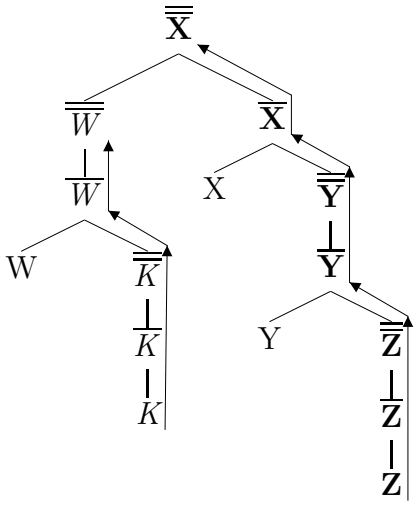
As in the previous example, Cinque's (wrong) prediction is that stress is on the most deeply embedded constituent, i.e. *Philadelphia*.

Cinque proposes the following amendment to his theory as a solution to this problem with specifiers. His basic idea consists in excluding specifiers from the computation of nuclear stress in a principled fashion. First, he notes that "it is well known

[11] I assume that the genitive morpheme *'s* is generated as the head of the DP containing the genitive phrase. Another possibility would be to assume that D is empty, and that the genitive morpheme heads the phrase in the specifier of DP. See Abney 1987 for discussion.

that the complement, not the specifier, introduces recursion, so that depending on the relative position of the complement and the head a language will be right-recursive (say, Italian) or left-recursive (say, Japanese)." He cites several works which provide evidence for asymmetries between recursive and non-recursive sides from several languages (Zwarts 1973, Emonds 1976, 1985, Williams 1982, Longobardi 1991). He then proposes that "the relevant notion of depth of embedding is now limited to the continuous path uniting from the bottom all and only the nodes found on the recursive side and on the X-bar projection line of a phrase up to the node that is expanded on the nonrecursive side." For instance, the following tree has several such paths of embedding:

(41) *Depth of embedding and recursion*



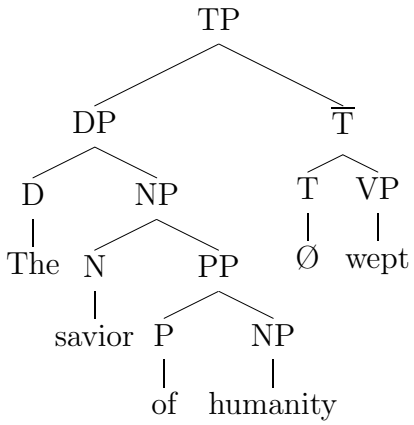
Two paths of embedding are marked in this example: the one connecting the root ($\overline{\overline{\mathrm{X}}}$) to the terminal Z, and the one connecting the specifier $\overline{\overline{\mathrm{W}}}$ to the terminal K.[12] Cinque defines the one connecting the root to a terminal node (i.e. Z) as the *main path*, and the one that does not include the root node as a *minor path*. His amendment to the theory of stress is that "when a minor path of embedding joins the main path (i.e. when the minor cycle joins the main cycle), only the end result of the former is visible in the form of a single asterisk." This means that, whatever metrical grid is

[12]There are, of course, more paths of embedding, i.e. one for each terminal node W, X, and Y. These are not relevant for Cinque's proposal.

computed in the specifier ($\overline{\overline{W}}$) cycle, only one asterisk from this grid is visible in the grid computed in higher cycles (i.e in $\overline{\overline{X}}$).

Unfortunately, Cinque does not state more explicitly what it means "to be visible in the form of a single asterisk." However, the basic idea seems to be that specifiers count as words with respect to stress, i.e. when joining the main path of embedding, the metrical grid of a specifier is visible only in terms of a word level (line 3) asterisk on top of the word (vowel) containing primary stress in the specifier. Consider one of the problematic examples again:

(42) The savior of humanity **wept**.



First, the metrical grids for DP and $\overline{T}$ are computed on separate cycles:

(43)

	*	line 7	
(——————*——)		line 6	
((——————*——))		line 5	* line 5
(((——————*——)))		line 4	(——*—) line 4
((* ((——*——))))		line 3	((—*—)) line 3
[The [savior [of [humanity]]]]			[Ø [wept]]

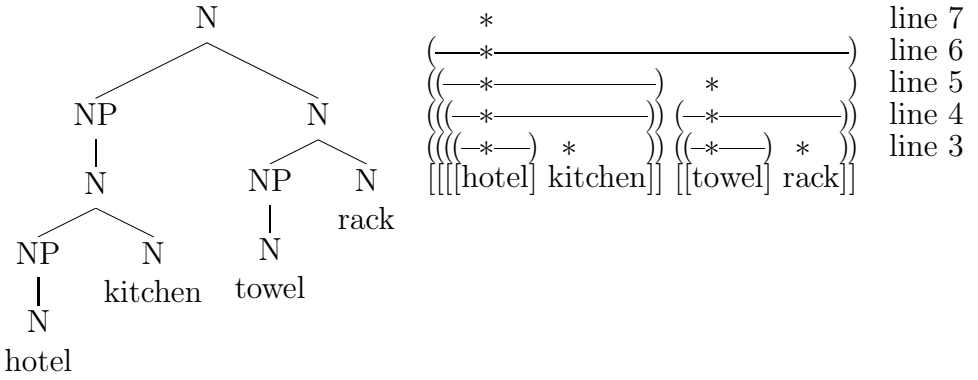
In the root cycle, the grid for the DP is simplified, since it is a specifier:

(44)

	*	line 6
(——————————————*——)		line 5
((*))		line 4
(* ((*)))		line 3
[[The [savior [of [humanity]]]] [Ø [wept]]]		

Cinque argues that this solves a similar problem that arises in compounds. The following is a relevant example:

(45) hotel kitchen **towel** rack

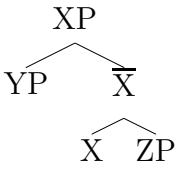


The problem with this example is basically the same that we saw above with respect to specifiers. Cinque's theory, without the amendment discussed above, predicts that the most deeply embedded constituent has primary stress. Although this is true in many cases, it is not in others.

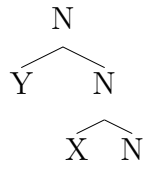
Cinque argues that this problem has exactly the same solution that he proposes for the problem with specifiers. These two problems can be schematized as follows:

(46) *Complex left branches in phrases and compounds*

a. *Phrases*

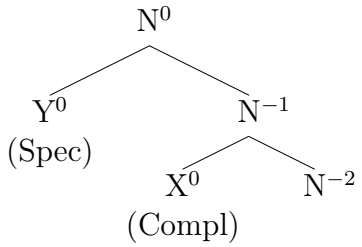


b. *Compounds*



In both cases, the generalization is that the non-head daughter of the root node (YP and Y, respectively) does not attract stress, regardless of its complexity. Drawing on this similarity, Cinque extends certain concepts of $\overline{\text{X}}$-theory to the compound level. In particular, he proposes that Y and X in (46b) are the specifier and the complement of the head, respectively, and that this is expressed in terms of sub-zero bar-levels:

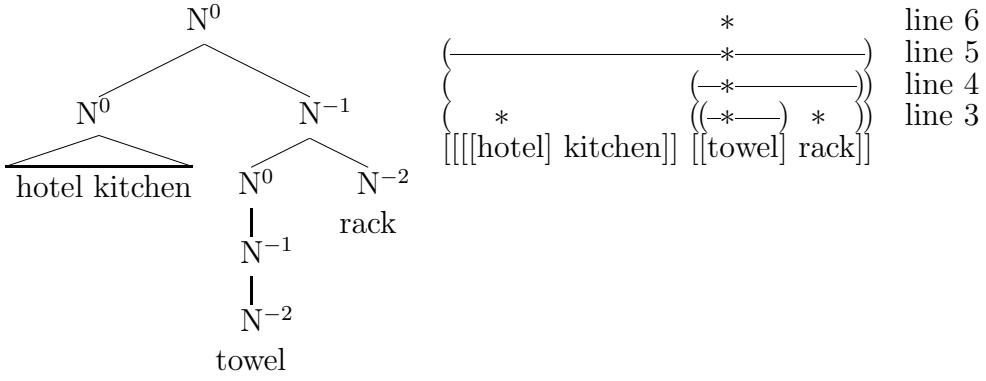
(47) *Cinque 1993: the structure of compounds*:



The basic idea is that, at the word level, X^0 counts as a 'maximal projection', and thus there are lower X-bar levels (-1 and -2).

Given this structure, the constituent *hotel kitchen* in the problematic compound (45) is a specifier. Given Cinque's proposal about specifiers, its metrical grid is simplified, so that it does not attract nuclear stress:

(48) hotel kitchen **towel** rack



To conclude, several stipulations about phrase structure, the structure of compounds, and how the cycle works permit Cinque to maintain a maximally simple version of the NSR. In the following section, I explore a different alternative which, although a bit more complex than Cinque's, does not need these stipulations and covers the same range of data.

3.4 A Structure-Based Definition of the NSR

In previous sections, we have seen that syntactic structure determines the placement of stress at the phrase level in the form of the following generalizations:

(49) a. In a head-complement structure, the complement is prosodically more prominent than the head.

b. In a specifier-$\overline{\text{X}}$ structure, $\overline{\text{X}}$ is prosodically more prominent than the specifier.

Although Cinque's theory derives these generalizations, it does so with the addition of certain assumptions about syntactic structures and the application of the NSR. In particular, he derives (49b) by stipulating that only part of the metrical grid of a specifier is considered when computing stress in higher cycles (see §3.3.3). He also argues that this can also be extended to handle similar data in compounds, once we make certain assumptions about their structure.

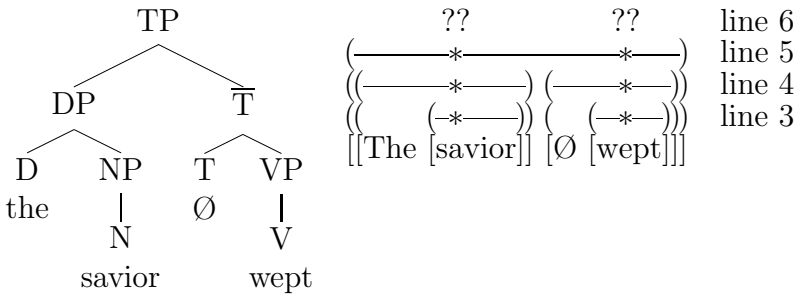
In this section, I propose an alternative version of the NSR which does not need these extra assumptions. The basic idea is to incorporate generalization (49b) into the formulation of the NSR. As will be shown below, this implies making explicit reference to syntactic structure in our stress rules. In this sense, this version of the NSR is heavily influenced by Liberman and Prince 1977, although the formalism to be used is quite different from theirs. As we will see, this addition to the NSR has several advantages. First, it not only accounts for generalization (49b), it also accounts for (49a). Second, it allows us to account for the stress pattern of compounds. Finally, it makes the extra assumptions needed by Cinque's NSR unecessary. In §3.4.1, I introduce this new version of the NSR, and show how it makes correct predictions in phrases. In §3.4.2, I argue that this version of the NSR can also account for stress in compounds.

3.4.1 Stress in Phrases

As we saw in §3.3.3, Cinque's version of the NSR has problems with specifiers because, in this theory, complex branches, including complex specifiers, attract primary stress. As stated in (49b), this prediction is wrong: quite generally, specifiers do not attract primary stress. This problem is illustrated in the following sentence:

(50) *Cinque 1993: complex left branches*

The ^{2}savior ^{1}wept.



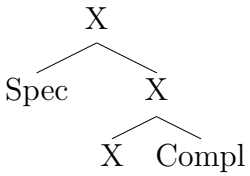
Since *savior* is as deeply embedded as *wept*, the prediction is that neither is more prominent than the other. Cinque's solution is to stipulate that the metrical grid of the subject *the savior* is visible only in terms of a single asterisk.

I would like to explore a different alternative, namely, to incorporate this property of specifiers into the formulation of the NSR. The basic idea is that, in two-membered feet, like the one on line 5 in (50), the grid element corresponding to the non-specifier projects to the next line. In order to make this more precise, we need to make the notion 'specifier' clearer. In both $\overline{\text{X}}$-theory and BPS, concepts like 'specifier' and 'complement' are not primitives. In BPS, they can be defined as follows:

(51) *Specifiers and complements in BPS*

a. A *complement* is the sister of a non-branching head.

b. A *specifier* is the sister of a branching head.



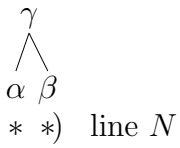
That is, 'specifier' and 'complement' are defined in terms of the more basic terms 'head' and 'branching'. Thus, we can define the NSR based on these more basic terms:

(52) *The Nuclear Stress Rule*

On line $N (N \geq 3)$:

a. Edge-marking: RRR: $\emptyset \rightarrow$) / $*\_\_]$

b. In the following configuration:

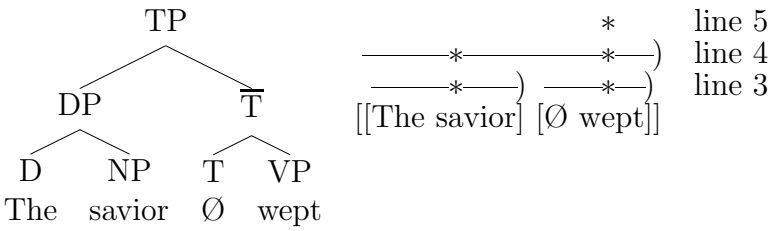


The grid element corresponding to the head of γ projects to line $N+1$ iff the head of γ is branching.

This version of the NSR derives generalization (49b), that $\overline{\text{X}}$ is more prominent than its specifier sister. Since, by definition, a specifier is the sister of a branching head (i.e. $\overline{\text{X}}$), (52b) determines that its sister is more prominent (i.e. its grid column projects to the next line).

Consider example (50) again, with its structure in BPS and with the grid assigned to it by this new version of the NSR:

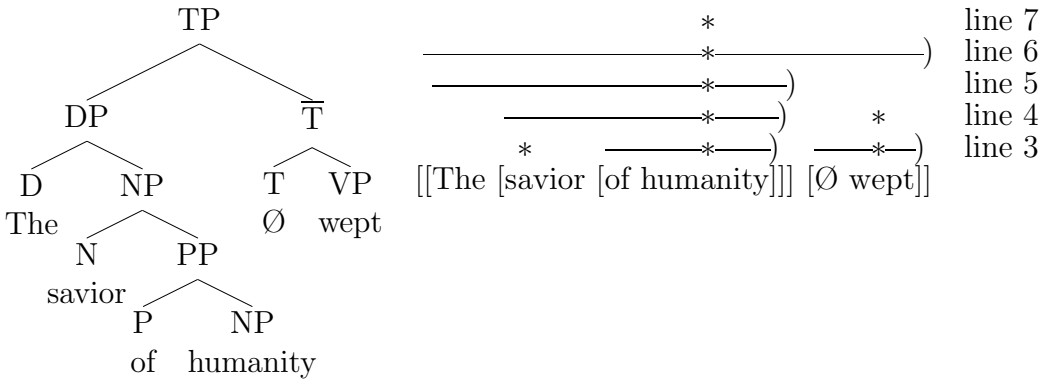
(53) The savior^{2} wept.^{1}



The crucial step is the projection from line 4 to 5. On line 4, there is a foot corresponding to TP, containing two grid elements: one corresponding to the subject DP, and another one corresponding to $\overline{\text{T}}$. Since $\overline{\text{T}}$ is the head and it branches, (52b) determines that its corresponding grid element projects to line 5.

The current theory can handle complex specifiers in cases such as (53), where both the specifier and its sister have the same complexity. However, cases in which the specifier is more complex than its sister are more complicated:

(54) The savior^{3} of humanity^{2} wept^{1}.



The problem raised by this example is by now a familiar one: since the NSR is a cyclic rule, it applies more times to complex branches than to simpler ones, so that the former are predicted to attract stress, which is the wrong result. Even though the current version of the NSR states that a specifier (i.e. the sister of a branching head) is less prominent than its sister, this can only apply in two-membered feet. In this example, the subject is more complex than $\overline{\text{T}}$, which means that the foot on line 6 contains only one grid element, the one corresponding to the subject. This grid element is thus designated as the one which projects to the next line, giving the wrong result.

Thus, we need something else to ensure that $\overline{\text{T}}$ in (54) is as prominent as the subject when the NSR appies to the constituent that contains both (TP), so that the NSR can assign more prominence to $\overline{\text{T}}$. Recall from §3.2 that H&V's solution to this same problem is their SEC, repeated below as (55):

(55) *Stress Equalization Convention (SEC)*

When two or more constituents are conjoined into a single higher level constituent, the highest grid columns of the constituents are equalized by adding grid elements to the lesser column(s).

We can incorporate the SEC to our analysis in order to obtain the correct result in cases like (54). The stress of the subject and $\overline{\text{T}}$ is computed on separate cycles. As shown in (54), the grid for the subject projects up to line 6, and that of $\overline{\text{T}}$ projects up to line 4:

(56)
		∗	line 6	∗	line 4
[The [savior [of humanity]]]				[Ø wept]	

On the next cycle, the SEC ensures that the highest columns in the subject and in $\overline{\text{T}}$ are of the same height, i.e. line 6:[13]

(57) *SEC*

	∗	⋆	line 6
[$_{\text{TP}}$[$_{\text{DP}}$The savior of humanity] [$_{\overline{\text{T}}}$Ø wept]]			

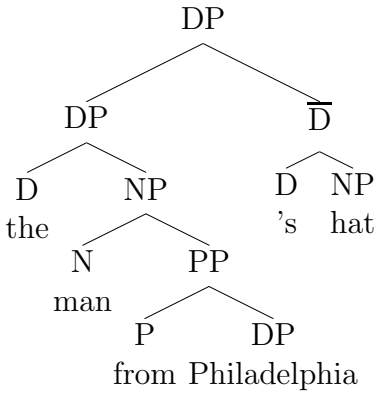
Then, the NSR gives more prominence to $\overline{\text{T}}$ (i.e. the branching head), giving the correct result:

(58) *NSR*

		∗	line 7
	∗	⋆)	line 6
[$_{\text{TP}}$[$_{\text{DP}}$The savior of humanity] [$_{\overline{\text{T}}}$Ø wept]]			

Another example illustrating the problem with complex specifiers is (40), repeated below as (59).

(59) The man^{3} from Philadelphia^{2}'s hat^{1}.



As in the preceding example, the specifier *the man from Philadelphia* is more complex than its sister *'s hat*, so its grid is correspondingly higher:

[13]For ease of exposition, and following the notational convention established in §3.2, I distinguish grid elements added by the SEC from others by representing the former with a star '⋆', rather than an asterisk.

(60) ∗ line 6 ∗ line 4
[The [man [from Philadelphia]]] [s hat]

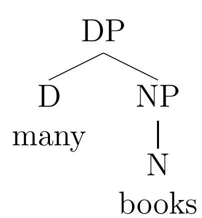
In the next cycle, the SEC equalizes the grid of both consituents, and the NSR gives more prominence the branching head, i.e. [$_{\overline{\text{D}}}$ s hat]:

(61) ∗ line 7
∗ ⋆) line 6
[[the man from Philadelphia] ['s hat]]

To sum up so far, the current version of the NSR derives the correct results for complex specifiers by adding a rule (52b) which, in essence, makes $\overline{\text{X}}$ more prominent than its sister. It is important to note that the rule does not mention specifiers or $\overline{\text{X}}$ explicitly. It is stated in terms of the more basic notions of 'head' and 'branching'. This has several advantages. First, it makes predictions for the stress pattern of constructions in which there are no specifiers, but in which the more basic notions 'head' and 'branching' are relevant. As I argue in §3.4.2, these predictions are correct in the case of compounds. Second, as I show immediately below, it also derives the other generalization about phrase level stress, namely, that a complement is more prominent than its sister (cf. 49a).

Recall that Cinque's account of this generalization relies on the basic hypothesis made in $\overline{\text{X}}$-theory that complements are phrasal. This provides Cinque with the asymmetry that is needed in his theory, as exemplified in the following DP:

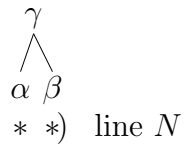
(62) many[2] books[1]



Since the complement *books* must be phrasal, this word is more deeply embedded than the head D, which in Cinque's theory results in more prominence on the former.

In the current version of the NSR, this assumption about complements is no longer necessary. Again, the relevant part of the NSR is the headedness rule, repeated below:

(63) In the following configuration:

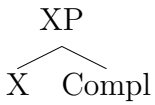


The grid element corresponding to the head of γ projects to line $N + 1$ iff the head of γ is branching.

This rule basically states that a head is more prominent than its sister iff it is branching. Since, in every foot, there must be an element which is more prominent (i.e. the metrical head of the foot), in all other cases (i.e. when the head is not branching), the sister of the head is more prominent.

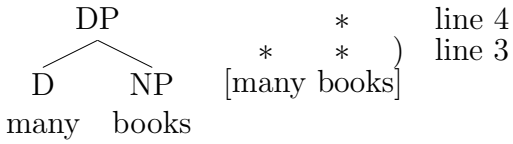
This 'elsewhere' case is what allows us to account for the generalization about complements, since a complement, by definition, is the sister of a non-branching head:

(64) *Complements*



Thus, the assumption that complements are phrasal is not necessary to account for this generalization. Consider again the DP *many books*:

(65) many books
2 1

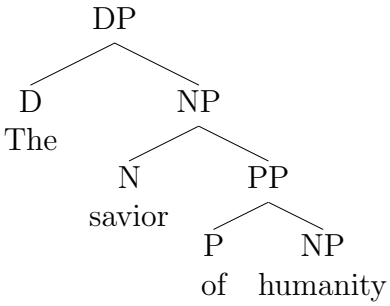


The foot corresponding to the DP contains two grid elements: one corresponding to the head *many*, and another one corresponding to the complement *books*. Since the head is not branching, the elsewhere clause of (63) applies, giving the complement more prominence, as desired.

This difference between the two theories of nuclear stress is crucial. In Cinque's theory, certain stipulations of $\overline{\text{X}}$-theory ensure that some element in the complement

is more deeply embedded than the head. This asymmetry results in the complement being more prominent than the head. In the theory proposed here, the fact that the complement is more prominent than the head is derived from the way the NSR is defined. Note, furthermore, that the asymmetry that is needed in Cinque's theory is in effect eliminated by the SEC in the current theory. Consider, for instance, the subject of the sentence in (54):

(66)



The grid corresponding to the PP is as follows:

(67)

	*	line 4
	*)	line 3
[of humanity]		

In this case, more prominence os given to *humanity* than *of* because English prepositions do not have the relevant level of stress, and also because *humanity* is the complement. On the other hand, *savior* is not a phrase, so the NSR does not apply to it. Thus, the input to the NSR in the cycle corresponding to *savior of humanity* is:

(68)

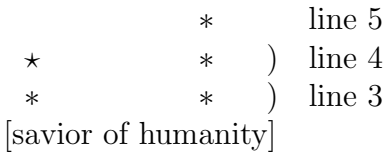
	*	line 4
*	*)	line 3
[savior of humanity]		

In Cinque's theory, this would automatically result in more prominence for *humanity*. However, in the present theory, the asymmetry between the head *savior* and the complement *of humanity* is neutralized by the SEC, which equalizes grid columns:

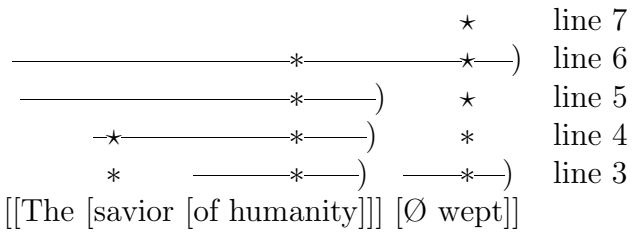
(69)

⋆	*	line 4
*	*)	line 3
[savior of humanity]		

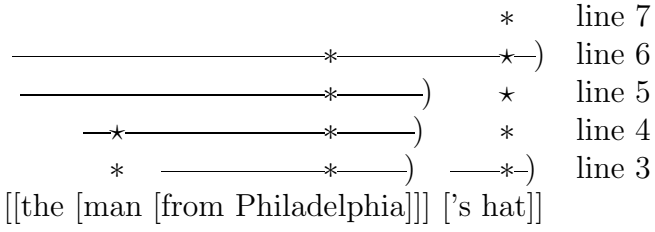
At this point, the NSR applies, giving more prominence to the complement (i.e. to the sister of the non-branching head):

(70)


The complete grid for example (54) is thus as follows:

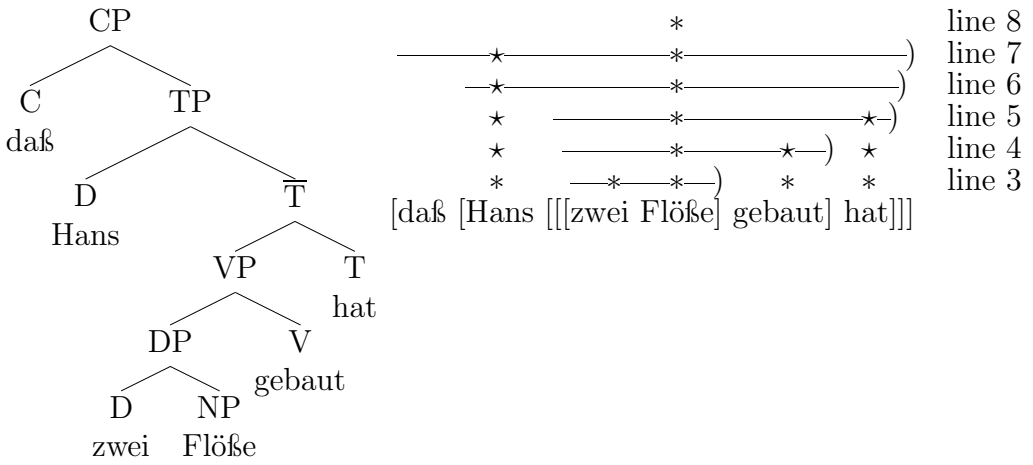
(71)


The complete grid for the similar example in (59) is:

(72)


Since rule (63) assigns more prominence to a complement than to the corresponding head, irrespective of their order, it also makes correct predictions in right-headed phrases. This can be illustrated with one of the German examples discussed in §3.3:

(73) ... dass Hans zwei **Flöße** gebaut hat.
... that Hans two rafts built has
... that Hans has built two rafts.



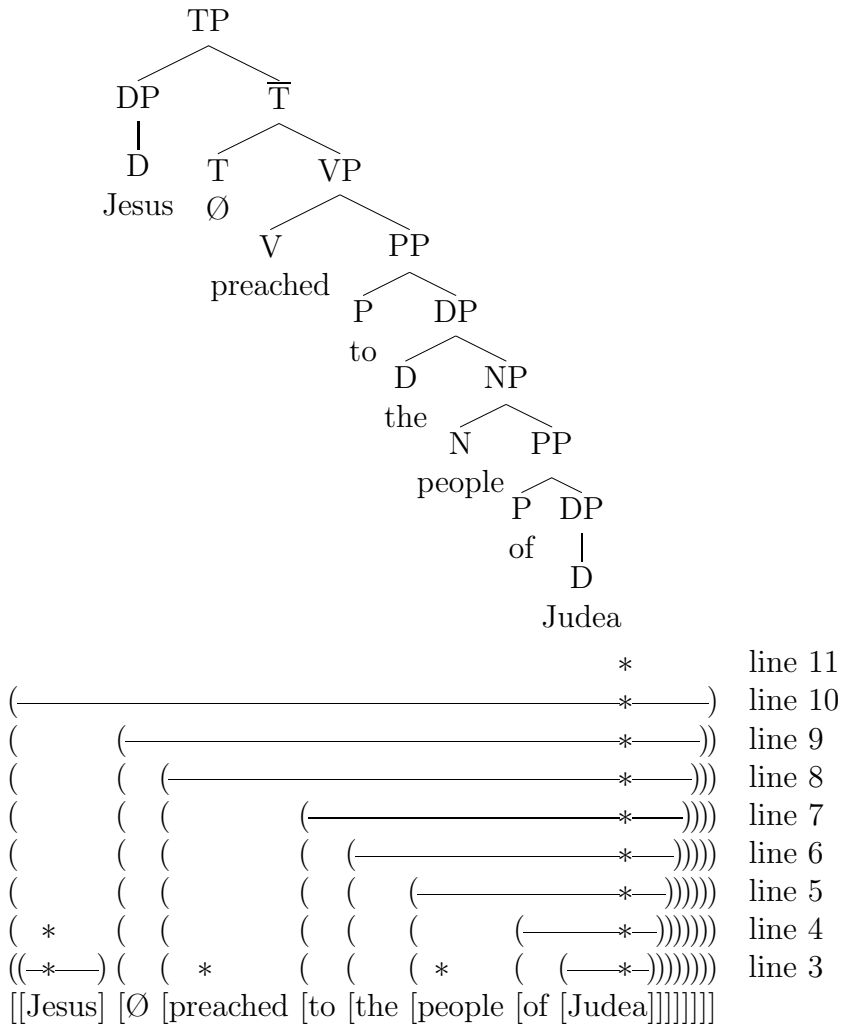
The crucial step is the projection from line 4 to 5. At this point, the NSR applies to the VP *zwei Flöße gebaut*:

(74)
∗	line 5
∗ ⋆)	line 4
[[zwei Flöße] gebaut]	

Line 4 contains one foot corresponding to the VP, which has two grid elements: one corresponding to the head *gebaut*, and another one corresponding to the complement *zwei Flöße*. Since the head is not branching, the NSR assigns more prominence to the complement.

The present theory has another advantage over Cinque's, having to do with different levels of stress. As noted by Cinque, his theory does not account for lesser stresses in a sentence. This can be illustrated with the following sentence:

(75) *Cinque 1993: levels of stress*
Jesus^{2} preached^{3} to the people^{4} of Judea^{1}.

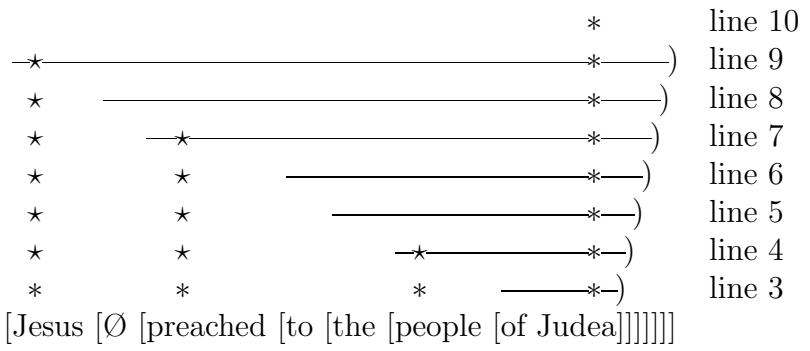


Although Cinque's analysis derives the fact that *Judea* has primary stress, it has nothing to say about the level of stress on *preached* and *people*. It cannot capture the fact that the former is more prominent than the latter. In footnote 9, he notes that

> If this is a clear and perceptible intuition, then the procedure (10) will need to be ammended. "Suplementary principles of prosodic realization" (Prince 1983:24) are likely to superimpose themselves on the effects of the present procedure to give finer stress gradations. Concerning rhythmic principles, see Selkirk 1984, Dell 1984, among others.

On the other hand, the current theory does not need any addition in order to account for the data. As in H&V's theory (§3.2), the SEC ensures that all the correct levels of stress are derived:

(76)



The SEC equalizes the columns of *people*, *preached* and *Jesus* with that of *Judea* on different cycles, giving the right result. Thus, the function of the SEC in the current theory, as in H&V's, is two-fold: it helps solve the problem of complex specifiers by removing the effects of depth of embedding, and it helps derive lesser levels of stress. Note, finally, that Cinque's theory cannot be ammended by adding the SEC in order to solve the problem with lower levels of stress. As shown in §3.3.3, the two are incompatible: asymmetries caused by different depths of embedding are essential in Cinque's theory, but the SEC neutralizes the effects of these asymmetries.

To sum up so far, the version of the NSR defended in this thesis accounts for phrase level stress, and makes the same basic predictions as Cinque's theory with respect to primary stress, but without the additional stipulations about phrase structure needed by Cinque. The basic idea is that a simple addition to a Cinque-style NSR can account for the generalizations about specifiers and complements that are being discussed here. Furthermore, unlike Cinque's theory, it can also account for lower levels of stress. In the following section, I argue that this version of the NSR can also account for stress in compounds.

3.4.2 Stress in Compounds

The current version of the NSR accounts for the generalizations in (49) by adding a rule which determines wich member of a foot projects to the next line:

(77) *The Nuclear Stress Rule*

a. Edge-marking: RRR: $\emptyset \rightarrow$) / $*\_\_]$

b. In the following configuration:

$* \ *)$ line N

The grid element corresponding to the head of γ projects to line $N+1$ iff the head of γ is branching.

Since this rule does not mention complements and specifiers explicitly, it also makes predictions for constructions in which there are no complements or specifiers.

In fact, as we saw in §§3.3.2-3.3.3, stress in compounds obeys certain generalizations that are very similar to those found in stress in phrases. Cinque, noting these similarities, proposes a new theory of the syntax of compounds that makes them compatible with his version of the NSR. These generalizations about stress in compounds can be summarized in the following (taken from Liberman and Prince 1977):

(78) In a configuration $[_{\mathrm{C}}$ A B $_{\mathrm{C}}]$, if C is a lexical category, B is strong iff it branches.

Although (78) is stated in Liberman and Prince's (1977) labeled tree notation, it can easily be restated in terms of the metrical grid:

(79) In the following configuration:

$* \ *)$ line N

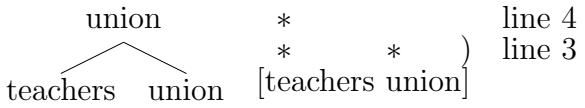
where γ is a lexical category, the grid element corresponding to β projects to line $N+1$ iff β branches.

Since compounds in English are always right-headed, β in (79) can be replaced by 'the head of γ'. This means that (79) is really a subcase of our NSR in (77), i.e. the

NSR proposed here accounts for the stress patterns of both phrases and compounds. Thus, the separate rule in (79) is not necessary.

Consider fist two-membered compounds, where primary stress is on the leftmost member:

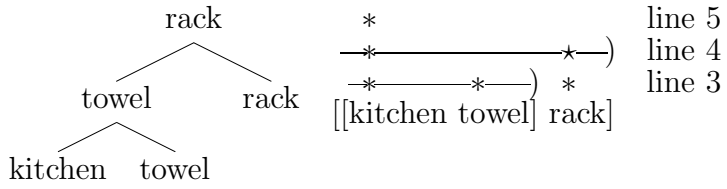
(80) ^{1}kitchen ^{2}towel ^{1}towel ^{2}rack ^{1}teachers ^{2}union



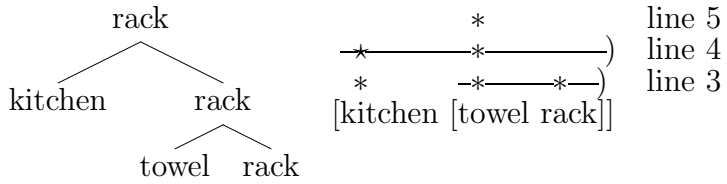
In compounds, the head is always rightmost. In these simple cases, the head is not branching, and thus primary stress is assigned to the non-head (i.e the leftmost member).

Consider next the contrast between left and right-branching compounds:

(81) a. ^{1}kitchen ^{3}towel ^{2}rack



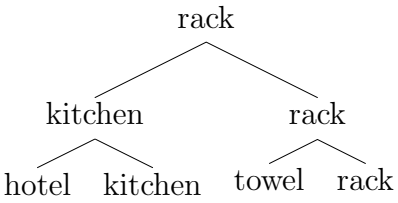
b. ^{2}kitchen ^{1}towel ^{3}rack



Left-branching compounds like (81a) are similar to two-membered compounds. In the first cycle, higher stress is given to the leftmost member of *kitchen towel*. On the second cycle, the head *rack* is not branching, and more prominence is given to the non-head (i.e. to *kitchen*). In right-branching compounds like (81b), the NSR applies first to *towel rack*, giving more prominence to the leftmost member. On the next cycle, *towel rack* is the head, and, since it is branching, it is given more prominence than its sister *kitchen*. Note also that the SEC ensures that the correct levels of stress are assigned in both types of compounds.

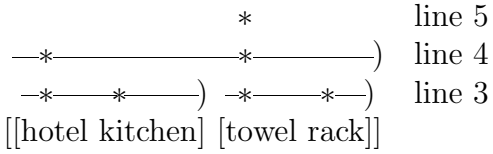
Recall that Cinque needs to make substantial revisions to the theory of compounds in order to account for their stress patterns, even in simple cases like the ones we just examined. In particluar, he proposes that compounds have a structure similar to phrases, with different (subzero) bar-levels, and with complements and specifiers. The following is one of the more problematic examples which motivate his new theory of compounds:

(82) $\overset{2}{\text{hotel}}\ \overset{3}{\text{kitchen}}\ \overset{1}{\text{towel}}\ \overset{3}{\text{rack}}$



Under the structure given, there is no terminal node which is more deeply embedded than any other terminal node. Thus, Cinque needs to enrich the syntactic structure of compounds in order to obtain the asymmetries that are needed in his version of the NSR. These asymmetries are not needed in the current theory, and the correct stress pattern is predicted under the simple structure in (82):

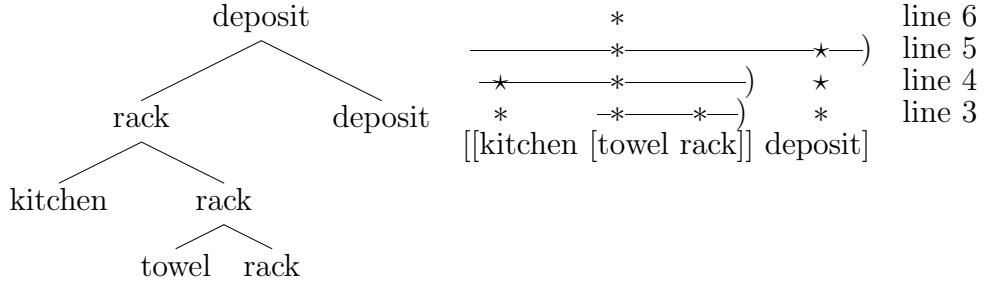
(83)



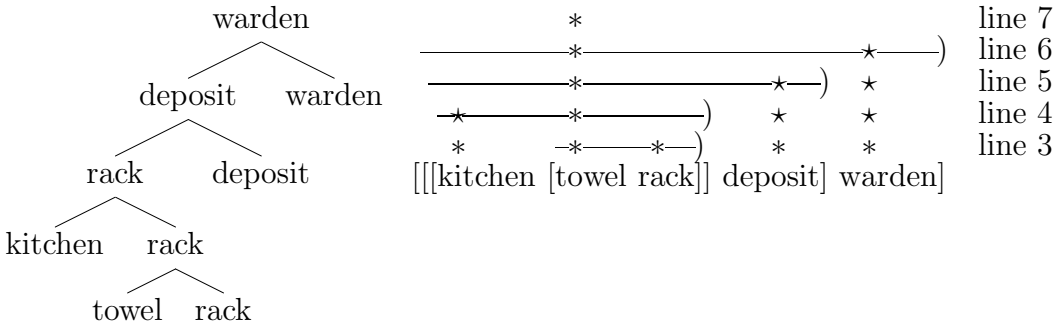
In the last cycle (projecting from line 4 to 5), the head *towel rack* is branching and is thus assigned primary stress.

In the reminder of this section, I illustrate the NSR further with other examples of compounds that were discussed in previous sections.

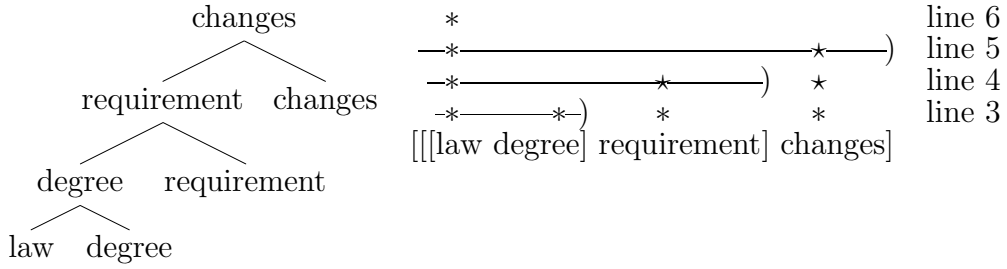
(84) $\overset{3}{\text{kitchen}}\ \overset{1}{\text{towel}}\ \overset{4}{\text{rack}}\ \overset{2}{\text{deposit}}$



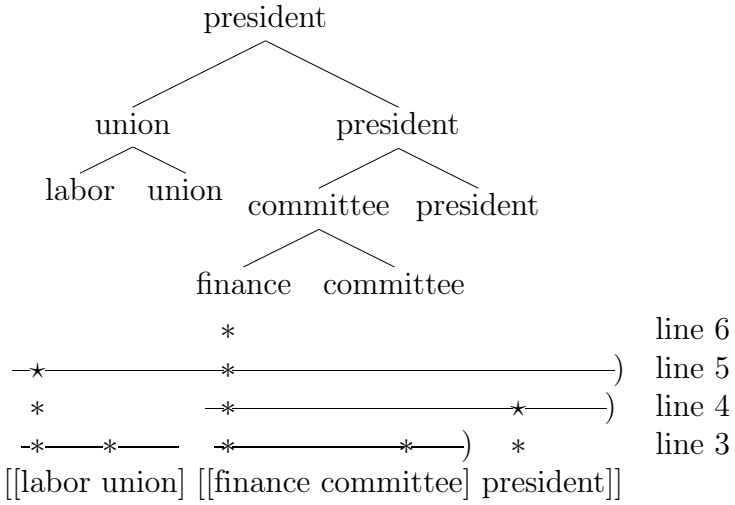
(85) ^{4}kitchen ^{1}towel ^{5}rack ^{3}deposit ^{2}warden



(86) ^{1}law ^{4}degree ^{3}requirement ^{2}changes



(87) ^{2}labor ^{4}union ^{1}finance ^{4}committee ^{3}president



3.5 Conclusion

In this chapter, I have proposed a new version of the NSR which accounts for several stress facts in phrases and compounds. Like Cinque's (1993) version, sentence stress in this analysis is highly dependent on syntactic structure. However, I have shown that

the facts about phrase and compound stress placement cannot be reduced to Cinque's 'minimal' theory. First, as noted by Cinque, the generalization that primary stress is on the most deeply embedded word is not correct in several cases. In order to account for these cases, Cinque resorts to additional assumptions having to do with the structure of phrases and compounds.

In the analysis proposed in this chapter, it has been argued that these additional assumptions are not necessary. First, following H&V, I have argued that the SEC is necessary in the framework of the metrical grid. This is what allows us to account for lower levels of stress in phrases and compounds. At the same time, it also helps solve the problem with complex specifiers. In particular, the SEC eliminates the effects that depth of embedding has on stress, so that complex specifiers do not (necessarily) attract primary stress. In order to account for the effect that syntactic structure has on the placement of stress, the NSR proposed in this chapter makes crucial reference to two properties of syntactic structure: headedness and branching. The basic idea is that the relevant generalizations about syntactic structure and stress can be reduced to the simple statement that a head is more prominent than its sister if and only if it branches.

To conclude, the NSR proposed in this thesis accounts for all the facts discussed in this chapter. In the following chapter, I apply this NSR to Basque sentences, arguing that it makes correct predictions about sentence stress in this language. This provides further support for the version of the NSR proposed here.