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THE STRESS AND SYNTAX OF COMPOUND NOMINALS

by

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Abstract

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by

Jill Caryn Burstein

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Both derivational and compound words have traditionally been separated from syntactic phrases in a morphological component (see Aronoff (1976), Lieber (1980), Williams (1980), and Selkirk (1982)). This dissertation examines the structure and stress of nominal compounds (N), e.g., **elevator** *operator*, as compared to N's, e.g., *cheerful* **operator**, with the structure "nonhead + head".[1] Evidence is presented in support of a syntactic theory of nominal compound formation in which it is shown that nominal compounds may be generated by the same phrase structure rules which form certain N' constructions. Furthermore, some syntactic relations may apply to nominal compounds. For these reasons, nominal compounds are considered to be syntactic objects.

Chapter 1 presents major theoretical claims which propose how syntactic relations, such as theta and case assignment,

[1] **Boldface** type indicates that a word has prominent stress.

and syntactic headedness may be applied to nominal compound structure. As Lieber's (1992) "Licensing Principles" show, there is an unarguable tie between syntactic headedness in a language and compound word headedness in that language. Chapter 2 uses data from Mandarin, Vietnamese, Turkish, Kannada, and Yoruba to illustrate that this phenomenon may be seen crosslinguistically.

In Chapter 3, N's and Ns with phrasal nonheads are examined and structural contrasts are noted which distinguish these two constructions. Chomsky and Halle's (1968) Nuclear Stress (NS) and Compound Stress (CS) rules are used to determine which structures are N's and which are Ns. It is shown that the phrasal nonheads of Ns may be productive N's, VPs, or Ss. The VP and S nonheads in Ns must be reanalyzed as Ns. Phrasal nonheads of N's may be PPs, N's, and VPs. However, these PP, N', and VP nonheads in N's are reanalyzed as Adjs. It is noted that phrasal nonheads which are reanalyzed as lexical items in N's or Ns must be "frozen". Such phrases are inserted into the nonhead of a complex nominal like any lexical item. Williams (1980) proposed a similar rule, but did not restrict it to "frozen" forms so it overgenerates.

(1) word --> phrase
(N --> VP)

Chapter 4 shows that X-bar theory yields correct structures for nominal compounds. N's and Ns often have the same internal constituents, e.g., Adj N and N N. Therefore, the same phrase structure rule may output either an N or an N'. The NS and CS rules may be used to distinguish N's from Ns. However, these stress rules do not explain why, for example, one Adj N construction receives NS, while another receives CS. Chapter 4 proposes three rules to account for alternating stress patterns for Ns and N's with identical internal constituents. The rules are dependent on the syntactic occurrence of the nonhead, as well as semantic factors.

Chapter 5 presents two pilot experiments designed to test the stress rules proposed in Chapter 4 which account for the alternate stress patterns in Adj N constructions.

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CHAPTER ONE

Theories of Compounding

1.1 Introduction

Nominal compounds (N) have traditionally been handled in a morphological component of the grammar, together with derivational word forms, (see Bloomfield (1933), Roeper and Seigel (1978), Lieber (1981), Selkirk (1982), and Di Sciullo and Williams (1987)). There is certainly a place for a morphological module in the grammar for handling derivational words. A lexicon is also necessary to list certain words and phrases whose structure or meaning is not predictable, e.g., idioms. This thesis attempts to show that word formation is not necessarily restricted to a morphological component. Therefore, the dissertation maintains a syntactic theory of nominal compound formation which is founded primarily on two generalizations which will be developed throughout the dissertation. First, X-bar theory yields correct structures for nominal compounds. Secondly, syntactic relations, such as theta and case relations, and syntactic headedness may be applied to nominal compound structures. It may also be shown crosslinguistically that syntactic headedness of a language applies to the headedness of nominal compounds in the

language.

This chapter provides the background regarding both morphological and syntactic theories of compound formation. It is shown that the evidence in support of syntactic compounding is stronger than that for morphological compound formation. Crucially, morphological compound formation can neither capture the generalization that X-bar theory yields correct structures for nominal compounds, nor can it explain the application of syntactic relations to nominal compounds. Furthermore, since it can be shown that nominal compound structures can be generated by phrase structure rules in X-bar theory, similar rules for morphological compound formation would be redundant.

Subcategorization and case relations have been discussed at least since the 1960's, and subcategorization was one of the first relations to be extended to the word level by Roeper and Siegel (1978). X-bar theory and headedness, as well as theta relations have also been shown to apply to nominal compounds. Despite evidence that syntactic relations apply to nominal compounds, to some nominal compound formation remained restricted to the morphological component (Williams (1981), Lieber (1981), Selkirk (1982), DiSciullo and Williams (1987)). Others pointed out convincingly that consistent overlaps of

syntactic relations observed between nominal compounds and syntactic phrases (Fabb (1984), Sproat (1985), Lieber (1988, 1992), Liberman and Sproat (1992)) made it possible to develop a theory of syntactic compounding.

The literature review presented in this chapter points out the trend discussed above. For the most part, it is chronological. Word formation theories more or less started out within a morphological component which excluded all syntactic structures and relations. Newer theories moved to a slightly more flexible morphology, accepting some syntactic relations, and finally, nominal compound formation was viewed as purely syntactic.

1.2 A Review of Literature on Compounding

1.2.1 Restrictive Morphological Compounding

Bloomfield (1933) claims that morphology includes constructions of words and parts of words. He develops a classification for words in which compound words are a subset of "Secondary Word"-types, that is, words containing free forms. He points out that compound words can contain multiple free forms, e.g., door *knob*, as well as phrases, e.g., [[*wild* animal]$_N$, *tamer*$_N$]$_N$, and [[*devil-may*-care]$_S$ *manner*$_N$]$_N$. Though he recognizes that compounds contain phrases in the

nonhead position, Bloomfield (1933) does not address what the presence of word-internal phrases implies for a theory of grammar in which the syntax and morphology are modular.

Bloomfield claims that major distinctions can be made between words and phrases based on the following criteria. First, he claims that there is a semantic distinction between compounds and phrases in that compounds, unlike phrases, have "specialized meanings". This claim is obviously false. Examples such as, [**tomato** *sauce*]$_N$, [**drug** *abuse*]$_N$, and [**cat** *lover*]$_N$, just to name a few, show that compounds occur quite productively with compositional, "non-specialized meanings". Bloomfield claims that compounds are characterized by reverse syntactic order, and he gives examples for English, e.g., **house***keep*, and French, e.g., *blanc bec*[1] Bloomfield classifies compounds as being either "syntactic," e.g., **black***bird*; "asyntactic" e.g., **door** *knob*[2]; or "semi-syntactic",

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[1] This means "callow, young person" when N + Adj order is reversed.

[2]Bloomfield (1933:233) claims that forms such as *door knob*" are asyntactic since the "...members stand to each other in a construction that is not paralleled in the syntax..." of English. He states (p. 233) that "...English has no such phrasal type as **door knob*. It is difficult to tell what he really means by this; however, I imagine that he would think that *knob on a door* would be the syntactic version of a compound, such as *door knob*. Bloomfield misses the fact that for English, syntactic ordering in terms of "headedness" is different for modification and complementation. Nominal compounds are "right-headed," as are modified structures in

e.g., turn*key*. However, it should at least be noted, for the time being, that despite any less-than-syntactic ordering, syntactic relations, such as, "case and theta relations," "subcategorization," and "headedness" may still be found in compounds.

Lees (1960) criticizes Bloomfield's classification of nominal compounds because it does not address the syntactic relations in nominal compounds. Lees provides a transformational account of nominal compound formation to show the derivational relationship between syntactic phrases, e.g., Ss and NPs, and nominal compounds. He claims that nominal constructions are generated by a set of iterative and recursive rules which transform underlying sentences and NPs into nominal compounds as in examples (1) and (2) in which the second example is derived from the first.

(1) $[[\textit{the plant}]_{NP}\ [\textit{which assembles autos}]_{S'}\ ]_{NP}$

(2) $[[\text{auto } \textit{assembly}]_{N}\ [\textit{plant}]_{N}\ ]_{N}$

Lees' derivations rely on semantic relations between the compound constituents. His theory, therefore, depends on the speaker having knowledge of such relations. In other words,

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modifier relations, *door knob* should not be considered asyntactic. Accordingly, $[\text{door}_N\ \textit{knob}_N]_N$ is no less syntactic than $[\textit{kitchen}_N\ \text{table}_N]_{N'}$. Both N N constructions may be generated by the same phrase structure rule: N'/N --> N N.

a speaker must know, for instance, that a **ballot** *box* is a "box *for* ballots," and not a "box *made of* ballots". Compounding theories dependent on semantic relations always run into the issue of "ambiguous" relations between compound constituents. This can also be seen with Levi's (1980) theory of "Recoverable Predicate Deletion".[3] An example of an ambiguous relation is below. (4a). and (4b). are the possible meanings of (3).

(3) **steam** *iron*

(4)(a) iron *uses* steam
(b) iron *makes* steam

So far, this type of ambiguity has not been successfullly resolved by any semantic theory of compounding. These theories are also unable to correctly predict the distinctions between Ns and N's with identical underlying constituents. Most importantly, such derivational accounts completely ignore the generalization that nominal compounds can be correctly generated by phrase structure rules, so a transformation is

[3]Levi (1980) claims that the predicates "cause," "have," "make," "use," "be," "in," "for," "from," and "about," are deleted from a phrase, such as *"from-olive oil," to form "olive oil". Any deleted predicate from this list will be understood by a speaker of English.

just an extra, unnecessary step.[4]

Aronoff (1976) proposes that all word formation is word-based. Under this proposal, he claims that words are stored in a dictionary which is separate from both the syntactic and phonological components, and that words are independent, fully specified items which are not dependent on one another or on rules. Word-formation occurs by applying a word-formation rule (WFR) to the set of words listed in the dictionary. This theory is unique in that it does not depend on the morpheme as a basic meaning-bearing element. Aronoff points out that morphemes can be meaningless, e.g., the *cran-* in *cranberry*, or the *-fer* in *prefer*, although they must be recognizable to the speaker of a language.

Aronoff's morphological component may not include or refer to syntactic, semantic, or phonological rules. Strangely, WFRs may make reference to the semantic, syntactic, and phonological properties of words. It is clear that Aronoff wants to maintain an autonomous morphological component. Yet, there is some fuzziness about what he means by an autonomous morphological component, since on the one

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[4] It should be noted that phrase structure rules cannot capture the relationship in meaning between an NP, such as *the plant which assembles autos*$_{NP}$, and the N, *auto assembly plant*$_{N}$.

hand, it is "rule-autonomous," but on the other hand, it is "feature-dependent". The concept of "rule-autonomy" implicates that only "morphological WFRs" may apply in word-formation. Yet, the rules themselves rely on syntactic features. For instance, Aronoff's (1976) WFR for +ee attachment is as follows.

(5) $[+[X]_V +ee]_N$

Aronoff also uses phonological and semantic description in his proposed WFRs. It is a general practice that when a component of the grammar is believed to be autonomous that discussion about the properties and rules concerning the entities represented in the particular component are expressed within the vocabulary of that component. Presumably, in an autonomous morphological component, reference would not be made to syntactic, semantic, and phonological properties, contrary to what Aronoff claims. So, there is an interface issue here. If entities in Aronoff's morphological component may refer to properties of other components, why not rules of other components as well?

It is not clear how Aronoff's theory would handle compounding. However, it is obvious that Aronoff's analysis would not be able to handle nominal compounds with phrasal

nonheads as in (6), since his theory prohibits word-internal phrasal constituents.

(6) [[*American clothes of the* 1920's]$_{N'}$ [*auction*]$_{N}$]$_{N}$

If all words, including nominal compounds were in the morphology as Aronoff claims, then, surely, some interaction would have to occur between the syntax and the morphology in examples such as (6) since the nonhead is a productive N'. If, on the other hand, nominal compounds were exported to the syntax, so that syntactic rules were available to them, this would refute Aronoff's absolute claim that all word formation is handled in the morphological component.

Lieber (1981), like Aronoff (1976), keeps word-formation restricted to a word-formation component. However, Lieber (1981) eliminates Aronovian WFRs. She claims that the morphology is composed of three subcomponents: a permanent lexicon consisting of lexical entries for all unanalyzable morphemes, with idiosyncratic information, and morpholexical rules; a lexical structure component in which unlabeled, binary branching trees are generated by rules; and, the word formation component which contains rules for handling string dependent rules, such as, "reduplication".

Lieber's morpholexical rules represent relationships between "roots" and their inflected "stem variants" as in the German examples below.[5]

(7) a. X ~ Xn --> Name/Namen
b. X ~ Xe --> Bach/Ba:che ;(a: = umlauted "a")
c. CoVCo ~ CoV:Cor --> Mann/Ma:nner

Extensions may be added to morpholexical rules to handle orthographic/morphological exceptions. Lieber (1981:15) claims that some nominal compounds in German may be handled by her morpholexical rules since "...the forms of the noun which attach to the base noun correspond exactly to the root and stem forms of the class to which the noun belongs." This is illustrated below from Lieber (1981).

(8) a. Staatenbung 'confederation'
Schwesternkind 'sister's child'
Schwesternliebe 'sisterly love'

(cf. Staat, stem allomorph = Staaten
Schwestern, stem allomorph = Schwestern)

Lieber claims that X-bar theory may not apply to word formation since word formation may include elements, such as,

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[5]The elements on the left side of the "-->" show the "root" to the left of the "~" and the "stem variant" to the right of the "~". On the right of the "-->" are tokens of the corresponding "root" and "stem variant" of a particular form.

affixes, which are outside of the primitive elements, i.e., N, V, A, used in X-bar theory. She also claims that word formation does not adhere to the conventional "X^n --> X^{n-1} convention". Fabb (1984) notes that X-bar theory may be adjusted to accomodate compound formation with the rule, X^n --> X^{n-1} or X^n. Fabb's rule is also consistent with the notion that compounds may be formed by the same phrase structure rules which generate N's, e.g., Adj N.
This generalization may not be accounted for in Lieber's theory.

The purist theories of morphological compounding of Bloomfield (1933), Lees (1960), Aronoff (1976), and Lieber (1981) cannot handle the syntactic characteristics apparent in nominal compound formation. None of these theories accounts for even the most obvious syntactic relation in compounding, namely, syntactic headedness. Furthermore, these morphological theories are unable to explain the fact that the same phrase structure rules which generate certain N' constructions may also be used in compound formation.

1.2.2 Morphological Compounding and Syntactic Relations

Williams (1981) imports the concept of "syntactic headedness"

to describe morphological structure with his Right Hand Head Rule (RHHR) He points out that in X-bar syntax, the head of a phrase is immediately identifiable because it is the subphrase which has all of the same categorical features as the phrase which dominates it, but has one bar fewer.

(9) X" --> X' Y

Williams notes that for X^0 categories, the head is not identifiable as having one bar fewer than its dominating node. He, therefore, proposes the RHHR to identify the head of a word. The RHHR states that the head of a morphologically complex word is the rightmost member of the word. He recognizes the exceptions to this rule in English, such as prefixed words, e.g., [*en-able*]$_V$ and headless words, e.g., [push$_V$ *up*$_P$]$_N$. Williams suggests that headless words such as *pushup* might be formed by a rule such as (10) But, as he points out, a rule such as (10) is too general.

(10) word --> phrase
(N --> VP)

The examples which Williams uses, such as *pushup*, are not productive. Rather, these examples are idiomatic or "frozen" to some degree. This is consistent with the claim in

Chapter 3 that phrases may be reanalyzed as words only if they are "frozen". The rule in (10) would not overgenerate if Williams restricted his use of "phrase" to "lexicalized phrase".

The RHHR has been subject to overwhelming criticism. Both Lieber (1980, 1988, 1992), and Selkirk (1982), show that the RHHR is not universal. Lieber (1980, 1988, 1992) gives examples of languages, e.g., Vietnamese, Tagalog, French, in which words are left-headed because of the licensing principles in the language. Lieber's (1988, 1990) criticism also applies to Di Sciullo and Williams' (1987) "revised" RHHR. Furthermore, Clements (1989) shows that for Spanish and French, any single "directional" definition, that is, leftmost or rightmost, regarding headedness would be incapable of predicting headedness for a number of compound types since headedness may vary according to the lexical category of the head, and also foreign language borrowing. The latter point may be observed in Vietnamese. Sino-Vietnamese compounds (productive in Vietnamese) have the reverse order of native Vietnamese compounds.

The RHHR misses the crucial generalization that compound headedness in a language follows the syntactic headedness of a language. This is why the RHHR fails as a universal

principle. Right-headed compounding in English is related to the fact that modification structures in English are also right-headed, e.g.,[*large*$_{Adj}$ **boat**$_{N}$]$_{N'}$. Williams' failure to capture this relationship between syntactic and compound headedness is what brings him up against so much criticism.

Roeper and Siegel (1978), (henceforth, R&S), develop a transformational account of compound formation in which they claim that "verbal compounds," i.e., compounds with a verbal ending: *-er, -ing, and -ed*, are a class of compounds for which lexical rules can affect subcategorization frames. They point out that subcategorization applies to verbal compounds. R&S claim that compound formation is handled in the morphological component where subcategorization frames may exist for verbal compounds. However, they also note that syntactic relations, namely, subcategorization, apply to both word and phrase structures. This illustrates an overlap between certain syntactic relations and nominal compounds which is consistent with the notion of syntactic compounding.

R&S point out that verb-complement relations do exist, and that derived words, e.g., *destruction, restart*, also obey subcategorization restrictions. They claim that subcategorization frames may be inherited from the base word, and deleted with the addition of certain affixes.

(11) Inherited Subcategorization

(a) [destroy _____N]$_{VP}$ --> 'destroy the city'

(b) [___NP's destruct+ion _____PP]$_{NP}$ --> 'destruction of the city'

(12) Deleted Subcategorization

(a) [start ___S]$_{VP}$ --> 'start to go outside'

(b) [re+start]$_{VP}$ ---> 'restart *to go outside'

R&S state that verbal compound formation is impossible, e.g., "quick-making," if the incorporated constituent is not the immediate complement which is subcategorized for by the verb. This notion is formalized under the "First Sister Principle" (FSP) which states the following.

(13) FSP

All verbal compounds are formed by incorporation of a word in the first sister position of a verb.

This principle may rule out many verbal compounds which may seem impossible outside of a specific context. However, as is pointed out in Downing (1977), certain situational contexts may call for a compound which otherwise might seem ungrammatical. R&S claim that *peace thinking* is an impossible verbal compound because one cannot say "She thinks peace". However, if one were to say, "Those peace-*thinking* liberals are anti-American!," then peace-*thinking* then seems

acceptable.

Their analysis accepts Aronoff's (1976) claim that no phrasal categories are involved in word formation. This notion is profoundly weakened by the productive occurrence of nominal compounds with phrasal nonheads, e.g., [[*sundried* **tomato**]$_{N'}$[*sauce*]$_{N}$]$_{N'}$, and [[*large* **dog**]$_{N'}$[*groomer*]$_{N}$]$_{N}$, (see Sproat (1985) and Liberman and Sproat (1992)).

What is notable about R&S's work is that it reveals that "subcategorization" may extend to the word level. Subcategorization may occur between nominal compound constituents, since an N or N' nonhead may be a complement subcategorized for by the head noun, as in **dog** *catcher*, where the verb *catch* subcategorizes for the noun object, *dog*.

Selkirk (1982) proposes that compounds may be base-generated from a set of context-free rewriting rules like those for syntactic rules. She claims that verbal compounds have an argument structure like VPs, and proposes grammaticality constraints on argument satisfaction within verbal compounds.

Selkirk suggests the following rewrite rule in (14) for

nominal compounds in English which conflicts with the traditional X-bar rules (Chomsky 1970), namely, $X^n \dashrightarrow X^{n-1}$. Particularly for the phrase structures Adj N and N N which generate N's, (14) would appear to represent an overlap between the syntactic and compound structures. However, Selkirk maintains that word-formation is restricted to the morphological component.

(14)

N ---> {N,A,V,P} N

The rule in (14) is problematic because it equates idiomatic compounds of the structure, A N, V N, and P N, e.g., *blackbird, scrubwoman, and underbelly*, with productive A N and N N compounds.

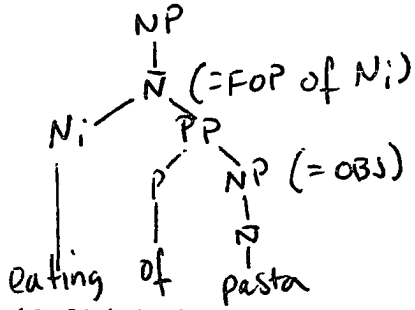
Selkirk adopts a non-transformational account, i.e., Lexical Functional (LFG) Account (see Bresnan (1982)), to represent argument structures in verbal compounds, that is, compounds in which the nonhead may be interpreted as an argument of the deverbal head noun, e.g., *elevator repair*, and *music lover*. Selkirk notes the constraints that predict which arguments of the deverbal noun may be satisfied inside of the compound. What this account implies is that theta-relations are applying at the word level. In other words, in the

compound dog *catcher*, both the "theme" and "agent" arguments of "catch" are satisfied. Selkirk shows that only non-SUBJECT arguments, (i.e., a verb's internal arguments), may be satisfied in a compound. The SUBJECT, that is, an external argument of the verb, may not be satisfied in the compound. This explains why compounds such as **girl swimming* are ungrammatical if interpreted as *swimming by girls.* Selkirk formalizes this notion in the First Order Projection Condition (FOPC) in (17).

(15) First Order Projection (FOP) (Selkirk (1982:38))

The FOP of a category X^n_i is the category X^m_j that immediately dominates X^n in the syntactic representation (i.e., in either S-syntactic or W-syntactic structure)

(16) Selkirk (1982:38)



(17) FOPC (Selkirk (1982:37))

All non-SUBJ arguments of a lexical category X_i must be satisfied within the first order projection of X_i.

Selkirk's account of verbal compounds shows, like R&S (1978), that subcategorization may apply to compounds.

Furthermore, she claims that argument structure relations must be satisfied, and that constraints exist for argument satisfaction within a compound. Though Selkirk recognizes these overlaps between syntactic relations and compounding, she still maintains that compounding is a morphological process.

Di Sciullo and Williams (1987), (henceforth D&W), also assert that words are formed in the morphology, yet syntactic argument relations apply to both derived words and compounds. Their claims about argument structure relations are discussed in terms of headedness.

D&W point out, justifiably, that Selkirk's use of SUBJ and nonSUBJ is problematic to describe argument relations in compounds. For instance, Selkirk (1982:34) claims that "...the SUBJ argument of a lexical item may not be satisfied in a compound structure". This is not necessarily true of words of such as, **scrub***woman*, or **delivery** *boy*. In both cases, the external argument, (i.e., SUBJ) of the verb is, arguably, satisfied.[6] D&W (1987:30) assert that argument structures for words need to be established in relation to the head of the

[6]Richard Sproat pointed out to me that it is not completely clear with respect to this argument, whether in examples such as **scrub***woman*, *woman* actually satisfies the external argument of *scrub*, or is just somehow merely identified with it.

word, and they make the following claims with regard to this notion.

(18) a. A nonhead may but need not satisfy one of the arguments of the head.

b. It cannot satisfy the external argument.

c. The arguments of the nonhead are not part of the argument structure of the compound.

d. Only the external argument of the head is part of the argument structure of the compound.

(18b) explains why **delivery** *boy* is grammatical, but **boy** *delivery* is not, where it is interpreted as a *boy who delivers X*. The external argument, i.e., *boy*, may only be satisfied by the head of the compound.

D&W's evidence which showing the existence of argument structure relations exist in words is consistent with the notion of an overlap between syntactic relations and nominal compounds.

Clements (1989) claims that heads of compounds, for the most part, follow the Adj Noun ordering in a language, implying an overlap in syntactic headedness between syntactic structures and nominal compounds. He focusses primarily on Spanish and French, and claims that these languages are productively left-headed. Clements asserts that for French

and Spanish non-productive, right-headed compounding exists also, even though left-headed compounding is the productive ordering. Clements claims that this alternate headedness can be predicted by a set of lexical rules, based on a hierarchy of lexical category. The rules predict that [+N] categories have precedence over [-N] categories, and with regard to Spanish and French, left-headedness has precedence over right-headedness in a productive compound, when both constituents are [+N]. Clements also suggests that all of this headedness selection occurs in an autonomous morphological component.

What is confusing about Clements claim is that on the one hand he asserts that syntactic headedness is driving the productive left-headed compounding in Spanish and French. On the other hand, he claims that his lexical hierarchy rules are sitting in the morphological component making decisions about compound headedness. Presumably, the productive left-headed compounds he cites from Spanish and French could just as easily be said to follow syntactic headedness of these languages. The non-productive compounds, on the other hand, could be frozen entries in the lexicon, such as, **pick-*pocket***, or **push-*up***, in English. Perhaps, for these frozen entries, Clements "lexical hierarchy rules" are more applicable.

1.2.3 Syntactic Compounding

Both Fabb (1984) and Sproat (1985) argue that compounds may be represented in the syntax, and that syntactic relations apply to certain derived words and nominal compounds. Both claim that theta and case relations apply to words. Regarding the arguments for case marking and compounding, Sproat's "adjacency argument" is the more convincing of the two, so only this argument will be included in the following discussion.

Fabb (1984) proposes the following X-bar rule expansion to represent words (i.e., compounds) in the X-bar framework.

(19) X^n --> X^{n-1} or X^n

This rule expansion will account for the structure in (20), and the corresponding examples in (21)[7].

(20) N --> N N
(21) $[\textbf{drug}_N\ \textit{abuse}_N]_N$, $[\textbf{meat}_N\ \textit{eating}_N]_N$, $[\textbf{plant}_N\ \textit{life}_N]_N$

[7]This rule may also generate the Adj N compounds discussed in Chapter 4.

Fabb shows that theta-relations exist in verbal compounds, such as, meat *eating*. The verb which heads the compound assigns a theta-role to the noun complement in the compound. Therefore, in the verbal compound $[[\text{meat}]_N\ [eat]_V\ ing]_N]_N$, the verb *eat*, assigns a theta-role to its noun complement, *meat*. Fabb points out that the difference between theta-role assignment in compounds and phrases is that in compounds, theta-assignment is to the left, while in phrases it is to the right. Both Sproat (1985) and Lieber (1992) attribute this to the historical SOV ordering of Old English, which has been preserved, and is still used to generate the productive verbal compound in Modern English.[8]

Sproat (1985) argues, as does Fabb, that theta-relations apply to compounds. Sproat's approach is different from Fabb's, but also sheds an interesting light on the relationship between compounding and theta-relations.

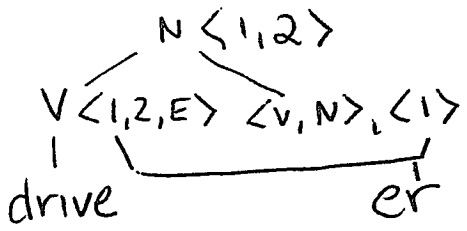
Sproat discusses both agentive nominals and synthetic compounds, (in (22) and (23), respectively) with regard to "theta-grid percolation".

(22) driver
(23) car driver

[8]This issue is discussed in detail in a later section.

He claims that theta-role grids are required to percolate from stems to dominating nodes. For example, in (20), the external argument of *driver* is satisfied by the suffix *-er*, which carries the Agent theta-role. The theta-grid for the verb *drive*[9] percolates to the dominant node.[10]

(24)



"Theta-grid percolation" will also apply to synthetic compounds as in (25).

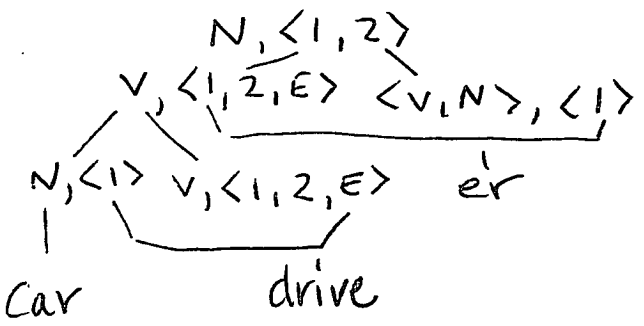
---

[9]Sproat notes the observation that theta-grids may vary on a single verb depending on whether or not it is transitive or intransitive. For example, the verb "drink" may be either transitive or intransitive.

a. a drinker (=one who drinks (alcohol) in general)
b. a drinker of tea (=one who drinks tea)

[10]Sproat explains that for idiomatic agent nominals, e.g., roaster, and fryer in "commercial chicken sale terminology," that theta-roles will not percolate from the verb.

(25)



Sproat claims that the verb in synthetic compounds will assign case to its nominal complement, (i.e., in *car driver*, *drive*, case marks *car*) He assumes that case assignment is only possible under adjacency (as in Stowell 1981) Sproat (1985:209) notes that according to adjacency, it follows "...that a verb could only case mark the complement." He claims that this accounts for why **shelf book putter* (i.e., one who puts books on shelves) is ungrammatical. Clearly, "shelf" cannot get case marked in **shelf book putter*, since according to Stowell's "Adjacency Condition," the case assigner *put* is not adjacent to *shelf*, which would be required in order for *shelf* to be case marked by *put*.

Both Fabb's and Sproat's arguments that syntactic relations, such as theta and case relations, apply to both certain derived words and compounds clearly show that, at least, the words in their analyses are syntactic objects. Fabb's adjusted X-bar rule, X^n --> X^{n-1} or X^n also supports this view.

Lieber (1992) points out quite convincingly that syntactic relations apply to compounds, and therefore, compounds may be handled in the syntax. She points out that headedness in compounding follows licensing principles for syntactic headedness in a language. She claims that English is rightheaded for compounding because it follows the licensing principle set for modification in English. Lieber (1992) claims the following licensing principles for English.

(26) a. Heads are initial with respect to complementation.
b. Heads are final with respect to specifiers.
c. Heads are final with respect to modification.

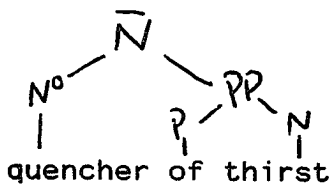
Lieber (1992) points out that compound headedness in other languages, e.g., Tagalog, French, and Dutch, also follow the licensing principles of the language. In head-initial and head-final languages, such as Yoruba and Turkish, respectively, it is of interest to note that heads in compounds follow the headedness of syntactic phrases, i.e., VP. Lieber notes that English is not consistent with this. She claims that the SOV ordering of Old English may be an explanation for this lack of consistency in head ordering, regarding complementation and modification. Lieber suggests that head-finalness in terms of modification, namely, Adj N sequences, is, perhaps, a structure remaining from Old

English. Synthetic compounds, such as, "dog catcher," have an internal OV ordering, also consistent with Old English ordering. The structure of synthetic compounds, then, is inconsistent with Lieber's licensing condition for complementation in English, which would predict "catch dog," (or something of the like), rather than "dog catcher". Lieber asserts that when the parameter setting for Old English SOV changed to SVO, that synthetic compounds then had to be derived from movement. Presumably, (28), below, would be derived from (27).

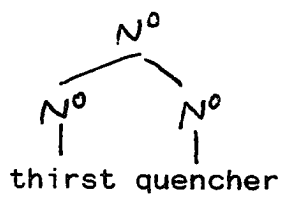
(27) *catch dog*
(28) **dog** *catcher*

Lieber attempts to justify R&S's (1978) movement notion to explain the formation of synthetic compounds. She claims that in (28a) the theme-complement of the verb *quench* moves to nonhead position in the compound in order to ultimately derive (28b).

(28) a.



(28) b.



Lieber claims that in (28b), the movement of *thirst* from an N explains why a phrase, namely, N', is never the first element in a synthetic compound, which is also pointed out by R&S.

There does not appear to be any synchronic motivation for such movement. Contrary to Lieber, Sproat (1992) notes that synthetic compounds can have N' nonheads as in the examples below.

(30) [[*American* history]$_{N'}$ [*teacher*]$_{N}$]$_{N}$
(31) [[*purple* people]$_{N'}$ [*eater*]$_{N}$]$_{N}$

Lieber's claim that structures, such as *American history* are explained by the fact that they are lexicalized, does not hold up against the nominal compound, *purple* people *eater*. As Sproat notes, *purple people* can by no stretch of the imagination be said to be lexicalized. Lieber argues that only X^0 nodes may participate in movement. Lieber's "movement claim" is profoundly weakened by Sproat's arguments.

It may be said, then, that the Old English structure found in synchronic, synthetic compounds is a preserved syntactic structure which has always been, and has remained highly productive in Modern English. Lieber cites Old English examples from Marchand (1969).

(32) gold-gifa
'gold-giver'

(33) man-slaga
'man-killer'

Lieber's licensing principles may be off the mark regarding synthetic compounds. Nevertheless, her claim showing the relationship between the licensing principles of a language and compound headedness is evidence for an overlap between syntactic N's and nominal compounds which supports a theory of syntactic compounding.

1.3 Conclusion

Any theory of compounding must be able to account for the syntactic relations which apply to compounding, e.g., theta and case relations, and syntactic headedness. Furthermore, it must be able to handle the fact that the constituent structure in phrase structure rules which generate N's, e.g., N' --> Adj N and N' --> N N, may also correctly yield nominal compounds. Therefore, it may be said that X-bar theory can generate nominal compounds. Furthermore, a theory of compounding must account for the fact that syntactic phrases may be compound constituents. Though the morphological

theories discussed in this chapter may be appropriate for derived words, they are clearly limited in terms of their ability to handle the syntactic features associated with nominal compounds.

Therefore, further research about compounding processes must treat compounds as syntactic objects, and examine the differences between N's and Ns of the structure "nonhead + head". Criteria besides Chomsky and Halle's (1968) stress rules are required to distinguish between these two structures, especially with regard to N's and Ns with identical constituent structures. The remainder of this dissertation is, therefore, dedicated to a careful study of N' and N constructions to establish the facts about structure which distinguish between these two structures as syntactic objects.

The following chapter provides crosslinguistic evidence to confirm the relationship between syntactic headedness and compound headedness. Other distinctions between N's and Ns are also discussed.

CHAPTER TWO

Syntactic Headedness and Nonhead Phrase Structure: Crosslinguistic Evidence

2.1 Introduction

Possibly the strongest evidence in support of the claim that nominal compounds are "syntactic objects," is the fact that compounds have "syntactic headedness". If we consider Lieber's (1988,1992) Licensing Principles, which illustrate syntactic headedness for a language in terms of complementation, modification, and specification, we find, crosslinguistically, that compounds follow syntactic headedness. If a language has alternate headedness for modification and complementation, e.g., English, compounding in that language will follow headedness for modification. Alternatively, if headedness for modification and complementation is uniform, compound headedness will, of course, follow headedness for both modification and complementation. Clements (1989) work shows that both French and Spanish compounds share the head-initialness of their respective languages, with regard to modification and complementation. In other words, since French and Spanish are left-headed for modification and complementation, productive

compounding for both languages is left-headed as well. English compounds are head-final since they follow the modification relation, with regard to headedness (see (Lieber (1988, 1992))), as in the example below.

(1) a. $[[constant]_{Adj}\ [abuse]_{N}\ ]_{N'}$

b. $[[drug]_{N}\ [abuse]_{N}\ ]_{N}$

This chapter shows that crosslinguistically, compounds have syntactic headedness. I have collected nominal compound and N' data from Turkish, Kannada, Yoruba, Vietnamese, and Mandarin, none of which are related to each other, nor to English. In looking at both compound (N), and N' structures, one can see the shared syntactic headedness between structures at the word, and phrase level, respectively. The data for N's and Ns with phrasal nonheads in these languages were obtained from native speakers, all of whom are linguists. Two interesting observations show up in the data. However, the main point that I would like to convey in this chapter, is that syntactic headedness is a relation which applies to compounding, crosslinguistically. This is compelling evidence in support of a theory which includes compounds in the set of "syntactic objects". A secondary, but notable observation, is that it appears that a crosslinguistic distinction may be made between nonhead structures in N's and Ns. That is, phrasal nonheads of compounds may not be APs and QPs. Both APs and

QPs may only occur as nonheads in N's. We see that this is also the case for English.[1]

(2) a. $[[very\ large]_{AP}\ [cage]_N]_{N'}$

b. $[[every\ five]_{QP}\ [cards]_N]_{N'}$

(3) a. $[[large\ dog]_{N'}\ [cage]_N]_N$

b. $[*[very\ large]_{AP}\ [cage]_N]_N$

In the style of Lieber (1992), I will present the licensing principle schemata, with regard to modification and complementation, for each language presented. Furthermore, data will be presented which illustrates the licensing principles, and the shared syntactic headedness relation between phrases and compound words.

2.2 Turkish

Licensing Principles:

(a). Head-final with regard to complementation
(b). Head-final with regard to modification

As can be seen below, in Underhill's (1976) illustration of S in Turkish, Turkish is head-final with regard to complementation.

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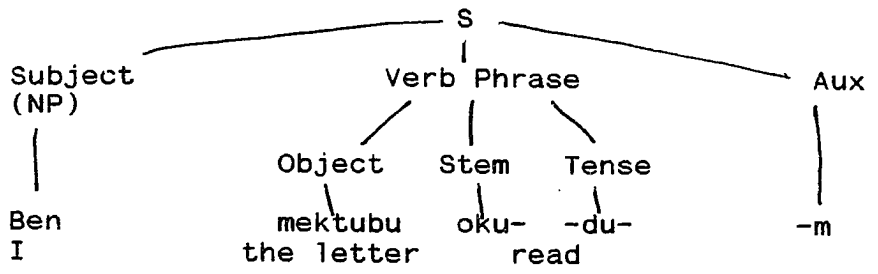
[1]Productive [Q N]N compounds do not even exist.



'I read the letter'

Underhill's (1976) examples of NPs with the structure Adj N, show that Turkish is head-final with regard to Adj modification.

(4) a. küçük çocuk
small child
'the small child'

b. eski ağaç
old tree
'the old tree'

c. iyi adam
good man
'the good man'

The compound data below in (5), from Lewis (1976), and (6) from a an informant[2], show that nominal compounds follow syntactic headedness., that is, they are head-final.

[2]I thank Bahar Arsoy for this data.

(5) a. [ba bakan]$_N$
head minister
'prime minister'

b. [orta çağ]$_N$
middle epoch
'Middle Ages'

c. [ön söz]$_N$
front word
'foreward'

(6) a. [[eski araba]$_{N'}$ [satisiçi]$_N$]$_N$
old car salesman
'the old-car salesman'

b. [[büyük köpek]N' [kayesi]N]N
big dog cage
'the big-dog cage'

Concerning the issue of acceptable phrasal nonheads, the informant stated that while Ns may only take a phrasal N' nonhead, N's themselves, may take S' and AP nonheads. The data below these N' constructions.

(7) a. [[senin gördüğün]$_{S'}$ [çocuk]$_N$]$_{NP}$
that you saw child
'the child who you saw'

b. [[cok akilli]$_{AP}$ [[bir]$_{Det}$ [çocuk]$_N$]$_{N'}$]$_{NP}$
very smart a child

'a very smart child'

c. [[akille ve guvenitir]$_{AP}$ [çocuk]$_N$]$_{NP}$
'smart and trustworthy child'

2.3 Yoruba

Licensing Principles:

(a) Head-initial with regard to complementation
(b) Head-initial with regard to modification

Bamgbos.e's (1966:79) example sentences show that Yoruba is head-initial with regard to complementation.

(8) a. wó?n á fun lóbi je?
they will give him in kolanut eat
'They will give him a kolanut to eat'
b. dúro dè nú
stand await me
'Wait for me'

Yoruba has head-initial NPs, with regard to the structure "head + nonhead". Bamgbose (1966) illustrates with the following examples.

(9) a. owó ,yi
money this
'this money'
b. ile nla
house big
'a big house'

As would be predicted, Yoruba nominal compounds are head-initial, following the syntactic head-initialness of the language. Many nominal compound phrasal nonheads are derived

from VPs through nominalizations. These nominalizations may occur with or without an overt marker. Hence, it is possible for such a nominalization to appear exactly as it would if it were used as a VP (A. Akinlabi, personal communication). The nominals below are head-initial.[3]

(10) a. [[ibeere]$_N$ [[gba(i)kan o subu]$_V$']$_N$]$_N$
question take one you fall
'difficult question'

b. [[ohun-elo]$_N$ [[ko see ma nii]$_V$']$_N$]$_N$
thing use NEG able to NEG have
'essential commodity'

c. [[abewoo]$_N$ [[mo-mi-ki-n-mo-o]$_V$']$_N$]$_N$
visit know me let I know you
'familiarization tour'

d. [[owo]$_N$ [[gba ma biinu]$_V$']$_N$]$_N$
money take NEG be angry
'compensation'

(11) a. [[ijo]$_N$ [ipari odun]$_N$']$_N$
dance end year
'end of the year dance'

b. [[ero]$_N$ [a soro ma gb(a)esi]$_N$']N
machine agentive prefix-speak NEG take reply
'radio'

---

[3] The NP and nominal compound data below was provided by A. Akinlabi.

2.4 Vietnamese

Licensing Principles:

(a). Head-initial with regard to complementation
(b). Head-initial with regard to modification

Thompson (1965) gives an example sentence which shows the head-initial complementation structure in Vietnamese.

(12) ...d-i sâu vào xã-hội Việt-nam
[if you] go be enter society Vietnam
deep
'...if you go deep into Vietnamese society'

The data on NPs and Ns, below was provided by an informant.[4] It shows that NPs in (13), and nominal compounds in (14) are both head-initial.[5] As expected, nominal compounds follow the syntactic headedness of the language. Furthermore, the informant explained that Vietnamese compounds cannot have AP and QP nonheads.

---

[4]I wish to thank Ngo Thanh Nhan for this data.

[5]Sino-Vietnamese compounds which are common in Vietnamese are head-final due to having taken the head-final structure of Chinese compounds.

(13) a. [[áo]$_N$ [cộc tay]$_{AP}$]$_{NP}$
shirt short sleeve
'short-sleeved shirt'

b. [[người]$_N$ [đói bụng]$_{AP}$]$_{NP}$
person hungry stomach
'hungry person'

c. [[kẻ]$_N$ [mù mắt]$_{AP}$]$_{NP}$
person blind eye
'blind person'

(14) a. [[người]$_N$ [bán sách cũ]$_{VP}$]$_N$
person sell book-old
'old-book seller'

b. [[trường]$_N$ [dạy nghề]$_{VP}$]$_N$
school teach job
'job-training school'

c. [[hồ]$_N$ [cá con/bé]$_N$,]$_N$
tank fish-baby-small
'little-fish tank'

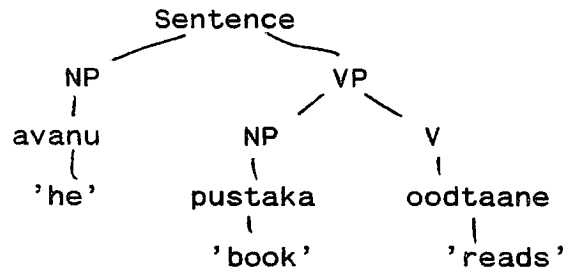
2.5 Kannada

Licensing Principles:

(a). Head-final with regard to complementation
(b). Head-final with regard to modification

Shiffman (1983) illustrates the syntactic head-finalness in Kannada, with regard to complementation.

(15)



'He reads the book'

Shiffman's example NPs also show that Kannada is head-final with regard to modification.

(16) a. aa naak cik manegLu
'those four small houses'

b. doD mane
big house
'a big house'
c. cik pustaka
small book
'a small book'

Compounding is very productive in Kannada, and productive compound structures appear to be head-final, following "syntactic headedness" in Kannada. Sridhar and Aronoff (1991) give numerous examples of Kannada compounds, which show their "syntactic headedness".

(17) a. be:sige ka:la
'summer season'

b. kudure ga:Di
'horse carriage'

c. a:sparin ma:tre
'aspirin tablet'

d. kally sakkare ka:rkhane
'rock candy factory'

e. husi nage
'artificial smile'

An informant[6] confirmed that in the following compound the nonhead is an N'; however, she believed that phrasal nonheads were not very productive in Kannada compounds. Below are examples of N's with phrasal nonheads, which apparently are productive.

(18). [[nere mane]$_{N'}$ [suddi]$_{N}$]$_{N}$

'next-house news'

(19) a. [[ninaginta ettara]$_{AP}$ [huḍugi]$_{N}$]$_{NP}$

you than tall girl
'a girl taller than you'

b. [[atyanta sundara]$_{AP}$ [čitra]$_{N}$]$_{NP}$

'very beautiful picture'

c. [[ayd-antastina]$_{N'}$ [kaṭṭaḍa]$_{N}$]$_{NP}$

'5 story building'

[6]I thank Jayashree Nadahalli for these examples.

2.6 Mandarin

Licensing Principles:

(a). Head-initial with regard to complementation
(b). Head-final with regard to modification

Like English, syntactic headedness in Mandarin alternates for complementation and modification. The following sentence from Li and Thompson (1981) illustrates head-initialness for complementation.

(20) zhei zhong zhiwu keyi da-ng zuo chi- de
this type plant can take make eat NOM
'(one) can take this type of plant as food'

The following examples from Li and Thompson illustrate the head-final relation for modification in Mandarin.

(21) a. liu li
six mile
'six miles'

b. nei liu ben shu-
that six CL book
'those six books'

Mandarin has the marker de which marks relative clauses. Nonheads of complex nominals marked by de can only modify phrase level projections (Sproat and Shih (1990)). Therefore, the occurrence of de in the modifier position distinguishes a

true phrasal projection from an N-level projection in which the modifier (or nonhead) is de-less. Examples (22) - (24) are NPs with phrasal nonheads. (25) - (26) illustrate nominal compounds with phrasal nonheads.[7] The data reveals, as might be predicted, that nominal compounds, like NPs, are head-final. Nominal compounds, therefore, have syntactic headedness regarding modification.

(22) a. [[women hezuo de]$_{S'}$ [wenti]$_{N}$]$_{NP}$

concerning their cooperation problem
'the problem concerning their cooperation'

b. [[hu-bian de]$_{S'}$ [chuan]$_{N}$]$_{NP}$

lake side boat
'boat by the lake'

(23) a. [[san ge]$_{Q'}$ [ren]$_{N}$]$_{NP}$

3 -measure word- person
'3 people'

b. [[san duo]$_{Q'}$ [hua]$_{N}$]$_{NP}$

3 -measure word- flower
'3 flowers'

(24) [[[hen hao]-de]$_{A'}$ [peng you]$_{N}$]$_{NP}$

'very good friend'

---

[7] I wish to thank Chilin Shih for these examples.

(25) a. [[shou-yin]$_{VP}$ [ji]$_{N}$]$_{N}$

receive-sound machine
'radio'

b. [[jiu-huo]$_{VP}$ [che]$_{N}$]$_{N}$

save-fire car
'fire engine'

(26) a. [[di-xia]$_{PP}$ [[gong-zuo]$_{N}$ [ren-yuan]$_{N}$]$_{N}$]$_{N}$

under ground work personnel
'under ground worker'

b. [[hai-shang]$_{PP}$ [zuo-ye]$_{N}$]$_{N}$
sea on/top operation
'operation on the sea'

Nominal compounds are able to take Q and A nonheads; however, they are not "full-fledged" QPs and APs since they are "de-less," as can be seen in (27) and (28).

(27) a. [[ba bao]$_{Q}$ [fan]$_{N}$]$_{N}$

'3 treasure rice' (a dessert)

b. [[san hua]$_{Q}$ [jiu]$_{N}$]$_{N}$
'3 flower wine'

c. [[san ren]$_{Q}$ [zuo]$_{N}$]$_{N}$
'3 person seat'

(28) a. [[hong-shao]$_{Adj}$ [rou]$_{N}$]$_{N}$

red braised meat
'meat cooked in soy sauce'

b. [[bai-qie]$_{Adj}$ [ji]$_{N}$]$_{N}$

white cut chicken
'plain cut chicken without seasoning'

2.7 Conclusion

The syntactic headedness relation observable in the above data for Turkish, Yoruba, Vietnamese, Kannada, and Mandarin, and for English, supports the notion that nominal compound structure may be described in terms of syntactic relations. The evidence presented here showing that syntactic headedness exists in nominal compounds, along with other syntactic relations, discussed in Chapter 1, such as theta and case relations, and subcategorization, all point strongly in favor of a theory of syntactic compounding.

Based on the above data, and English data, it may also be observed, crosslinguistically, that both AP and QP nonheads appear to be prohibited in nominal compounds, but may be nonheads of N's. Regarding English, it is the case, with few exceptions, that nonheads of productive nominal compounds are nonmaximal projections of N.[8] Though, APs and QPs in English may be nominalized, the only way to do this is by attaching a Determiner (Det), and making them maximal projections of N, which are prohibited in the nonheads of nominal compounds.

---

[8]Lexicalized Adj N sequences, e.g., "blackbird," and Adj N sequences in which the head N is a "broad reference" N, (as described in Chapter 4), are exceptions to this rule.

(29) a. Buster, $[[\text{the}]_{Det}\ [\text{very playful}]_{AP}]_{NP}$

b. $[\text{the}\ *[[\text{the}]_{Det}\ [\text{very PLAYFUL}]_{AP}]_{NP}\ [\text{cat}]_{N}]_{N}$

(30) a. She-Ra, $[[\text{the}]_{Det}\ [\text{all powerful}]_{QP}]_{NP}$

b. $[\text{the}\ *[[\text{the}]_{Det}\ [\text{all powerful}]_{QP}]_{NP}\ [\text{lioness}]_{N}\ ]_{N}$

Whether or not this explanation may apply to the other five languages discussed here is an issue for further research.

CHAPTER THREE

Phrasal Nonheads in N's and Ns

3.1 Introduction

For nominals of the form "nonhead + head," Chomsky and Halle's (1968) Nuclear Stress (NS) and Compound Stress (CS) rules may reliably predict phrasal and compound word structures, respectively. According to the NS and CS rules, phrases have rightmost stress and compound words have leftmost stress. However, Chomsky and Halle's stress rules are not explanatory. This chapter provides criteria to explain stress placement, specifically in N's and Ns with phrasal nonheads. In some cases, a certain type of phrase may only occur in the nonhead of an N' or an N. On the other hand, the phrasal nonheads of N's and Ns may be identical, e.g, N', VP. It is shown that in such cases, phrasal nonheads of N's are frozen expressions which are reanalyzed as Adjs, and the phrasal nonheads of Ns must be nonmaximal projections of N. For Ns, phrasal nonheads which are not nominals, e.g., VP, are also frozen expressions which are reanalyzed as nominals.

It is shown that Prepositional Phrases (PP), N's, and VPs which occur as nonheads in N's, such as

[[*over the fence*]$_{PP}$ **gossip**$_{N}$]$_{N'}$, [[*run of the mill*]$_{N'}$**meeting**$_{N}$]$_{N'}$, and [[*stick to the issue*]$_{VP}$ **article**$_{N}$]$_{N'}$ respectively, are frozen expressions or idioms reanalyzed as Adjs. Since the phrases are considered "frozen," they no longer have the same status as a true phrase. Therefore, such phrases may be inserted into a complex nominal just like any lexical item might be inserted into a sentence. The following rules are proposed with regard to lexical reanalysis of frozen phrases.

(1) a. Adj --> PP
    b. Adj --> N'
    c. Adj --> VP

It will be argued that PP, N', and VP idioms are Adjs based on the following three observations. First of all, such phrasal idioms distribute like absolute and relative Adjs with regard to Adj ordering. As is pointed out by Sproat and Shih (1990), Adjs which refer to absolute properties, e.g., *industrial*, must appear next to the head noun while this is not the case for adjectives which refer to relative properties, e.g., *filthy*. For example, one can easily say "That is *filthy industrial* **waste**.", but not, "That is **industrial filthy* **waste**." Similarly, PP, N' and VP nonheads reanalyzed with absolute properties must also stand next to the head noun, e.g., "What a *nasty over the fence* **gossip**!", but not "What **over the fence nasty* **gossip**!" Furthermore, PP,

N', and VPs reanalyzed as relative Adjs may take degree modifiers, and may occur as Adj complements for the verbs *seem*$_V$ and *consider*$_V$, e.g., "I consider that painting [[*run of the mill*]$_{N'}$]$_{Adj}$."

Lieber (1988) asserts that the nonheads in [[[*over the fence*]$_{PP}$]$_{Adj}$ [**gossip**]$_N$]$_{N'}$, and [[[*run of the mill*]$_{N'}$]$_{Adj}$ [**meeting**]$_N$]$_{N'}$ type structures are not idioms, and may be equated with structures with nonidiomatic nonheads, such as [[*floor of a* **birdcage**]$_{N'}$ [*taste*]$_N$]$_N$. She also claims that Chomsky and Halle's (1968) CS rule, i.e., leftmost stress, applies to all of these structures, and therefore they are all Ns. I claim that structures, such as [[*floor of a* **birdcage**]$_{N'}$ [*taste*]$_N$]$_N$ are Ns because they have productive N' nonheads which do not occur in N' constructions. Therefore, they may not be equated with [[[*over the fence*]$_{PP}$]$_{Adj}$ [**gossip**]$_N$]$_{N'}$, and [[[*run of the mill*]$_{N'}$]$_{Adj}$ [**meeting**]$_N$]$_{N'}$ which I argue have idiomatic nonheads. Furthermore, I claim that [[*floor of a* **birdcage**]$_{N'}$ [*taste*]$_N$]$_N$ is an N and gets CS.

For PPs, Maling (1983) also observes that "metaphorical" PPs may appear in Adjective Phrase (AP) slots, but she claims that they are not Adjs. Though Maling (1983) makes a relevant

distinction between "metaphorical" PPs which appear in AP slots, and locative-directional PPs which cannot appear in AP slots, she also claims that the "metaphorical" PPs are not Adjs, which claim I reject. Secondly, unlike non-idiom PPs, PP idioms can take a degree modifier, e.g., "a *very off the wall* remark". They may also appear with verbs which take AP complements, e.g., but "I consider that remark *below the belt.*"

Overall, this chapter points out structural distinctions between N's and Ns which have the structure "nonhead + head". Primarily, it is shown that certain N's and Ns may be distinguished based on Chomsky and Halle's (1968) stress criterion, and by the structure of their phrasal nonheads. Ns differ from N's in that Ns allow both idiomatic and non-idiomatic N's in nonhead position, e.g., [[*teacher of the* year]$_{N'}$[*award*]$_{N}$]$_{N}$, and [[*American clothes of the* 1920's]$_{N'}$ [*auction*]$_{N}$]$_{N}$. Furthermore, phrasal nonheads of Ns must be nonmaximal projections of N. Nominal compound formation in Afrikaans displays similar characteristics to English nominal compound formation with respect to the types of phrasal categories which may occur in the nonhead. N's may only take idiomatic PPs, N's and VPs in nonhead position which are reanalyzed as Adjs.

3.2 Chomsky and Halle's (1968) Stress Rules

Chomsky and Halle's (1968) NS and CS rules are used, herewithin, to distinguish N's from Ns. These NS and CS rules reliably predict stress pattern assignment for phrases and compounds, respectively. Up until now, these rules were basically the only reliable criteria for distinguishing between phrases and compounds. The rules are illustrated and described, below.

(2) Nuclear Stress (NS) (Chomsky and Halle (1968:90):

$$V \rightarrow [1 \text{ stress}] \; / \; [\#\#X \; [------] \; Y\#\#] \quad [1 \text{ stress}]$$

The NS rule states that primary stress will be placed on the final or "rightmost" sonority peak in a phrase as illustrated in the phrases below. Henceforth, the term Phrasal Stress (PS) will be used to indicate that the rightmost member of a "phrase" is stressed.

(3) a. [*black* **bird**]$_{NP}$
b. [*easy to* **please**]$_{AP}$
c. [*ate some* **bread**]$_{VP}$

(4) Compound Stress (CS) (Chomsky and Halle (1968:92):

$$V \rightarrow [1 \text{ stress}] / \#\#X[------]Y\#\#Z\#\# \quad [1 \text{ stress}] \quad NAV$$

The CS rule states that for compounds, primary stress will be assigned to the first or "leftmost" sonority peak in the structure, as in the examples below.

(5) a. [**black***bird*]$_N$
b. [**cold-***hearted*]$_A$
c. [**air-***condition*]$_V$

Liberman and Prince (1977) and, more recently, Liberman and Sproat (1992) note that different stress assignment patterns need to be considered for compounds whose subconstituents have internal structure. They state that when the first constituent of a compound is itself a compound, then one can be fairly certain that the leftmost constituent will receive primary stress. Liberman and Sproat illustrate this point with the following examples.

(6) **air** *force Academy*, **money-***market account*,
data *acquisition board*, **bit** *vector machine*,
fund *raising operations*

They also discuss examples of compounds in which there are multiple levels of compounding. Such examples are presented below.

(7) *radio* **direction** *finder*, *water supply* **network** *repairs*, *VAX* **instruction** *set*, *spark-plug* **heat** range

Liberman and Sproat claim that for these examples for which the rightmost member is complex, primary stress will typically be assigned to the penultimate member of the entire compound. They state the overall generalization that for a noun compound structure, as in, [N1 N2], if N2 is not itself a compound (i.e., complex), then primary stress will occur in N1. However, if N2 is a compound (i.e., complex), then primary stress will occur within N2, on its leftmost constituent.

3.3 Phrasal Nonheads of N's

3.3.1 Prenominal Prepositional Phrase Modifiers

The following are examples of acceptable rightmost stressed N's with PP prenominal modifiers. The proposed structure for these examples is $[[PP]_{Adj}\ [N]_N]_{N'}$.

(8) *over the fence* **gossip**
(9) *around the world* **flight**
(10) *in-store* **installations**
(11) *on/off-line* **editing**
(12) *after tax* **reform**
(13) *after school* **special**
(14) *off the books* **payment**
(15) *in depth* **report**
(16) *under the table* **payment**
(17) *after dinner* **speaker**
(18) *over-the-knee* **spanking**
(19) *off-night* **classes**
(20) *off the cuff* **remark**
(21) *over the road* **truck**
(22) *out of control* **situation**
(23) *on/off campus* **housing**
(24) *below the belt* **remark**

(25) *below the knee* dress
(26) *off the rack* dress
(27) *on time* flight
(28) *on the mark* politics
(29) *off the wall* statements
(30) *over the counter* drugs
(31) *on the go* people
(32) *out of the way* places
(33) *from Hollywood* report[1]
(34) *off-duty* police
(35) *around the clock* service
(36) *off-Broadway* performance
(37) *on-the-job* training
(38) *between meal* snacks[2]
(39) *after hours* liasons
(40) *on-site* inspections
(41) *out-of-town* performance
(42) *across-the-board* increases

The following are examples of unacceptable N's with PP prenominal modifiers.[3]

(43) **along the wall ivy*
(44) **beside the river vineyards*
(45) **along the highway telephones*
(46) **at the corner cafe*
(47) **by the sea cottage*
(48) **underneath the ground wires*
(49) **on the shoulder parrot*
(50) **across the desert journey*
(51) **inside the pool fungus*
(52) **at sunrise boatride*
(53) **during the holiday feast*
(54) **in pencil sketches*

---

[1]This expression was heard on a New York major network news program.

[2]Examples (31) - (35) are from Levi (1978).

[3]These examples were created from sentences in Hall, Diane (1986), Working with English Prepositions, Thomas Nelson and Sons Ltd, Walton-on-Thames, Surrey, UK.

(55) *at 8:30 train
(56) *from the bank money
(57) *by bullet death
(58) *by air visit
(59) *by Kafka book
(60) *about Florence Nightingale film
(61) *over her broken love affair crying
(62) *out of concern donation
(63) *from malnutrition suffering
(64) *throughout her life dedication
(65) *for their beliefs death
(66) *on Monday class
(67) *about farming talk

Many of the prenominal PPs in (8) - (42) are non-compositional idioms, as in "below the belt" in, [[[*below the belt*]$_{PP}$]$_{Adj}$ [**remark**]$_{N}$]$_{N'}$," or they may be semantically decompositional and asyntactic, such as *out of town* in, [[[*out of town*]$_{PP}$]$_{Adj}$ [**performance**]$_{N}$]$_{N'}$. The difference between these two types of idioms is that the figurative meaning of the latter example can be easily deciphered from the meaning of its parts, unlike the former example. Both types of idioms, however, are reliable modifiers in N's. It is clear that all of the PPs in (8) - (42) are idioms because syntactic alteration, such as adjective insertion, causes them to lose their figurative meaning.[4] This point is illustrated in the examples (68) -

[4]The exception to the claim that syntactic alteration of an idiom may cause it to lose its figurative meaning is the insertion of the adjectives "ol'" and "proverbial", e.g.,"John kicked the ol'/proverbial bucket". Gibbs and Nayak (1989) claim that these adjectives work because "...the referent of

(74) below. In the idioms "kick the bucket", and "out of the woods," adjective insertion destroys the figurative meaning of the expression. Examples (69) - (74) show the same result when lexical items are inserted inside of the prenominal PP expressions.

(68) a. kick the bucket --> kick the **oaken* bucket
b. out of the woods --> out of the **dense* woods

(69) off the **brick* wall statement
(70) after **new* tax reform
(71) off the **shirt* cuff remark
(72) below the **bruised* knee dress
(73) out of **small* town performance
(74) between **every* meal snack

Based on the above data it is obvious that acceptable cases of prenominal PPs are idioms. N's with PP nonheads are generated by the phrase stucture rules in (75) and (76). Rule (76) appears to be an X' theory "violator". Since rule (76) is restricted to "frozen" phrases, the phrases are treated like a lexical item. Therefore, the rule in (76) is not different from (77) which clearly does not violate X' theory.

(75) N' --> Adj N
(76) Adj --> PP
(77) Adj --> *yellow*

"bucket" exists only in some obscure proverbial scenario...".

It is important to note that is not necessarily the case that all PP idioms can modify nouns, as is illustrated below in examples (78) -(87). Rather, if a PP is prenominal, then it is an idiom. Furthermore, as Maling (1983) suggests, the acceptability of these structures may vary by individual speaker.

(78) ?*on the market product*
(79) ?*in stock items*
(80) ?*on the newstand issue*
(81) ?*in love man*
(82) ?*up in the air plans*
(83) ?*on leave professor*
(84) ?*on sabbatical school teacher*
(85) ?*in the palm of her hand boyfriend*
(86) ?*on the nose answer*
(87) ?*on the bandwagon supporter*

Lieber (1988) claims that acceptable PP modifiers, as in *over the fence* **gossip**, and *around the world* **flight**, are compound constituents and maximal projections of P. She also states that prenominal PP modifiers, such as *over the fence*, and *around the world* in the above examples are not lexicalized or frozen elements. However, theories of the idiom state that an idiom is a phrase which, though it may have a literal meaning, has a figurative meaning as well (see Chafe (1968), Fraser (1970), and Gibbs and Nayak (1989) for further discussion). So, for example, one can say "John jumped *over the fence.*" to convey the literal meaning of the PP *over the fence*, or one could say, "John was big on *over the fence*

gossip" to convey the figurative meaning of *over the fence*. It is clear that in Lieber's PP N examples, e.g., *over the fence,* are the PPs are idioms.

3.3.1.1 Absolute and Relative Properties of Adjectives

Prenominal PP modifiers, and some prenominal N' modifiers are Adjs.[5] This section shows how they may have the same distribution as absolute and relative Adjs. The criteria for absolute and relative distribution is based on Siegel's (1976) distinction between absolute and relative modifiers, and Sproat and Shih's (1990) theory of Adj ordering. I show that the relative PP idioms, unlike non-idiom PPs, can take degree modifiers, such as *very*, and *so*, and that they can also be the predicate complement of verbs, such as *seem* and *consider* which cannot take non-idiom PPs. Absolute PP idioms, like absolute Adjs, cannot take degree modifiers, nor can they be the predicate complements of the verbs, *seem* and *consider*.

Siegel (1976) states that Adjs may be relative to the common nouns they modify, or they may be free, absolute

[5]Healey (1968) claims that the function of a syntactic phrase must be determined by its external context, that is, its function in a sentence. Therefore, he classifies many PP and NP idioms as other syntactic categories, e.g. adjectives and adverbs.

modifiers. She claims that in the sentence "*Marya is a beautiful dancer.*" both a relative and an absolute reading is present. That "*Marya is beautiful as a dancer.*" is the relative reading, and that "*Marya herself is beautiful.*" is the absolute reading.

Sproat and Shih (1990) note that Adjs which refer to absolute properties, such as COLOR and SHAPE are closer to the head than Adjs which refer to relative properties, such as SIZE or QUALITY. In (88a), (89a), (90a), and (91a), the absolute Adjs are immediately next to the head. In (88b), (89b), (90b), and (91b), the violation of Adj ordering restrictions is evident.

(88) a. This is a *large red* peach.
b. This is a **red large* peach.
c. This is a *red, large* peach.

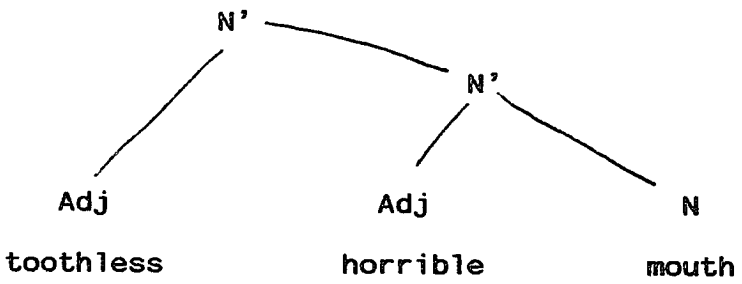
(89) a. This is a *beautiful red* house.
b. This is a **red beautiful* house
c. This is a *red, beautiful* house.

(90) a. This is a *horrible toothless* mouth.
b. This is a **toothless horrible* mouth.
c. This is a *toothless, horrible* mouth.

(91) a. This is a *gigantic cancerous* tumor.
b. This is a **cancerous gigantic* tumor.
c. This is a *cancerous, gigantic* tumor.

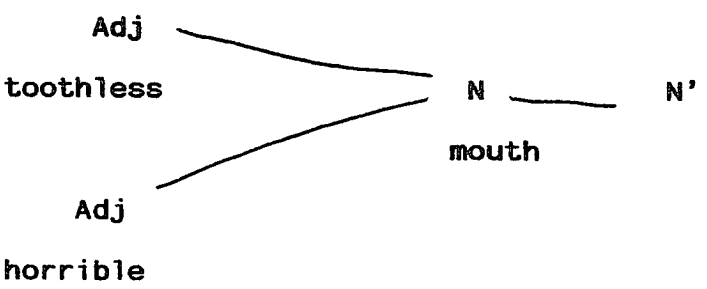
However, Sproat and Shih have claimed that Adj ordering restrictions need only apply if the relationship between the Adj and the Noun is hierarchical as in (88a) - (91a). The figure, below, illustrates a "hierarchical structure".

(92)



Alternatively, they claim that for a parallel structure modification, Adj ordering restrictions need not apply, but appropriate intonation may be indicated by commas, as in (88c) - (91c). Below, (93) illustrates a parallel structure.

(93)



Finally, following Sproat and Shih's observations about Adj ordering, it will be assumed that absolute Adjs are not easily separated from the head noun by a relative Adj.[6]

Following the same story, certain Adj Noun sequences in (94a) - (96a) are unacceptable if the abslute Adj is separated from the head noun by a relative Adj, as in (94b) - (96b).

(94) a. That *smelly industrial* waste is disgusting!
b. That **industrial smelly* waste is disgusting!

(95) a. The *radical presidential* committee made surprising suggestions.
b. The **presidential radical* committee made surprising suggestions.

(96) a. The *secretive senatorial* investigations were revealing.
b. The **senatorial secretive* investigations were revealing.

---

[6] If an absolute and a relative Adj in the sequence are separated by commas, indicating both a pause in intonation, and parallel structure, the structure seems somewhat more acceptable, though accepability often remains questionable.

(a) That industrial, smelly waste is disgusting!
(b) The presidential, radical committee made surprising suggestions.
(c) The senatorial, secretive investigations were revealing.

The distributions of *industrial*, *presidential*, and *senatorial* in (94b) - (96b) suggest that these Adjs have absolute values. One of Siegel's (1976) tests may be applied to check for absolute and relative values. If "*X is Adj for N*," e.g., *Marya is beautiful for a dancer*, then the Adj has relative value. However, if it cannot be shown that "*X is Adj for N*", e.g.,That is industrial for waste, then the Adj does not have relative value in relation to the Noun it modifies.

(97) a. That is *filthy* for waste.
b. They are *radical* for a committee.
c. That was *secretive* for an investigation.
d. That is *large* for a peach.
e. That is *beautiful* for a house.
f. That is *horrible* for a mouth.
g. That is *gigantic* for a tumor.

(98) a. That is **industrial* for waste.
b. That is **presidential* for a committee.
c. That is **senatorial* for an investigation.
d. That is **cancerous* for a tumor.
f. That is **toothless* for a mouth.

3.3.1.2 PPs Reanalyzed as Adjectives

The distribution of absolute and relative PP modifiers in the data presented here correspond to the syntactic distribution of absolute and relative Adjs, respectively. Below are examples of PP modifiers with absolute value.

(99) a. Johnny the Rat gave Sammy the Snake a extraordinary *under the table* payment.
b. Johnny the Rat gave Sammy the Snake an **under the table extraordinary payment.*

(100) a. Channel 11 had a *wonderful after school* special.
b. Channel 11 had an **after school wonderful special.*

(101) a. Millie told Hazel some *unusual over the fence* gossip.
b. Millie told Hazel some **over the fence unusual gossip.*

(102) a. What a *conservative below the knee* dress!
b. What a **below the knee conservative dress!*

(103) a. The masons have *creative on-the-job* training.
b. The masons have **on-the-job creative training.*

(104) a. Those are *competent in-store* installations.
b. Those are **in-store competent installations.*

(105) a. The garage had *unreliable around the clock* service.
b. The garage had **around the clock unreliable service.*

Furthermore, if one applies Siegel's (1976) test, one finds more evidence that the PP modifiers in (99) - (105) do not have relative value.

(106) a. That is **under the table* for a payment.
b. That is **after school* for a special.
c. That is **over the fence* for gossip.
d. That is **below the knee* for a dress.
e. That is **on-the-job* for training.
f. That is **in-store* for an installation.
g. That is **around the clock* for service.

Below are cases in which PP modifiers have relative value.

(107) a. He made a *sarcastic off the wall* comment.
b. He made an *off the wall sarcastic* comment.

(108) a. Mary presented an *accurate in depth* report.
b. Mary presented an *in depth accurate* report.

(109) a. That was an *idiotic below the belt* remark!
b. That was a *below the belt idiotic* remark!

(110) a. She made a *surprising off the cuff* remark.
b. She made an *off the cuff surprising* remark.

Examples (107) - (110) also pass the test for relative value. Furthermore, these PP modifiers, like Adjs, can take degree modifiers as in (111), below. On the other hand, PPs with absolute value are not modified by degree modifiers as in (112).

(111)a. That is *(very) off the wall* for a comment.
b. That is *(very) in depth* for a report.
c. That is *(very) below the belt* for a remark.
d. That is *(very) off the cuff* for a remark.

(112) a. That is **very after school* for a special.
b. That is **very below the knee* for a dress.
c. That is **very on-the-job* for training.
d. That is **very around the clock* for service.
e. That is **very in-store* for installation.
f. That is **very over-the-fence* for gossip.

In (113) it can also be observed that relative PP idioms, like Adjs, appear as predicate complements for the verbs

"consider" and "seem," which cannot take real PPs as complements. On the other hand, absolute PP Adjs cannot be predicate complements of "consider" and "seem," as in (114).

(113) a. I consider that remark *off the wall.*
b. That remark seems *off the wall.*
c. I consider that report *in depth.*
d. That report seems *in depth.*
e. I consider her politics *on the mark.*
f. Her politics seem *on the mark.*
g. I consider that restaurant *out of the way.*
h. That restaurant seems *out of the way.*

(114) a. I consider that training *on the job.*
b. That training seems *on the job.*
c. I consider that TV special *after school.*
d. That TV special seems *after school.*
e. I consider that service *around the clock.*
f. That special seems *after school.*

Maling (1983) tries to account for the distribution of what she terms "metaphorical" PPs, e.g., *out of the way.* She claims that these "metaphorical" types take degree modifiers, such as, *very* and can be the predicate complement of verbs like *consider* and *seem* because they have a feature [+gradable].

(115) That restaurant is very *out-of-the-way.*
(116) That restaurant seems *out-of-the-way.*

Her claim about gradability as a feature of metaphorical PPs only accounts for the "relative" type PPs. Maling accounts for the fact that real, locative-directional PPs, e.g., "on

degree modifiers because they are [-gradable].

(117) That old newspaper is **very on the roof*.
(118) That old newspaper seems **on the roof*.

Maling's account does not account for the distribution of absolute PP idioms, such as *on-the-job*, which may also function prenominally as Adjs. Furthermore, she incorrectly equates idiomatic locative-directional PP, such as *out of town*, with with non-idiom, locative-directional PPs, such as, *out on the roof*.. Maling claims that "metaphorical" PPs are not Adjs, which claim I reject based on the three observations about prenominal PP idioms discussed in this section. Finally, Maling's claim that such metaphorical PPs are not Adjs will not allow her account to predict the prenominal distribution of PPs.

3.3.1.3 PP Modifiers in Afrikaans

Botha (1980) notes that for Afrikaans, a prenominal PP modifier is only sometimes acceptable, as I have shown to be the case for English. According to Botha, PP prenominal modifiers may have an obligatory presence, an optional appearance, or an obligatory absence in a compound. The examples in (119) illustrate all three cases.

Obligatory Presence:

(119) a. op - aandag - staan -ER *aandag-staan-ER
'to attention stand -er'

met - mekaar -stry -ERS *mekaar-stry-ERS
'with each other argue-ers'

onder - druk - werk - ERY *druk-werk-ERY
'under pressure working'

Optional Appearance:

b. (met-die-) hand-werk -ER
'with the hand work -er'

(in-die-) dag-slaap -ER
'in the day sleep -er

(uit-) Engels - vertaal -ER
'from English translate -or'

Obligatory Absence:

c. koord-dans -ER *op-die-koord- dans -ER
'rope dancer' 'on the rope danc -er

veld -werk -ER *in-die- veld-werk -ER
'field worker' 'in the field work -er'

mes - steek -ER *met-'n- mes -steek -ER
'knife stabber' 'with a knife stab -er

Botha speculates that the behavior of the examples in (119) may have to do with whether or not the PP + N constituent has an idiomatic sense, whether or not the PP and the N jointly constitute a fixed syntactic combination, or

whether or not the compound as a whole has a noncompositional, lexicalized meaning. Botha's (1980) notions about PP + N structures in Afrikaans appear to be consistent with my claims about PP + N structures in English. Botha's data should be investigated to see whether or not PP modifiers in Afrikaans have the adjectival status, like PP prenominal modifiers in English.

3.3.2 N' Nonheads in N's

The N' nonheads in the following examples are all idioms which have been reanalyzed as Adjs. Therefore, the following phrase structure rules are proposed for them with regard to idioms.

(120) N' --> Adj N
(121) Adj --> N'

The claim that these structures are N's in which the N' nonhead has been reanalyzed as an Adj is based on the same three arguments presented for prenominal PP idioms: (1) the structures take Phrasal Stress, observed below; (2) the nonhead and head may be separated by an Adj; and, (3) nonhead N's distribute like absolute and relative Adjs, whereby the relative forms may take a degree modifier, and may appear as the predicate complement of the verbs *seem* and *consider*.

(122) [[[*turn of the century*]$_{N'}$]$_{Adj}$ [**art**]$_{N}$]$_{N'}$

(123) [[[*top of the line*]$_{N'}$]$_{Adj}$ [**printer**]$_{N}$]$_{N'}$

(124) [[[*run of the mill*]$_{N'}$]$_{Adj}$ [**meeting**]$_{N}$]$_{N'}$

(125) [[[*hole in the wall*]$_{N'}$]$_{Adj}$ [**restaurant**]$_{N}$]$_{N'}$

(126) [[[*one of a kind*]$_{N'}$]$_{Adj}$ [**quilt**]$_{N}$]$_{N'}$

(127) [[[*middle of the road*]$_{N'}$]$_{Adj}$ [**format**]$_{N}$]$_{N'}$

(128) [[[*state-of-the-art*]$_{N'}$]$_{Adj}$ [**computer**]$_{N}$]$_{N'}$

(129) [[[*spur of the moment*]$_{N'}$]$_{Adj}$ [**party**]$_{N}$]$_{N'}$

(130) [[[*fast lane*]$_{N'}$]$_{Adj}$ [**lifestyle**]$_{N}$]$_{N'}$

(131) [[[*last minute*]$_{N'}$]$_{Adj}$ [**decision**]$_{N}$]$_{N'}$

These N' idioms distribute like absolute and relative adjectives, whereby those N's with relative properties do not have to be immediately next to the head noun, as those with absolute value do. Examples (132) - (135) are examples of N's with relative properties, while examples (136) - (137) show the distribution of N's with absolute properties (which seem to be fewer in number).

(132) a. That is a *speedy top of the line* **printer**.
b. That is *top of the line speedy* **printer**.
(133) a. That was a *lengthy run of the mill* **meeting**.
b. That was a *run of the mill lengthy* **meeting**.
(134) a. That is an *expensive state-of-the-art* **computer**.
b. That is a *state-of-the-art expensive* **computer**.

(135) a. Hers is a *fatiguing fast lane* **lifestyle**.
b. Hers is a *fast lane fatiguing* **lifestyle**.

(136) a. The museum displays *priceless turn of the century* artwork.
b. The museum displays **turn of the century priceless* artwork.
(137) a. That is a *rewarding one-of-a-kind* job.
b. That is a **one-of-a-kind rewarding* job.

The following examples show that N' idioms with relative properties can take degree modifiers.

(138) That printer is *very/so top of the line.*
(139) That meeting was *very/so run of the mill.*
(140) Their format is *very/so middle of the road.*
(141) That computer is *very/so state-of-the-art.*
(142) Her lifestyle is *very/so ?fast lane/fast laneish.*
(143) Their decision was *very/so last minute.*

Furthermore, N' idioms with relative properties can be predicate complements of the verbs "consider" and "seem" which take APs, but not true PPs.

(144) a. I consider that printer *top of the line.*
b. That printer seems *top of the line.*
(145) a. I consider that meeting *run of the mill.*
b. That meeting seems *run of the mill.*
(146) a. I consider their format *middle of the road.*
b. Their format seems *middle of the road.*
(147) a. I consider that computer *state-of-the-art.*
b. That computer seems *state-of-the-art.*
(148) a. I consider her lifestyle *?fast lane.*
b. Her lifestyle seems *fast lane.*
(149) a. I consider that decision *last minute.*
b. That decision seems *last minute.*

3.3.3 A'and Q' Nonheads in N's

A clear structural distinction between English N's and Ns is that A's and Q's may only occur as nonheads of N's.

(150) a. $[[very\ clean]_{A'}[room]_N]_{N'}$

b. $[[fairly\ new]_{A'}[car]_N]_{N'}$

c. $[[very\ playful]_{A'}[cat]_N]_{N'}$

d. $[America's\ [least\ listened\ to]_{A'}[radio\ station]_N]_{N'}$[7].

e. $[[too\ much]_{A'}[time]_N]_{N'}$

(151) a. $[[all\ three]_{Q'}[holidays]_N]_{N'}$

b. $[[all\ five]_{Q'}[days]_N]_{N'}$

c. $[[every\ nine]_{Q'}[questions]_N]_{N'}$

d. $[[all\ powerful]_{Q'}[executives]_N]_{N'}$

As is shown in a later section, phrasal nonheads of nominal compounds may only occur as nonmaximal projections of N. Since the only way that A's and Q's can be nominalized is with a determiner, e.g., "Buster, the very playful," they may not occur as nonheads of nominal compounds.

(152) $[the[*the\ very\ playful]_{NP}[cat]_N]_{NP}$

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[7]This phrase was said by a radio announcer on WNYC, New York City's public radio station.

3.3.4 VP Nonheads in N's

A VP N construction with Phrasal Stress is an N'. In such cases, the VP is reanalyzed as an Adj. Of course, when a VP is reanalyzed as an Adj it must be "frozen" to some extent. Therefore, the following rule is proposed with regard to lexicalized VP nonheads.

(153) Adj --> VP

When VP nonheads behave like "absolute" Adjs, they sound preferable when they are directly next to the head noun they are modifying. However, with proper intonation they may be separated from their head noun. Such VP nonheads may not take a degree modifier.

(154) a. I want to buy that *decorative,*
[[hang-on-the-wall]$_{VP}$ [TV]N]$_{N}$,[8]

b. I want to buy that
[hang-on-the-wall]$_{VP}$, *decorative* TV.

c. I want to buy a **very hang-on-the-wall* TV.

[8]*Hang-on-the-Wall* TV was taken off of the AP Newswire.

(155) a. Those expensive, *[[sit on your lap]$_{VP}$* [computers]$_{N'}$ are convenient.

b. Those *[[sit on your lap]$_{VP}$, expensive* computers are convenient.

c. Those **very sit on your lap* computers are convenient.

The VP nonheads, *hang-on-the-wall*, and *sit on your lap* may be said to be "frozen" to the extent that if another lexical item is inserted into them they will no longer be accepted prenominally.

(156) a. Those are *expensive, hang on the* **plaster wall* TVs.
b. Those *sit on your* **fat lap* computers.

Relative VP nonheads appear to be rare. The example in (157) is relative, however. *Stick-to-the-issue* is relative since another Adj may intervene between it and the nonhead. Furthermore, this idiomatic VP may take a degree modifier.[9]

(157) a. He wrote a *provocative, stick-to-the-issue* article.
b. He wrote a *stick-to-the-issue, provocative* article.
c. He wrote a *very stick-to-the-issue* article.

[9]*Stick-to-the-issue* does not appear to be able to occur as a predicate complement of *seem* and *consider*.

3.4 Nominal Compounds with Phrasal Nonheads

It has been shown in the previous section that phrasal nonheads of N's are "frozen" items which are reanalyzed as Adjs. In contrast, phrasal nonheads of nominal compounds must be nominals. Therefore, phrasal nonheads which are not categorically nominal, i.e., VP and S, must be frozen expressions reanalyzed as nominals.

3.4.1 N' Nonheads in Nominal Compounds

The structure N' N may be a nominal compound, if the following two criteria are met. In contrast to N' constructions, nominal compounds must receive CS. Furthermore, the nonhead and head constituents must be inseparable. The latter criterion is illustrated in the examples in (158), and the former in all of the data below. Therefore, all of the examples are argued to be Ns.

(158) a. [[*teacher of the* **year**]$_{N'}$[*award*]$_{N}$]$_{N}$

b. [*teacher of the year *honorable award*

c. [[*friend of the* **court**]$_{N'}$[*brief*]$_{N}$]$_{N}$

d. *friend of the court *long brief*

e. [[*frozen* **yogurt**]$_{N'}$[*dessert*]$_{N}$]$_{N}$

f. *frozen yogurt *delicious dessert*

g. [[*first* lady]$_N$,[*joke*]$_N$]$_N$

h. *first lady *sarcastic joke*

i. [[*seat of the* pants]$_N$,[*attitude*]$_N$]$_N$

j. *seat of the pants *non-chalent attitude*

(159) [[*Cold* war]$_N$,[*game*]$_N$]$_N$

(160) [[*good* samaritan]$_N$,[*law*]$_N$]$_N$

(161) [[*red* tape]$_N$,[*curtain*]$_N$]$_N$

(162) [[*soft* ice *cream*]$_N$,[*truck*]$_N$]$_N$

(163) [[*fine* china]$_N$,[*setting*]$_N$]$_N$

(164) [[*conflict of* interest]$_N$,[*law*]$_N$]$_N$

(165) [[*state of the* union]$_N$,[*address*]$_N$]$_N$

(166) [[*back* door]$_N$,[*man*]$_N$]$_N$

(167) [[*sundried* tomato]$_N$,[*sauce*]$_N$]$_N$

(168) [[*industrial* waste]$_N$,[*plant*]$_N$]$_N$

(170) [[[*actual*][*hot* firings]]$_N$,[*interfacing*]$_N$]$_N$

(171) [[[*famous*][*critical* items]$_N$,[*list*]$_N$]$_N$

(172) [[[*potential*][*credible* hazards]$_N$,[*analysis*]$_N$]$_N$

(173) [[*generic* procedures]$_N$,[*manual*]$_N$]$_N$

(174) [[*standard* parts]$_N$,[*program*]$_N$]$_N$

(175) [[*photographic* operations]$_N$,[*contractor*]$_N$]$_N$

(176) [[*technical* services]$_N$,[*department*]$_N$]$_N$

(177) [[*abolition of* slavery]$_N$,[*movement*]$_N$]$_N$

(178) [[*American clothes of the* 1920's]$_N$,[*auction*]$_N$]$_N$

(179) [[*allegation of* treachery]$_N$,[*trial*]$_N$]$_N$

(180) [[*recruitment of* personnel]$_N$,[*campaign*]$_N$]$_N$

(181) [*The [Kidney Foundation of New York and New* Jersey]$_{N'}$[*auction*]$_{N}$]$_{N}$

3.4.2 Complexity of N' Nonheads

N's in English can be rather long and complex with regard to PP attachment, as in the examples below. In terms of nominal compounding, however, it appears that the likelihood of "acceptable" compounding decreases, as the length and complexity of an N' nonhead increases. Therefore, the N' nonhead of a nominal compound is not necessarily predictable based on the acceptable length and complexity of grammatical N's which can exist outside of a compound.

(181) a. *the* [[[[*clothes*]$_{N}$]$_{N}$]$_{N}$]$_{N'}$[*from Alabama*]$_{PP}$]$_{N'}$

b. *the* [[[[*clothes*]$_{N}$]$_{N'}$[*of the 1920's*]$_{PP}$]$_{N'}$

c. *the* [[[[*clothes*]$_{N}$]$_{N'}$[*of the 1920s*]$_{PP}$]$_{N'}$
[*from Alabama*]$_{PP}$]$_{N'}$

d. **the* [[[[[*clothes*]$_{N}$]$_{N}$]$_{N'}$[*from Alabama*]$_{PP}$]$_{N'}$
[*of the 1920's*]$_{PP}$]$_{N'}$

e. *the* [[[[*clothes*]$_{N}$]$_{N'}$[*of the 1920s*]$_{PP}$]$_{N'}$
[*from Alabama*]$_{PP}$[*during the depression*]$_{PP}$]$_{N'}$

(182) a. *the [[clothes of the* **1920's**$]_{N'}$ *auction*$]_N$

b. *the [[clothes from* **Alabama**$]_{N'}$ *auction*$]_N$

c. *?the [[clothes of the 1920's from* **Alabama**$]_{N'}$ *auction*$]_N$

d. **the [[clothes from Alabama of the* **1920's**$]_{N'}$ *auction*$]_N$

e. **the [[clothes of the 1930's from Alabama during the* **Depression**$]_{N'}$ *auction*$]_N$

In the examples above, one can see that (181a) and (181b), and their compound correlates, (182a) and (182b) are perfectly acceptable. Regarding nominal compounds, as a rule, an N' plus a single PP complement is generally acceptable. As the length of the N' increases, as in (181c), its acceptability as a compound nonhead starts to be become questionable, as in (182c). Example (182d) is ungrammatical for the same reason as (181d). This is because "of the 1920's" must attach to the N, "clothes," and in its position in (181d), it may only do so by prohibited "cross-branch attachment" (see Radford (1981)). The lengthy N' in (181e) is itself acceptable. However, it is easily ruled out as an acceptable nonhead of the nominal compound in (182e). Based on these observations, it is obvious that there are constraints on the complexity of an N' nonhead (for further discussion, see Liberman and Sproat (1992) of a nominal

compound which may be attributed to parsing complexity.

3.4.3 Genitives and Determiner in Nominal Compounds

Lieber (1988) states that the initial element in compounds perhaps receives a generic interpretation which is incompatible with the presence of determiners. She asserts that while determiners may not appear in the nonhead of a compound, possessives can occur in the Specifier position of an N' nonhead, in a phrasal compound, e.g., *a* [[**dog's** *head*]$_{NP}$[*shadow*]$_{N}$]$_{N}$. She asserts that in, *a dog's head shadow*, that *dog's head* is a maximal projection of N in which the possessive is the Specifier of the N' nonhead. However, this analysis cannot sucessfully predict when the genitive can and cannot be the nonhead of a compound, as in the ungrammatical examples below.

(183) the *[[*John's* **investment**]$_{NP}$[*plan*]$_{N}$]$_{N}$
(184) a *[[**building's** *balcony*]$_{NP}$[shadow]$_{N}$]$_{N}$

Evidence from English nominal compounds shows that the determiner may not occur internally to the nonhead of the compound. This is even the case for nominals, such as *The Bronx*, (Fabb 1984), in which the determiner is obligatory when such a construction is in isolation, illustrated below.

(185) a. *That* *[[*The* **Bronx**]$_{NP}$ [*gang*]$_N$]$_N$ **is really wild.**

b. *That* [[**Bronx**]$_N$ [*gang*]$_N$]$_N$ **is really wild.**

(186) a. *A* *[[*The* **Thinker**]$_{N'}$[*show*]$_N$]$_N$ **is at the museum.**

b. *A* [[**Thinker**]$_N$ [*show*]$_N$]$_N$ **is at the museum.**

(187) a. I liked *the* *[[*The* **Fly**]$_{N'}$ [*film*]$_N$]$_N$.

b. I liked *the* [[**Fly**]$_N$ [*film*]$_N$]$_N$.

It will be shown in the following sections that neither determiners, nor "non-lexicalized" genitives are permissable elements in the nonhead of a compound. Therefore, a maximal projection of N cannot occur in the nonhead of a compound.

3.4.3.1 Genitive Nonheads

Examples (188)-(190) have the same structure and stress patterning as the nominal compounds "BERNOULLI equation," "CHOMSKY adjunction," and "TAYLOR series" in the examples (193) - (195).

(188) *The* [[**Schroedinger's** *equation*]$_N$[*lecture*]$_N$]$_N$ **was easy.**

(189) *The* [[**Grimm's** *law*]$_N$ [*discussion*]$_N$]$_N$ **was unexpected.**

(190) *The* [[**Godel's** *theory*]$_N$[*paper*]$_N$]$_N$ **is really dense.**

(191) *The* [[*Lord's* **prayer**]$_{N'}$[*recitation*]$_N$]$_N$ **was last Sunday.**

(192) *The* [[*God's* **truth**]$_{N'}$[*sermon*]$_N$]$_N$ **is next week.**

(193) *The* [[**Bernoulli** *equation*]$_N$[*lecture*]$_N$]$_N$ **was fun.**

(194) *The* [[Chomsky *adjunction*]$_N$[*reading*]$_N$]$_N$ was due on Friday.
(195) *The* [[Taylor *series*]$_N$[*exam*]$_N$]$_N$ was a snap!

The "SCHROEDINGER'S equation" type and the "BERNOULLI equation" type structures are nominal compounds which receive CS. In the former type, we find the grammatical cooccurrence of a determiner and a genitive. In these cases, the genitive has been suppressed through lexicalization; otherwise this cooccurrence would be impossible, e.g., the John's book. It appears that these genitive constructions have been lexicalized with Phrasal Stress, as in (191) and (192), and with CS. This does not present a problem in terms of the grammaticality of the structure, since nominal compounds may have N' nonheads. The occurrence of the genitive in these compound constructions, and the stress patterning in these preserved "genitive-N Noun" construction is apparently random and subject to the whims of the lexicalization process.

Lieber (1988) claims that *dog's head shadow* is evidence that genitives occur in the nonhead of compound. However, this example does not account for why dog's *head shadow* is acceptable with CS, but *child's* toy *shelf* is only acceptable with Phrasal Stress, and is therefore an N'. In the examples

below, it is shown that expressions referring to animal parts and animal products are themselves N N compounds which have CS. In the examples below, these types of constructions may be compared to the **Schroedinger's** *equation* and **Bernoulli** *equation* examples, regarding the capricious appearance of "'s" in such lexicalized forms.

(196) a. *the* [**dog's** *head*]$_N$
b. *the* [**rabbit's** *foot*]$_N$
c. *the* [**goat's** *milk*]$_N$
d. *the* [**pig's** *feet*]$_N$
e. *the* [**frog's** *legs*]$_N$

(197) a. [**goose** *liver*]$_N$
b. [**goat** *cheese*]$_N$
c. [**cow** *brain*]$_N$
d. [**dog** *doo*]$_N$

In these examples, it appears that the phrases themselves do not necessarily have to be lexicalized since as long as the first constituent is an "animal" this structure/stress combination occurs, e.g., *the* [[**koala** *bear's*]$_N$ [*head*]$_N$]$_N$.

There is still one last type of genitive that occurs

in the nonhead of a nominal compound, which may also coocur with a determiner, as in (198) and (199), below.

(198) a. *The Thinker* is a statue.

b. *Rodin's* [**Thinker** *exhibit*]$_N$ is popular!

c. *The* @[[*Rodin's* **Thinker**]$_N$,[*exhibit*]$_N$]$_N$ is popular!

d. *Rodin's* *[[*the* **Thinker**]$_N$,[*exhibit*]$_N$]$_N$ is popular!

(199) a. *The Minotaur* is a painting.

b. *Picasso's* [**Minotaur** *show*]$_N$ is in Madrid.

c. *The* @[[*Picasso's* **Minotaur**]$_N$,[*show*]$_N$]$_N$ is in Madrid.

d. *Picasso's* *[[*the* **Minotaur**]$_N$,[*show*]$_N$]$_N$ is in Madrid.

Having elicited several judgements from friends and colleagues for examples (198) and (199), I have found that grammaticality judgments varied on (198c) and (199c). A "@" has been placed in the c examples to indicate the alternate judgments for a particular constituent.

Phrasal Stress on *Rodin's* **Thinker**, and *Picasso's* **Minotaur**, in (198c), and (199c), indicate that these are N's.

For some, the cooccurrence of the determiner and the genitive make these constructions ungrammatical. In this case, the claim would be that these people interpret *Rodin's* **Thinker**, and *Picasso's* **Minotaur** in the same way as they would an N' such as, *the John's* **investment**, Alternatively, for those who accept the examples in (198c) and (199c), the cooccurrence of the determiner and the genitive is grammatical. With regard to this interpretation, people are presumably interpreting *the Rodin's* **Thinker** and *the Picasso's* **Minotaur** as they would the lexicalized N's, such as *the Lord's* **Prayer**. A claim that these are just being construed as Proper Names is not supported, since it is clearly ungrammatical to say, for example, *the Mantle's* **glove**, (as in "Mickey Mantle"). So, contra Lieber, the presence of "'s" in the nonhead of a compound is not necessarily evidence that the nonhead is a maximal projection of N.

3.4.4 S and VP Nonheads in Ns

S N and VP N sequences may be nominal compounds if they take CS. The S and VP nonheads must also behave like nominals. Ss and VPs which occur in nonheads of nominal compounds are generally quotatives or book titles which are

presumably lexicalized, and therefore can be nominalized.[10] The following rules are proposed with regard to S and VP nonheads which are "quotatives," or "titles," i.e., "frozen forms".

(200) N --> S
(201) N --> VP

The evidence that both S and VP nonheads can be reanalyzed as Nouns is that they may occur in Noun position in NPs as illustrated in the examples below.

(202) a. [["*The*]$_{Det}$ [[*New*]$_{Adj}$ [*Teach Yourself How to* **Knit**"]$_{VP}$]$_{N}$]$_{N}$]$_{NP}$

b. [[*the*]$_{Det}$ [[*new*]$_{Adj}$ [["*Teach Yourself How to* **Knit**"]$_{VP}$]$_{N}$[*book*]$_{N}$]$_{N}$]$_{N}$]$_{NP}$

c. [[*the*]$_{Det}$ [[*new*]$_{Adj}$ [**book**]$_{N}$]$_{N}$]$_{NP}$

d. [[*her*]$_{Det}$ [[*usual*]$_{Adj}$ ["*Get* **outta** *here*"]$_{VP}$]$_{N}$]$_{N}$]$_{NP}$

e. [[*her*]$_{Det}$ [[[*usual*]$_{Adj}$ [[["*Get* **outta** *here!*"]$_{VP}$]$_{N}$ [*remark*]$_{N}$]$_{N}$]$_{N'}$]$_{NP}$

f. [[*her*]$_{Det}$ [[*usual*]$_{Adj}$ [**remark**]$_{N}$]$_{N'}$]$_{NP}$

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[10] Since basically any S can be a quotative, it would be difficult to find an S which would not be acceptable as a nonhead. This is not the case for VP nonheads which must not have overt tense in nonhead position.

(203) a. $[[her]_{Det}\ [[firm]_{Adj}\ [$"*I'm not gonna sit around and* **gab**"$]_S]_N]_{N'}]_{NP}$

b. $[[her]_{Det}\ [[firm]_{Adj}\ [[[$"*I'm not gonna sit around and* **gab**"$]_S]_N$ $[lecture]_N]_N]_{N'}]_{NP}$

c. $[[her]_{Det}\ [[firm]_{Adj}\ [\textbf{lecture}]_N]_N]_{NP}$

3.5 Conclusion

This chapter points out structural criteria to distinguish N's and Ns of the structure "nonhead + head," in which the nonhead is phrasal. PP N, N' N, and VP N constructions which take Phrasal Stress are N's. It is shown that phrasal nonheads in N's, namely, PP, N', and VP must be "frozen" and are reanalyzed as Adjs. It is shown that they distribute like absolute and relative Adjs. Furthermore, the relative forms may take a degree modifier and may appear as Adj complements of the verbs "seem" and "consider". N' N, VP N, and S N structures which take CS are Ns. Phrasal nonheads in these Ns must be nominals. Therefore, VP and S nonheads of Ns are "frozen" forms which are reanalyzed as nominals. VP and S nonheads are generally book titles or quotatives which are reanalyzed as Nouns. It is shown that these lexicalized VPs and Ss occur in Noun position in an NP,

e.g., [[*The*]$_{Det}$[[*new*]$_{Adj}$[["*Teach Yourself How to* **Knit**"]$_{VP}$]$_{N}$]$_{N'}$]$_{NP}$. With respect to nominal compounds it is shown, contra Lieber (1988, 1992) that nominals in the nonhead of an N may not be maximal projections of N. Furthermore, only lexicalized genitives, e.g., [[*The*]$_{Det}$ [[[**Schroedinger's**]$_{N}$ [*equation*]$_{N}$]$_{N}$]$_{NP}$, are permitted in the nonhead of a compound. Cooccurrence of a determiner and the genitive show that the genitive has been lexicalized. Regarding the reanalysis of nonhead phrases as words, e.g., PP --> Adj and VP --> N, in N's and Ns, it is shown that such phrases will behave like words, and will be inserted into complex nominal structure like any other lexical item.

The table in (204) illustrates all of the structural distinctions between N's and N regarding phrasal nonheads. This criterion may be used to distinguish these structures as "syntactic objects".

CHAPTER FOUR

Identifying N's and Ns with Identical Constituent Structure

4.1 Introduction

As was discussed in Chapters 1 and 2, nominal compounds (N) and N-bars (N') of the structure "nonhead + head," may have overlapping internal constituent structures, as well as shared syntactic relations, e.g., case relations, theta-assignment, headedness (see Roeper and Seigel (1978), Fabb (1984), Sproat (1985), Lieber (1988), and Liberman and Sproat (1992)), which makes them difficult to distinguish between in English. In Chapter 3, it was shown that for certain constructions structural information about phrasal nonheads may provide enough information to make a distinction between N's and Ns.

This chapter points out that phrase structure rules may yield correct structures for both N's and Ns. Furthermore, N's and Ns may be generated that have identical underlying constituent structure, e.g., Adj N and N N. Chomsky and Halle's (1968) stress criterion can predict which structures are N's and which are Ns. However, it does not explain why structures with the same internal constituents, e.g., Adj N, should have different stress assignment, e.g.,

[[electrical]$_{Adj}$ [*system*]$_{N}$]$_{N}$, vs. [[*electrical*]$_{Adj}$ [outlet]$_{N}$]$_{N'}$. In these cases, it is shown that the syntactic occurrence of the nonhead with regard to stress is necessary to distinguish N's and Ns with identical constituent structure. The syntactic occurrence of a constituent may be different from its syntactic category. For example, if an Adj nonhead occurs as a nominal it may be stressed like a Noun , e.g., **legal** *work*. Accordingly, if an N nonhead occurs as an Adj, it may be stressed like an Adj, e.g., *quality* **year**. This chapter will explain how the syntactic occurrence of a nonhead constituent, as well as semantic factors may contribute to stress rules which distinguish between N' and N constructions with identical underlying constituents.

Assuming that Chomsky and Halle's (1968) stress rules can reliably predict Ns and N's (see Chapter 3), we find that one of the most common structural overlaps between N's and Ns is the Adj Noun sequence. Liberman and Sproat (1992) lay out numerous examples of Adj Noun sequences which show the seemingly erratic nature of stress patterning in Adj Noun sequences. Their data show that Adj N sequences may have CS, e.g., **electrical**$_{Adj}$ *tape*$_{N}$. CS and Phrasal Stress alternation for Adj N sequences is discussed. It is shown that when a syntactic Adj occurs as a nominal in an Adj N construction, CS occurs. On the other hand, when an Adj occurs adjectivally,

Phrasal Stress usually occurs. Therefore, it is claimed that stress rules may look at words in terms of their syntactic occurrences. It is also shown how stress patterning in Adj Noun sequences may be driven by semantic information about the head noun.

Three rules are proposed to predict stress patterning in Adj N sequences. The rules involve syntactic and semantic factors. The rules are: (a) the Ambiguous Structure Rule; b) the Nominal-Occurrence-Only Rule; and, c) the Broad Reference Head Rule. With the exception of the Broad Reference Head Rule, the rules are dependent on the syntactic occurrence of the Adj nonhead with regard to stress assignment.

4.2 Dual-Occurrence Adjs

The following discussion addresses the behavior of Adjs which may have both a nominal and adjectival occurrence with regard to stress.[1] Though a word is an Adj, syntactically, it may be stressed like a Noun. In such cases, the Adj N construction receives CS. If a nonhead Adj in an Adj N construction is adjectival, Phrasal Stress is assigned. Adjs

[1] This is most common for words ending in "-al," and "-ic," such as "electrical" and "atomic"

with may have both nominal and adjectival occurrences will be referred to as *Dual-Occurrence Adjs* (DOA). The nominal occurrence of a DOA will be termed a *Nominal Occurrence Adj* (NOA), and is defined below. For the sake of clarity, the unmarked, "adjectival occurrence" of an DOA will be referred to as the "AdjO," (or alternatively as an "adjectival occurrence"), so as not to confuse it with "Adj" as a syntactic category.

(1) Definition of an NOA:

> An NOA is an syntactic Adj which has a nominal occurrence, and may be stressed like a Noun.

When an NOA is the nonhead of an Adj N sequence, the entire construction gets CS. Such structures are, therefore, considered to be Nouns. In such cases, there is a conflict between the syntactic labeling of a word, and its actual syntactic occurrence with regard to stress. Therefore, the nonhead constituent requires a dual labeling. Such constituents must be labeled in terms of their actual syntactic category, as well as their syntactic occurrence with regard to stress. The dual labeling in (2a) reads, such that the first labeling is the actual "syntactic category," and the second is the "syntactic occurrence" with regard to stress.

(2) a. $[[\textbf{legal}]_{Adj/NOA}\ [\textit{work}]_{N}\ ]_{N}$

b. The attorney was fined heavily for the crooked **legal** *work* he did related to Sheila's insurance claim.

(3) a. $[[\textit{legal}]_{Adj}\ [\text{work}]_{N}\ ]_{N'}$

b. If you want to get *legal* work, you really need a Green Card.

The meanings associated with the nominal and adjectival occurrences appear to be different. This difference in meaning is illustrated in examples (2b) and (3b). For instance, in (3), "legal" describes the property of "legalness" of the head noun, "work". The presence of an NOA in (2), on the other hand, describes a "type". Here, "legal" describes a type of "work". It is "work" related to "the law". This does not necessarily entail that the head noun, "work," itself be "legal," as suggested by the usage in (2b). Based on this observed difference in meaning between the nominal and adjectival occurrences of a nonhead Adj, it is claimed that *meaning* may fall out of the structures, i.e., N and N', but this is not required. This claim may also apply to an Adj which becomes "nominalized". Here again, a different sense may apply to different structures. For example, the Adjs *legal* and *illegal* have one sense associated with their adjectival form, and a second sense associated with their nominal form, as illustrated in (4) and (5).

(4) a. Chain letters are $\textit{illegal}_{Adj}$.
b. The guy behind the counter is an

illegal$_N$.

(5) a. I want this bank transaction to be *legal*$_{Adj}$.
b. Everyone over in *legal*$_N$ is going for a drink.

Different senses may also be noted from the structures below. The two senses appear to fall out of the two different structures. In the first example with CS, **professional** *organization* is an N. The nominal compound, here, means 'an organization for some type of *profession*'. In the second case with Phrasal Stress, *professional* **organization** is an N', and refers to 'an organization which maintains a behavior expected of professionals'.

(6). The [[**professional**]$_N$ [*organization*]$_N$]$_N$ often held fund-raisers.

(7). Their attitude has to change to become a [[*professional*]$_{Adj}$ [**organization**]$_N$]$_{N'}$.

4.2.1 Levi (1980)

Levi (1980) uses predication to characterize the alternate nominal and adjectival occurrences which exist for Adjs such as, *legal*. She claims that nonpredicative Adjs behave as nominals. Discussed here, are three kinds of

evidence which Levi uses to support this claim. She claims that nonpredicative Adjs may not occur in predicative position. Furthermore, Levi shows that "quantifying prefixes," reserved for noun attachment may be prefixed to nonpredicating Adjs. Levi also notes that nonpredicative Adjs, like nouns, may not be conjoined with predicative Adjs.

Levi (1980) would claim that the difference between the readings of *legal* in (2) and (3) is that in (2) *legal* is nonpredicative and nominal, and (3) *legal* is predicative and adjectival. She claims that the predication distinction explains the asymmetry in examples such as (8) and (9).

Predicative

(8) a. The friendly policeman.
b. The policeman is friendly.

Nonpredicative

(9) a. The rural policeman
*b. The policeman is rural.

A predication argument may be used to explain some of the more clear-cut cases, as in the examples above. What makes the predication argument problematic is that not all nonpredicating Adjs are ungrammatical as predicates. Adjs, such as *medical*, *clerical*, and *surgical*, may all be shown to occur as nominals, since in nonhead position they will almost

without exception be stressed like Nouns, e.g, **medical** *degree*, **surgical** *wound*, **clerical** *error*. However, these NOAs may also be predicative.

(10) a. Her problems were all medical.
b. The error was clerical.
c. The wound is surgical.

In addition, some nonpredicative Adjs are not nouns, namely, *former* and *mere*.[2]

(11) a. The former president
b. The president was *former.
c. A mere gesture
d. The gesture was *mere.

Therefore, a test for predication may be misleading in terms of determining the syntactic behavior of an Adj.

Levi (1980) notes that since nouns are the only "countable" constituents, it is predicted that at least some nonpredicative Adjs should be able to attach to quantifying prefixes which attach to nouns, as in the following examples.

(12) a. polychemical solution
b. multielectrical system
c. triprovincial governer
d. biurban agreement
e. monoconsonantal syllable

---

[2]This was pointed out to me by Richard Sproat.

The problem with this analysis is that it is unclear in some of the examples whether the root word, e.g., *provincial*, is an Adj or a Noun. Though some of the root Adjs are nonpredicative, as in (13a),(13b), and (13c), others are clearly predicative, such as (13d) and (13e), and should therefore, according to Levi, be Adjs.

(13) a. The solution is *chemical.
b. The governer is *provincial.
c. The agreement is *urban.
d. That syllable is consonantal.
e. That system is electrical.

Levi (1980) notes that nonpredicating Adjs and predicative Adjs are not conjoinable in the same way that Nouns are not conjoinable with predicative Adjs. She shows, however, in comparison to a "N and N" structure that nonpredicating Adjs are conjoinable with nouns, which she asserts is due to the "nominal origins" of nonpredicating Adjs. Levi (1980) illustrates with the following examples.

Nonpredicating Adj conjoined with a noun:

(14) a. electrical and mining engineers
b. solar and gas heating
c. domestic and farm animals

Nonpredicating Adj conjoined with with Nonpredicating Adj/*Predicating Adj:

(15) a. a civil and mechanical/*rude engineer
b. continental and oceanic/*respected journals
c. literary and musical/*bitter criticism

This "conjoinability" account supports the claim that certain Adjs may, in fact, behave as nominals in certain contexts. This is consistent with the notion of an NOA in which syntactic Adjs may occur as nominals, and therefore, may be stressed like Nouns.

Levi's (1980) claims about the nounhood of certain Adjs in terms of distribution, namely, which parts of speech are conjoinable, appears to be correct. The "conjoinability" argument, therefore, is consistent with the notion of NOAs. Levi's predication scheme, on the other hand, is not reliable for predicting the syntactic occurrences of Adjs. Therefore, it cannot account for alternating stress in Adj N sequences. This chapter will show how stress alternation in Adj N constructions may be explained by syntactic occurrences of the nonhead Adj, as well as semantic factors.

4.3 The Structure of Compound Nonheads

4.3.1 Two Structures for an Adj Noun Sequence

According to Chomsky and Halle's (1968) stress

criterion, Phrasal Stress would be expected for Adj N sequences, e.g., $[[electrical]_{Adj}$ $[engineer]_{N}]_{N'}$, since they are typically classified as N's. However, there are numerous examples of minimal pairs in which a single Adj N sequence may have alternate stress assignment (see Ladd (1984)). I claim that this is because two different structures exist. The Adj N sequence with CS is an N, e.g., $[[legal]_{Adj/NOA}$ $[work]_{N}]_{N}$, and the Adj N sequence which gets Phrasal Stress is an N', e.g., $[[legal]_{Adj}$ $[work]_{N}]_{N'}$. The stress alternation is, of course, entailed by the structure of each sequence. It is argued that when a single sequence, such as *legal work*, has two different structures, then the stress looks at the syntactic occurrence of the nonhead to disambiguate the structure. If a nonhead is an NOA, it will be stressed like a Noun. In such cases, the entire structure get CS and so it is an N. If the nonhead occurs adjectivally, the structure will get Phrasal Stress, and will be an N'. The examples below show structurally ambiguous sequences with alternating stress which may be accounted for by the rule in (21). The NOAs in these (16) - (18) may show two possible cases of nominal distribution. First, these Adjs may be conjoined with Nouns. As Levi (1980) has noted, Nouns may only be conjoined with other Nouns. Secondly, it may be shown that *electrical* may occur with Determiners (Det), and *legal* may occur as the object of the Preposition *in*, in a context where a Noun would

be expected.[3] The different senses of the nonhead Adj associated with each structure are also illustrated.

(16) a. $[[ELECTRICAL]_{Adj/NOA}\ [store]_N\ ]_N$
"store which sells electrical stuff"
b. I own an *electrical and hardware store.*
c. Who did *the electrical* in your house?
d. $[[electrical]_{Adj}\ [STORE]_N\ ]_{N'}$
"store which is itself electrical"

(17) a. $[[LEGAL]_{Adj/NOA}\ [work]_N\ ]_N$
"work related to the law"
b. Chandler does *legal and sewing work.*
c. The people over *in legal* are very busy.
d. $[[legal]_{Adj}\ [WORK]_N\ ]_N$
"work permitted by law"

(18) a. $[[PROVINCIAL]_{Adj/NOA}\ [governor]_N\ ]_N$
"governor of a province"
b. She is the *provincial and tax governor.*
c. $[[provincial]_{Adj}\ [GOVERNOR]_N\ ]_{N'}$
"governor who is unsophisticated"

Outside of their ability to consistently conjoin with other Nouns, NOAs are restricted with regard to nominal distribution. Therefore, I claim that they are not true

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[3] *Provincial* may occur with a Det, *a provincial*, meaning either "someone from a province," or "one who acts unsophisticated". This usage of *provincial* is nominal and has a different meaning than its usage in $[\textbf{provincial}_{Adj/NOA}\ governor_N]_N$ where it refers to "an actual provinces of group of provinces".
Therefore, this usage will not occur with a Det, **a provincial.*

Nouns. It appears that their distributions as Nouns are idiomatic, as in *in legal* in (17c), which is an idiomatic reference to a *legal department* of a company. Though *legal* may occur as a Noun in that particular structure, it is clear that it may not appear in a Noun slot in just any construction, e.g, **a legal*. It would also be expected that since *electrical* may take a Det, that it should be able to be modified by Q terms, such as *each* and *most* like other count Nouns. However, it is illustrated below that such cases are ungrammatical. Therefore, I claim that the construction *the electrical* in (16c) is an idiomatic usage.

(19) a. each person
b.*each electrical

(20) a. most people
b.*most electricals

The alternating stress patterns in cases, such as (16) - (18), may be accounted for by the *Ambiguous Structure Rule* defined as follows.[4]

(21) Ambiguous Structure Rule

If a single Adj N sequence may be an N' or an N,

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[4] Alternating stress assignment may also involve a pragmatic device to resolve the unavoidable ambiguity present in Adj N constructions in which the Adj is a DOA, since the combination of the DOA and the head noun also allows two meanings for a single construction.

the structure with a nonhead NOA is an N, and receives CS, and the structure in which the nonhead is adjectival is an N',and receives Phrasal Stress.

4.3.1.1 More on Stress, Structure and Meaning

It was noted in a previous section that more than one meaning may be associated with DOAs, and that these different meanings may fall out of different structures, i.e., N' and N. For example, it was pointed out that in *legal work* the nominal and adjectival occurrences of $legal_{Adj}$ have different meanings. In phrases, such as $[electrical_{Adj}$ **engineer**$_N]_{N'}$ and [**electrical**$_{Adj/NOA}$ $course_N]_N$, it may be shown that different meanings may be associated with occurrences of *electrical*, both of which have nominal distributions. The occurrence of *electrical* in *[electrical* **engineer**$]_{N'}$, has a nominal distribution, e.g., *an electrical and mining engineer.* Even though *electrical* has a nominal distribution, it is still stressed like an Adj. In the N [**electrical**$_{Adj/NOA}$ $course_N]_N$, on the other hand, *electrical* also has a nominal distribution, e.g., *an electrical and circuit theory course*, but it is stressed like a Noun. In both the N' and the N construction, *electrical* distributes nominally. However, the sense of *electrical* in each construction is different. This is consistent with the notion that different meanings may fall out of different structures. Furthermore, we can see that

a syntactic Adj will not necessarily become a nominal because it has a nominal distribution as is illustrated in the case of *electrical* **engineer.**

4.3.2 -AL Adjectives Restricted to a Nominal Reading

If the nonhead Adj in an Adj N sequence is one of the following: *medical, surgical, clerical, postal, or dental,* the construction will almost always be an N, and receive CS. These Adjs are strictly NOAs, and they adhere to the following rule.

(22) Nominal-Occurrence-Only Rule:

If in an Adj Noun construction, the nonhead Adj must only occur as an NOA, the structure is an N, so CS applies.

(23) - (27) are examples of sequences in which the Adj is restricted to a nominal occurrence.[5]

(23) a. $[[\textbf{medical}]_{Adj/NOA}\ [\textit{building}]_{N}\ ]_{N}$

b. $[[\textbf{medical}]_{Adj/NOA}\ [\textit{procedure}]_{N}\ ]_{N}$

c. $[[\textbf{medical}]_{Adj/NOA}\ [\textit{alert}]_{N}\ ]_{N}$

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[5]A few examples are found, e.g., "medical MEDIOCRITY," and "medical ENGINEERING," in which NS applies. However, it is also the case that a number of Noun Noun sequences also receive NS, e.g., "kitchen TABLE". Therefore, NS in examples such as,"medical MEDIOCRITY," are not counterexamples to the claim that "medical," is an NOA.

d. [[**medical**]$_{Adj/NOA}$ [*cure*]$_N$]$_N$

e. [[**medical**]$_{Adj/NOA}$ [*degree*]$_N$]$_N$

f. [[**medical**]$_{Adj/NOA}$ [*association*]$_N$]$_N$

g. [[**medical**]$_{Adj/NOA}$ [*doctor*]$_N$]$_N$

h. [[**medical**]$_{Adj/NOA}$ [*excuse*]$_N$]$_N$

(24) a. [[**dental**]$_{Adj/NOA}$ [*appointment*]$_N$]$_N$

b. [[**dental**]$_{Adj/NOA}$ [*work*]$_N$]$_N$]$_N$

c. [[**dental**]$_{Adj/NOA}$ [*assistant*]$_N$]$_N$

d. [[**dental**]$_{Adj/NOA}$ [*disease*]$_N$]$_N$

(25) a. [[**surgical**]$_{Adj/NOA}$ [*procedure*]$_N$]$_N$

b. [[**surgical**]$_{Adj/NOA}$ [*wound*]$_N$]$_N$

c. [[**surgical**]$_{Adj/NOA}$ [*gloves*]$_N$]$_N$

d. [[**surgical**]$_{Adj/NOA}$ [*mask*]$_N$]$_N$

e. [[**surgical**]$_{Adj/NOA}$ [*technique*]$_N$]$_N$

(26) a. [[**clerical**]$_{Adj/NOA}$ [*error*]$_N$]$_N$

b. [[**clerical**]$_{Adj/NOA}$ [*job*]$_N$]$_N$

c. [[**clerical**]$_{Adj/NOA}$ [*occurrence*]$_N$]$_N$

d. [[**clerical**]$_{Adj/NOA}$ [*file*]$_N$]$_N$

e. [[**clerical**]$_{Adj/NOA}$ [*matters*]$_N$]$_N$

(27) a. [[**postal**]$_{Adj/NOA}$ [*worker*]$_N$]$_N$

b. [[**postal**]$_{Adj/NOA}$ [*delivery*]$_N$]$_N$

c. [[**postal**]$_{Adj/NOA}$ [*strike*]$_N$]$_N$

d. $[[\textbf{postal}]_{Adj/NOA}\ [fee]_N\ ]_N$

e. $[[\textbf{postal}]_{Adj/NOA}\ [stamp]_N\ ]_N$

For this class of NOAs, Levi's (1978) test for "conjoinability" also shows that *"medical," "dental," "surgical," "postal," and "clerical,"* may distribute like Nouns. It can be shown that they behave like nominals, and are therefore conjoinable with Nouns, but not true Adjs.

(28) a. Mary had *medical and *phony* excuses.
b. She had *medical and maternity* excuses.
c. Fred had *medical and massage* training.

(29) a. He had *surgical and *infected* wounds.
b. Pedro had *surgical and war* wounds.
c. Karen had *surgical and gardening* gloves.

(30) a. She did *dental and *exciting* work.
b. Cindy had *dental and money* problems.
c. Wendy did *dental and hospital* work.

(31) a. These are *clerical and *irreparable* errors.
b. The company made both *clerical and management* errors.
c. He said he could do *clerical and factory* work.

(32) a. Buster charged for *postal and *illegal* stamps.
b. That guy sold *postal and food* stamps.
c. Pat was charged a *postal and veternarian* fee for safe delivery of her cats.

As shown in the previous section, NOAs consistently conjoin with other Nouns, other nominal distributions for these NOAs appear to be idiomatic. In other words, a specialized usage of an NOA may occur as a nominal, but not

all usages of the NOA have unrestricted nominal distribution. Idiomatic nominal distributions for *medical*, *surgical*, and *dental* are illustrated below.

(33) a. *The insurance* she gets from her job is great!
b. *The medical* she gets from her job is great!
c. *The dental* she gets from her job is great!
d. *The ?surgical* she gets from her job is great!
e. Send your papers to *medical*.
f. Send your papers to *dental*.
g. Send your papers to *?surgical*.
h. *Most medical* pays for 80% of hospital stays.
i. *Most ?dental* will not pay for cosmetic treatments.

4.4 Compound Head Nouns

4.4.1 Stress and Structure of Proper Names

It is fairly common knowledge that Proper Names receive Phrasal Stress assignment. They are therefore N's.

(34) a. [*Mickey* **Mantle**]$_{N'}$
b. [*American* **Airlines**]$_{N'}$
c. [*Carnegie* **Hall**]$_{N'}$
d. [*Sun* **Microsystems**]$_{N'}$
e. [*Madison* **Avenue**]$_{N'}$

Proper names also have stress patterning much like coordinate structures, and N's + N sequences.

(35) a. [*Adrianne Elizabeth Sara* **James**]$_{N'}$
b. [*John's cousin's mother's dog's* **house**]$_{N'}$[6]
c. [*Adrianne, Elizabeth, Sara and* **James**]$_{N'}$

Proper Names will, therefore, be considered to be N's unless otherwise stated.

4.4.2 Broad Reference Heads and Proper Names

Ladd (1984) notes that minimal pair contrasts in Proper Names, such as **Madison** *Street*, and *Madison* **Avenue**[7] do exist, and therefore, need to be accounted for in a structure-dependent theory of stress, such as Chomsky and Halle (1968). Ladd claims that in cases, such as **Madison** *Street*, the head noun is being "deaccented," because *Street* is, presumably, the "least marked" head noun in the set of nouns which might be used to label a particular *Street*. I have termed these "least marked" nouns as *Broad Reference (BR) Nouns* defined below.

(36) Definition of a Broad Reference Noun:
A Broad Reference Noun is an Noun which is underspecified.

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[6]This example is from Liberman and Prince (1977:255).

[7]It has been suggested to me that in Proper Names with NS, the nonhead, and the head are equally parts of the entire name, as in *Mickey* **Mantle**. On the other hand, when a Proper Name, such as **Madison** *Street* receives CS, it is not as clear that the deaccented head noun, is as much a part of the entire name as is the nonhead.

The Broad Reference Head Rule (BRHR) in (37) accounts for the structure and stress of complex nominals with BR heads.

(37) Broad Reference Head Rule:

> No *narrow* reference heads may appear in nominal compounds, where *narrow* implies that a *broader* head exists.

According to the BRHR, the presence of a BR N in the head of a Proper Name will affect its structure and stress. Proper Names with BR head Ns will therefore be Ns, and receive CS. The street/avenue contrast discussed by Ladd generalizes to many other examples as shown below. This contrast also is accounted for by the BRHR. Below, Proper Names which are Ns have *BR heads*, and those which are N's have *narrow reference heads*.

(38) a. [[**Henry**]$_N$ [*Street*]$_N$]$_N$

b. [[*Madison*]$_N$ [**Avenue**]$_N$]$_N$,

c. [[*Roosevelt*]$_N$ [**Boulevard**]$_N$

d. [[*East River*]$_N$, [**Drive**]$_N$]$_N$,

e. [[*Boerum*]$_N$ [**Place**]$_N$]$_N$,

f. [[*Abbey*]$_N$ [**Road**]$_N$]$_N$,[8]

---

[8]It is debatable whether in the cases of "street," or "road," one can be said to be less marked than the other. "Street" is obviously more likely to be used in the city, while "Road" is perhaps more common outside of the city. However, Ladd notes a marked usage of "Road" which does not apply to "street," which is that "...a Road probably leads out of town..." (Ladd:260). "Street" really has no marked

(39) a. [[*The* [[**Packard**]$_N$ [*School*]$_N$]$_N$]$_{NP}$[9]

b. [*The* [[*Robert* **Fiance**]$_{N'}$ [*School*]$_N$]$_N$]$_{NP}$

c. [*The* [[*Manhattan*]$_N$ [**Conservatory**]$_N$]$_{N'}$]$_{NP}$

d. [[*Temple*]$_N$ [**University**]$_N$]$_{N'}$

e. [[*Trinity*]$_N$ [**College**]$_N$]$_{N'}$

f. [*The* [[*Wilfred*]$_N$ [**Academy**]$_N$]$_{N'}$]$_{NP}$

(40) a. [[**Hopi**]$_N$ [*Land*]$_N$]$_N$

b. [**Disney***land*]$_N$[10]

c. [[*Delaware*]$_N$ [**County**]$_N$]$_{N'}$

d. [[*New York*]$_{N'}$ [**State**]$_N$]$_{N'}$

e. [[*Kansas*]$_{N'}$ [**City**]$_N$]$_{N'}$

(41) a. [*The* [[*Betty* **Ford**]$_{N'}$ [*Center*]$_N$]$_N$]$_{NP}$

b. [[**Covenant**]$_N$ [*House*]$_N$]$_N$

c. [*The* [[*Fosterdale* **Heights**]$_{N'}$ [House]$_N$]$_N$]$_{NP}$

d. [[*Overlook*]$_N$ [**Hospital**]$_N$]$_{N'}$

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usage at all.

[9]It has been pointed out to me, that in some "prestige conscious" circles, that certain "schools," considered to be "elite," get NS on the head noun, "school," e.g., "The Hotchkiss **School**". This is presumably some sort of attempt to "prestigify" the name. The Robert **Fiance** School (of beauty) does not have such stress patterning.

[10]Ladd notes that certain geographical referents may take NS, while other take CS. This is relatively easy to explain given examples where the head nouns are "state," "city," and "county," as opposed to "land". The former three are well-defined territorial and political units, while "land" has no such definition.

(42) a. [[**Sylvia's**]$_N$ [*Place*]$_N$]$_N$

b. [[*Sylvia's*]$_{NP}$ [**Restaurant**]$_N$]$_{N'}$

c. [[*Wilson's*]$_{NP}$ [**Bakery**]$_N$]$_{N'}$

d. [*The* [[*Chatham Wok*]$_{N'}$ [*Diner*]$_N$]$_{N'}$]$_{NP}$

e. [*The* [[*Olive Tree*]$_N$ [**Cafe**]$_N$]$_{N'}$]$_{NP}$

In the above examples, *Street, School, Land, Center, House*, and *Place* are considered the broad reference head nouns in (38) - (42) and therefore, they are deaccented. In (38), *Street*, itself, could be used to refer to an *Avenue, Boulevard, Drive, Place, or Road.* These terms would be considered the relative *narrow* terms in relation to *Street.* Conceivably, if someone asked me where *Madison* **Avenue** was, I might answer "It's that **street**, down there by the **STOP** sign.". In (39), *School* could be a *University, Conservatory, College, or Academy.* One could ask what school one was attending, and the answer could be either of the four *narrow* terms for schools. The converse, however, is not possible. For example, one could not say they were attending a particular university if one were in high school. In (40), a *State, City*, or *County* is a land area," but not any land area is a *State, City*, or *County.* In (41), *Center* refers to a rehabilitation center, but it could just as easily refer to a hospital. In (41b), *House* refers to a shelter for runaways, but in (41c), it refers to Bed and Breakfast Inn. The term

House, therefore, could have a number of referents, unlike the heads in (41c)-(41f). And, in (42), a *Place* can be either a *Restaurant, Bakery, Diner, Cafe.* However, unless one knew of a particular business called Sylvia's *Place*, one could not be sure what type of place it was. For the *narrow* terms restaurant, *Bakery, Diner, or Cafe*, however, the type of referent is obvious. Based on this data, it is claimed that stress assignment for Proper Names can be predicted by the head.

4.4.3 Adj N Sequences with Broad Reference Heads

It would be expected that complex nominals, such as **electrical** *system* and **electrical** *class* would get Phrasal Stress like the N's *electrical* **outlet** and *electrical* **engineer.** The BRHR accounts for the structure and stress difference between the former and the latter cases. If a BR N is the head of an Adj N construction, CS assignment applies. Therefore, the nonhead Adj in such cases will always be stressed like a Noun. Furthermore, the BRHR is insensitive as to whether the nonhead Adj is a true Adj, or an NOA. In other words, regardless of whether the nonhead Adj distributes like an Adj, e.g., electrical and powerful system, or a Noun, e.g., electrical and heating class, CS will occur if the head is a Broad Reference type.

Adj with Adj Distribution:

(43) a. Can you fix the *ELECTRICAL system.*
ATOMIC
{ NUCLEAR }
CHEMICAL
MECHANICAL

b. The *ELECTRICAL area* is restricted to employees.
ATOMIC
{ NUCLEAR }
CHEMICAL

NOA with Nominal Distribution:

(44) a. That *ELECTRICAL class* is interesting.
{ NUCLEAR }

b. That type of *ELECTRICAL work* is sort of risky.
{ NUCLEAR }
ATOMIC

It would appear that a term, such as *[***legal** *secretary]*$_N$, might be a counterexample to the BRHR, since *secretary* would appear to be a relatively "narrow" term. However, it is argued that a more narrow term which refers to *secretary* does not exist, unlike the case of "Street" for which more narrow terms do exist *Road*, *Avenue*, *Drive*, *Place*, and *Circle*. Therefore, *secretary* may occur as the head of N.

I have also found cases in which the frozen PPs, N's, and VPs, discussed in Chapter 3, which have been reanalyzed as Adjs may be stressed like Nouns if they have a BR head. The fact that the nonhead Adjs may take a degree modifier

illustrates that these nonheads are still syntactic Adjs, even though they are stressed like Nouns.

(45) That *very [[[off the* **cuff**$]_{PP}]_{Adj/NOA}$[*thing*$]_N]_N$ you said the other day was not too kind.

(46) That *very [[[run of the* **mill**$]_{N'}]_{Adj/NOA}$[*junk*$]_N]_N$ is at that Flea Market.

(47) A *very [[[stick-to-the* **issue**$]_{VP}]_{Adj/NOA}$[*type*$]_N]_N$ just walked in.

It is perhaps the case that the BRHR is a result of pragmatic effects of "shifting of focus," (see Bolinger (1972)), in which primary stress is placed on the most vital piece of information in a complex nominal construction.[11]

4.5 Plural "-s" Attachment and BR Ns

There are numerous cases of complex nominals which can take inflectional "-s" on the nonhead, for example, "systems research"(see Selkirk (1982), DiSciullo and Williams (1987),

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[11] This stress shift does not appear to occur with ordinary Adjs, e.g., a strange **thing**, a weird **area**, an efficient **system**, an overcrowded **zone**, a fun **class**. This suggests that perhaps something related to DOAs, and "frozen" forms is allowing
them to be stressed like Nouns.

Churma (1983)). Predicting when plural "-s" may attach to a nominal nonhead seems to be an intractable problem, since this type of attachment appears somewhat arbitrary. None of the proposed structural descriptions of compounding can correctly generate an accurate set of compounds in which plural "-s" attaches to the nonhead of the compound. Stem theories of the word (cited by Selkirk (1982)) assert that inflectionless stems can be combined to form compound stems. And, an affix can be added to the stems to form words. The rules for compound formation in "stem theories," below, will not allow an inflected stem as the first constituent, so this rules out any possibility of compound forms such as, **systems** *engineer*.

(48) Stem --> Stem Stem
(49) Word --> Stem Af

Selkirk (1982) proposed the following rules for a "word based" system of compound formation which could generate compounds with plural nonheads.

(50) Word --> Word Word
(51) Word -> Word Af

Though these rules can clearly generate compounds such as, **systems** *engineer*, they will overgenerate. There are no restrictions preventing something such as, **televisions thief*.

Churma (1983) suggests that compounds such as, "Jets fan" could be generated by the following rules.

(52) Stem --> Stem Af
(53) Word --> Stem

In other words, some words, e.g., *Jets*, are stems and words simultaneously in English. They are stems in that they occur in their most primitive form in the lexicon. But, they are words since they come equipped with one inflectional suffix, which is all that English will permit. Again, Churma's rules handle only a limited number of the possible compound tokens with plural nonheads. Furthermore, some cases like *Jets fans* are easily explained by the fact that *Jets* occurs only as a plural, like *arms* in *arms race*. This section handles cases of compounds in which the nonhead is not a frozen plural.

Based on the difficulties concerning the above structural descriptions of compounds with plural nonheads, better explanations may be found by observing pragmatic and semantic factors that may influence plural "-s" attachment in nonheads of compounds. It is shown that even though "-s" may display some arbitrary attachment, it attaches most productively to BR nonheads in Ns.[12]

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[12]I have not been able to find an example of an N' of the structure [N-s N]N'. Therefore, I claim that the N-s + N construction is exclusive to nominal compounds.

Selkirk (1982) asserts that plural "-s" attaches to the nonhead of Ns for two reasons. She states that in examples such as, *private schools catalogue*, and *programs coordinator*, that the plural might be used in order avoid ambiguity which exists with the singular correlates of these examples. That is, a *private school catalogue* could mean a catalogue for a single "private school," as well as one for a number of *private schools*. This analysis may seem reasonable for the cases mentioned. However, examples such as *private schools catalogue* appear to be exceptions, since the "disambiguation" argument does not explain why examples such as, **gardening magazines catalogue*, **nursing homes catalogue*, **school lunches coordinator*, and **math classes coordinator*, seem less preferable than their correlates, with singular nonheads. These correlates, e.g., *gardening magazine catalogue*, and *school lunch coordinator*, are unarguably grammatical and the nonheads are easily interpreted as plurals. The disambiguation analysis also does not explain that a difference in meaning may not always be recognized between correlates such as, *programs coordinator*, and *program coordinator*. The acceptance of *programs coordinator* can be explained by the fact that *programs* may be considered to have broad reference.

Selkirk (1982) claims that plural "-s" may also occur on

the compound nonhead if the nonhead has an idiomatic meaning, i.e., one that cannot be figured out from the singular usage. Examples of these cases are, *arms merchant, tryouts judge, human services administration*, and *tall ships regatta*. And, of course, examples which Selkirk (1982) uses such as, *overseas investor*, and *pants-loving* are acceptable because these plural nonheads have no singular correlate.

It is claimed here, that plural "-s" attaches more productively to BR nonheads, e.g., *system, program, operation*. The more narrow the scope of reference is, the less acceptable the attachment of the plural to the nonhead will be. This explains why *programs coordinator* is acceptable, and **school lunches coordinator* is not.

The data below illustrate the productivity of nominal compounds with plural BR N nonheads. Cases in which the nonhead N has an obligatory plural, e.g., *arms system*, will not be discussed, since the reason for these cases being grammatical is obvious. This set of data contains technical expressions which were collected from the transcripts of the Senate panel investigations regarding the explosion of the "Challenger" shuttle. The plural nonheads in these examples are highly productive in this database, and are therefore, found to be used repeatedly with various head Ns. All of the

examples used, henceforth, in this section are assumed to have CS.

(54) [[*special* facilities]$_N$, [*team*]$_N$]$_N$
(55) [[loads]$_N$ [*analysis*]$_N$]$_N$
(56) [[flight *operations*]$_N$[*activity*]$_N$
(57) [[ground *operations*]$_N$ [*manager*]$_N$]$_N$
(58) [[shuttle *projects*]$_N$ [*office*]$_N$]$_N$
(59) [[missions *operation*]$_N$[*directorate*]$_N$]$_N$
(60) [[effects]$_N$ [*analysis*]$_N$]$_N$
(61) [[specifications]$_N$ [*standpoint*]$_N$]$_N$
(62) [[*generic* procedures]N'[*changes*]N
(63) [[systems]$_N$ [*standpoint*]$_N$]$_N$
(64) [[*critical* items]$_N$:[*list*]$_N$]$_N$
(65) [[*payload capabilities*]$_N$ [demonstration *phase*]$_N$]$_N$
(66) [[communications]$_N$ [*satellite*]$_N$]$_N$
(67) [[materials]$_N$ [*problem*]$_N$]$_N$
(68) [[*inert* parts]$_N$, [*preparation*]$_N$]$_N$
(69) [[*spare* parts]$_N$, [*procurements*]$_N$]$_N$
(70) [[*public* affairs]$_N$, [*person*]$_N$]$_N$

If we take any head noun in the above examples and attach to it a plural nonhead with a more or less specific referent we run into acceptability problems as illustrated below.

(71) a. [[*spare* parts]$_N$, [*procurements*]$_N$]$_N$
b. [[*spare* *doors]$_N$, [*procurements*]$_N$]$_N$
c. [[*spare* door]$_N$, [*procurements*]$_N$]$_N$
d. [[*spare* *windows]$_N$, [*procurements*]$_N$]$_N$
e. [[*spare* window]$_N$, [*procurements*]$_N$]$_N$

(72) a. [[materials]$_N$ [*problem*]$_N$]$_N$

b. [[*acoustical* ****tiles***]$_{N'}$ [*problem*]$_{N}$]$_{N}$

c. [[*acoustical* **tile**]$_{N'}$ [*problem*]$_{N}$]$_{N}$

d. [[*flammable* [**seat** **covers*]$_{N}$]$_{N'}$ [*problem*]$_{N}$]$_{N}$

e. [[*flammable* [**seat** *cover*]]$_{N'}$ [*problem*]$_{N}$]$_{N}$

f. [[*rusty* ****pipes***]$_{N'}$ [*problem*]$_{N}$]$_{N}$

g. [[*rusty* **pipe**]$_{N'}$ [*problem*]$_{N}$]$_{N}$

(73) a. [[**ground** *operations*]$_{N}$ [*manager*]$_{N}$]$_{N}$

b. [[*gourmet* ****supermarkets***]$_{N'}$ [*manager*]$_{N}$]$_{N}$

c. [[*gourmet* **supermarket**]$_{N'}$ [*manager*]$_{N}$]$_{N}$

d. [[*French* ****restaurants***]$_{N'}$ [*manager*]$_{N}$]$_{N}$

e. [[*French* **restaurant**]$_{N'}$ [*manager*]$_{N}$]$_{N}$

As is indicated in the beginning of this section, the attachment of the plural to nominal compound nonheads often seems arbitrary, and cases do exist in which "-s" attaches to a specific referent nonhead Ns, e.g., **weapons** *systems*, *Siamese* **cats** *fancier*.[13] However, "-s" does not attach as productively to *narrow* referents as it does to BR Ns. For instance, even though one can say **weapons** *systems*, we do not say ***guns** *systems*, or ***tanks** *systems*.

[13]The example was brought to my attention by Richard Sproat.

What can be concluded from all of this is that, first of all, nominal compounds productively attach "-s" to their nonhead Ns. Secondly, BR N nonheads have more productive plural attachment in nominal compounds.

4.6 N N Sequences and Phrasal Stress Assignment

Following the notion that an Adj may occur as a Noun, (namely, an NOA), with regard to stress, one might ask if it is then reasonable to assume that some Nouns occur as Adjs with regard to stress. I claim that an Adj N construction which takes CS is an N in which the Adj is a Noun with regard to stress. Such Nouns are referred to as *Adjectival Occurrence Nouns* (AON), defined below.

(74) Definition of an AON:

An AON is a syntactic Noun which has an adjectival occurrence, and may be stressed like an Adj.

These Nouns will have a second labeling, AON which refers to how they are handled regarding stress assignment. A labeling which reads N/AON should be read as a syntactic Noun,

which stress treats as an Adj occurrence; therefore, Phrasal Stress applies to such examples, as in 75.

(75) a. [[*Montana*]$_{N/AON}$ [**cowboy**]$_N$]$_{N'}$

b. [[*Tennessee*]$_{N/AON}$ [**air**]$_N$]$_{N'}$,[14]

c. [[*Wisconsin*]$_{N/AON}$ [**cheddar**]$_N$]$_{N'}$

d. [[*kitchen*]$_{N/AON}$ [**table**]$_N$]$_{N'}$

e. [[*quality*]$_{N/AON}$ [**year**]$_N$]$_{N'}$

f. [[*state*]$_{N/AON}$ [**representative**]$_N$]$_{N'}$

g. [[*city*]$_{N/AON}$ [**council**]$_N$]$_{N'}$

h. [[*family*]$_{N/AON}$ [**outing**]$_N$]$_{N'}$

(76) a. [[*lonely*]$_{Adj}$ [**cowboy**]$_N$]$_{N'}$

b. [[*polluted*]$_{Adj}$ [**air**]$_N$]$_{N'}$

c. [[*mild*]$_{Adj}$ [**cheddar**]$_N$]$_{N'}$

d. [[*large*]$_{Adj}$ [**table**]$_N$]$_{N'}$

e. [[*great*]$_{Adj}$ [**year**]$_N$]$_{N'}$

f. [[*lawless*]$_{Adj}$ [**representative**]$_N$]$_{N'}$

g. [[*trendy*]$_{Adj}$ [**council**]$_N$]$_{N'}$

h. [[*exciting*]$_{Adj}$ [**outing**]$_N$]$_{N'}$

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[14] "Montana COWBOY," and "Tennessee AIR" are from Liberman and Prince (1977).

There are a few more N N sequences, namely, "culinary terms," (see Ladd (1984)) which take Phrasal Stress. Culinary terms, such as, [**apple** *cake*]$_N$, and [**rye** *bread*]$_N$, have the expected CS assignment for a N N sequences. The Phrasal Stress patterning in others, however, has remained somewhat of a puzzle, which may have a few different explanations.

Liberman and Sproat (1992) have asserted that non-native English phrases, such as, [*beef* **wellington**]$_N$', and [*eggs* **benedict**]$_N$', are, possibly, structures borrowed into English from left-headed French culinary terms. Perhaps, for the data below, the stress pattern from the "source" languages of the head Noun, has been lexicalized in English.

French Head Noun

(77) a. [*carrot* **souffle**]$_N$'

b. [*raspberry* **sorbet**]$_N$'

c. [*lemon* **mousse**]$_N$'

In (77), all of the head Nouns are taken from French. The French structural equivalent of (77a)-(77c) would be "souffle au(x) (flavorX)," "sorbet au(x) (flavorX)," and "mousse au(x) (flavorX)," respectively, and "flavorX" has the

heaviest stress.[15] Perhaps, this rightmost stress in the French phrases has been lexicalized in English.

The lexicalization of foreign stress patterning, admittedly, is not conclusive, though, it may serve as a basis for which one can explain the origin of Phrasal Stress on culinary terms. It is not, however, a completely satisfactory explanation for all synchronic examples of culinary terms with Phrasal Stress. It is likely that the introduction of any new culinary term into English, regardless of its origin is likely also to take Phrasal Stress, so it has been suggested that the couple of culinary terms which take CS , i.e., "cake," and "bread," have been frozen in English with CS.

A final possible explanation for predominant Phrasal Stress patterning in culinary terms has been suggested by Ladd (1984), who points out that the stress patterning in culinary terms is the same as that for "nonhead + head" sequences in which the nonhead is a "material," e.g., [*gold* **ring**]$_{N'}$, [*tweed* **jacket**]$_{N'}$, [*silk* **purse**]$_{N'}$, [*paper* **bag**]$_{N'}$, and [*cardboard* **box**]$_{N'}$.

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[15]A French informant explained that for phrases such as, "mousse au chocolat," that although the stress is more or less even on "mousse," and "chocolat," he did feel that stress was somewhat heavier on the rightmost word in the phrase, "chocolat".

4.7 Conclusion

Evidence from English shows that N's and Ns may have identical underlying constituent structure. Therefore, it is claimed that the following two phrase structure rules may correctly generate N's and Ns. N's will take Phrasal Stress and Ns will receive CS.

(78) N' or N --> Adj N

(79) N' or N --> N N

The Ambiguous Structure Rule, the Nominal-Occurrence-Only Rule and the Broad Reference Head Rule are proposed to predict structure and stress for certain Adj N constructions. The former two rules use syntactic occurrence information about the nonhead Adj. For some Adj N and N N constructions it is shown that the syntactic occurrence information of the nonhead may be different from the actual syntactic category of the nonhead, with regard to stress. When an Adj occurs as a nominal with regard to stress, it is referred to as an NOA, e.g, $[\textbf{legal}_{Adj/NOA}\ \textit{work}_{N}]_{N}$. If an N occurs as an Adj, it is termed an AON, e.g., $[[\textit{quality}]_{N/AON}\ [\textbf{year}]_{N}\ ]_{N'}$. It is the syntactic occurrence of the nonhead which will determine the stress patterning for the whole construction, and therefore,

the overall structure as well. In these cases two labelings are assigned to the nonhead. The first refers to the syntactic category, and the second to the syntactic occurrence with regard to stress assignment. Constructions with CS are Ns and constructions with Phrasal Stress are N's. It is also noted that different meanings may be associated with the nominal and adjectival occurrences of a Dual Occurrence Adj. Therefore, different meanings of a DOA may fall out depending on whether the the DOA is the nonhead of an N' or an N, though the difference in meaning is not required. The Broad Reference Head Rule notes that stress and structure may be affected by semantic information in the head Noun of Adj N or N N constructions.

The N's and Ns discussed in this chapter are shown to be syntactic objects since both structures may be correctly generated by X' theory, i.e., phrase structure rules. However, it is also noted that semantic factors may contribute to the structure and stress of these "nonhead + head" constructions.

CHAPTER FIVE

Experiments Regarding Stress Preference

5.1 Introduction

Chomsky and Halle's (1968) theory of stress assignment predicts that Adj N constructions should receive Phrasal Stress assignment on the basis that they are N's. In Chapter 4, however, it has been shown that Adj N constructions may also be Ns and, therefore, may receive alternating Phrasal Stress or Compound Stress (CS) which is not predicted from Chomsky and Halle's stress theory. The alternating stress patterning for Adj N constructions may be predicted by the stress rules proposed in Chapter 4, namely, the Ambiguous Structure Rule, the Nominal-Occurrence-Only Rule, and the Broad Reference Head Rule.

Some people claim that they are not sensitive to alternating stress patterns. In other words, they are unable to hear a difference between an Adj N construction with Phrasal Stress or CS. However, the results from experimental work by Klavans, et al (1985) show that individuals do exhibit stress preferences with regard to different nominal compound

structures. This chapter presents two pilot experiments designed to test subjects' left and right stress preferences for Adj N constructions like those discussed in Chapter 4. I hope to find that subjects' stress preferences show a significant amount of agreement with the stress patterning predicted for such Adj N constructions by the stress rules in Chapter 4. Bolinger (1972) claims that stress is not predictable based on structure. Evidence supporting predictability of stress based on a particular structure would prove this claim to be incorrect, at least with regard to the Adj N stimuli used in these experiments.

5.2 Bolinger (1972)

Bolinger's (1972) claims would suggest that the experiments described in this chapter would not reveal any consistent results, since he claims that "accent" is not something that one could predict based on a well-defined measure, such as syntactic structure. He asserts that placement of "accent" is independent of syntactic structure.[1]

[1]Bolinger (1972) claims that "stress" is the abstract correlate for "accent". To be consistent with Bolinger (1972), I will use "accent" to refer to intonational patterning in a construction for the remainder of this section.

Rather, he claims that "accent" in a particular phrase, reflects the speaker's intention. Bolinger's data is composed primarily of sentences. In his examples, one can see that stress patterns may vary for identical structures due to different meanings, as in the following examples.

(1) a. They **strangled** him to death.
b. They **hounded** him to **death.**
c. They scared him to death.

Bolinger (1972) also offers examples of two-part nominals in which a "semantically empty" head may provoke a change in accent.[2]

(2) a. Those are **crawling** *things.*
b. Those are *crawling* **insects.**

Though Bolinger's (1972) claim that accent may not be predicted by syntactic structure may be true for some cases of accent, it should not be taken as an absolute. With regard to the Ambiguous Structure Rule and the Nominal-Occurrence-Only Rule, "accent" is directly related to the syntactic occurrence of the nonhead with regard to stress in Adj Noun

[2]See the discussion on "broad reference" and stress assignment in Chapter 4.

constructions. The Ambiguous Structure Rule notes that in a two-word construction, such as "legal work," Phrasal Stress occurs with the adjectival occurrence of "legal" , and CS occurs with the nominal occurrence of "legal".

(3) Selling drugs is not [[*legal*]$_{Adj}$ [work]$_{N}$]$_{N'}$.

(4) The attorney finished all of the [[legal]$_{Adj/NOA}$ [*work*]$_{N}$]$_{N}$ for his client's accident case.

A motivation for alternating accent clearly involves the speaker's intention as Bolinger (1972) would claim. Part of the motivation for the alternating accent may, perhaps, be explained in terms of pragmatics. However, it is also crucial to note that "stress rules" also look at words in terms of their syntactic occurrences. It is not coincidental that CS occurs for the nominal occurrence of "legal," and Phrasal Stress occurs for the adjectival occurrence of "legal".

The Nominal-Occurrence-Only Rule proposes that for constructions, such as **surgical** *mask*, CS applies because *surgical* occurs as a nominal with regard to stress. Accent, then, is predicted because of the syntactic occurrence of the nonhead Adj with regard to stress.

When a structure is composed of only two words, it is, perhaps, easier to characterize the "limited" number of possible speaker intentions. With respect to Bolinger's (1972) example sentences, it may be the case that the number of intentions may increase along with the length and syntactic complexity of the sentence. Therefore, capturing all of the possible intentions, and describing their syntactic motivations would be more difficult than in two word structures handled here.

5.3 Klavans, et al (1985)

Klavans, et al (1985) conducted a study which tested subjects' preferences for acoustic patterning correlated with the four-part noun compounds of the forms given in (5)-(7). Subjects also heard two-part, e.g., *law school*, and three-part, e.g., *law school requirement*, compounds of the forms listed below.

(5) a. ((((A)B)C)D)
    b. "law school requirement change"
(6) a. ((AB)(CD))
    b. "wine glass display box"
(7) a. ((A(BC))D)
    b. "computer execution time results"

By revealing whether subjects had a preference for "adjusted forms," or "citation forms"[3], Klavans, et al (1985:6) hoped "...to understand the nature of pitch and durational adjustments as a function of syntactic structure."[4] For "adjusted form compounds," pitch was manipulated to match a prosody that would be predicted for a particular structure by linguistic rules. For instance, in the "left-branching" structure in (5a)., according to Liberman and Prince's (1977) claim about stress placement main stress was placed on the first noun, and the fundmental frequency dropped accordingly thereafter.

Klavans, et al asked twenty subjects to listen to two versions of 75 nominal compounds and note their preference. One version was the "stress adjusted" version, and another version was the "citation" version. Their most significant finding was that 19 out of 20 subjects preferred the "stress adjusted" versions over the "citation" versions. These

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[3] Klavans, et al (1985) defined "citation form compounds" as those in which each component is treated as a prosodically autonomous noun.

[4] Their objective was to be able to fold such information into a text-to-speech synthesis system to upgrade its naturalness and intelligibility. The speech used in the experiment was generated from a synthesizer.

results indicate, as Klavans, et al point out, that one may show a relationship between "stress and structure."

Though the Klavans, et al results show that their subjects prefer the noun compound versions with adjusted stress, there is an issue with regard to their materials which needs to be addressed. Subjects heard a version, the "citation form," which, from its description, sounds as though it would be completely unacceptable to most people. Contrasted with the "citation form," subjects heard a form which was reasonably adjusted, and probably sounded far more natural than the "citation form." Subjects were basically being asked to compare a "good" form, and a "bad" form. Therefore, the Klavans, et al results may also be explained as a preference by subjects for the inherently more natural sounding "adjusted form". Their results do not provide evidence that the "adjusted forms" which they chose are the conclusively preferred forms. Had their subjects also heard alternative "adjusted forms," Klavans, et al may have gotten more informative results about actual stress preferences. In the long-run, such information would be more useful to implement stress patterning to create a more natural sounding text-to-speech synthesizer.

5.4 The Experiments: An Introduction

Chapter 4 proposes a syntactic account which predicts left and right stress assignment in certain Adj N sequences. In the following experiments, subjects are asked about their stress preferences for such Adj N constructions. The experiments are designed to test subjects' stress preferences of the Adj N stimuli to see if they agree with the syntactic account proposed in Chapter 4.

5.4.1 Experiment 1[5]

Stimuli

There were 150 Adj Noun constructions used in the experiment (see Appendix One). These stimuli were selected because their stress patterning may be predicted by the stress theory proposed in Chapter 4. The 50 stimuli for which left stress

[5]I am grateful to Jan van Santen at AT&T Bell Labs for helping me with the design and statistical analysis of the experiments, and for supplying me with software for the first experiment, and to Martin Chodorow for helping with the statistical analysis of the experiments. I thank AT&T Bell Laboratories for funding subjects for the first experiment.

was predicted were either examples of Adj N constructions with Broad Reference heads, or in which the Adj was restricted to a nominal occurrence by the Nominal-Occurrence-Only Rule. The 50 for which right stress was predicted take Phrasal Stress because they are regular Adj N constructions. The 50 for which ambiguous stress was predicted represent examples in which the Adj N constrcution had ambiguous structure, i.e., it could be an N' or an N.[6]

In Appendix One, one can see that there may be several repetitions of Adj nonheads in the stimuli. The reason for this is that the set of Adjs which may have nominal occurrences is itself a restricted class. Many of the N heads for examples in which right stress is predicted are +HUMAN, e.g., *electrical engineer*. The +HUMAN feature allows one to control for right stress assignment by eliminating the possibility of an ambiguous syntactic occurrence for the Adj nonhead.

Task

Four paid subjects participated in this experiment. None of

[6]Appendix One at the end of the dissertation lists all of the stimuli used.

the subjects were linguists. Each subject heard all 150 Adj Noun sequences with both stress patterns. All of the stimuli were generated by a text-to-speech synthesizer at AT&T Bell Laboratories (see Olive and Liberman (1985)).

Subjects were tested individually. They were seated in a sound proof booth in front of a CRT screen. Subjects wore headphones for the experiment. The task had two parts. On a given trial a two-word item was shown on the screen. The item was pronounced in two ways, referred to as Version 1 and Version 2. One version would have Phrasal Stress and the other would have CS. The F0 for each version was appropriately adjusted to output a natural sounding pronunciation of CS and Phrasal Stress. The sound level was fixed for the entire experiment. Subjects were asked to decide which version they preferred, and to hit "p" to indicate that Version 1 was their preference or "q" to indicate that they preferred Version 2. They could repeat the pronunciation of each item two times by hitting the "spacebar" on the keyboard. After subjects made a preference choice, a new screen appeared. The screen instructed subjects to rate how strongly they felt about their choice by typing a number from 1 - 6. "1" indicated that they had no preference at all, and "6" indicated that they felt very strongly about their

choice.

The presentation of Phrasal Stress before CS, or CS before Phrasal Stress was "counterbalanced" so that the order of the stress pattern presented would not affect the subjects stress preference judgement. Two scripts were used to provide counterbalancing. For the two scripts, if in the first script a particular Adj Noun sequence pair was initially presented with Phrasal Stress as Version 1 and CS as Version 2, it would be presented in the reverse order in the second script. Two of the subjects heard script 1 and the other two heard script 2.

Results

Correlations between subjects' responses, and the predicted preferences[7] were calculated for the materials in which either left or right stress was predicted. To calculate these correlations binary values, -1 and +1, were assigned to "left" and "right" stress preferences, respectively. The results were based on 100 stimuli, namely, 50 in which left stress is predicted, and 50 in which right stress was predicted. The results are given below in Table 1.

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[7]The predicted preferences correspond to my own stress judgements.

Table 1

Between-subject correlations of stress preferences.
JB=myself

	subj1	subj2	subj3	subj4	JB
subj1	1.00	0.22	0.43	0.45	0.57
subj2	.22	1.00	0.22	0.36	0.40
subj3	.43	0.22	1.00	0.40	0.58
subj4	.45	0.36	0.40	1.00	0.71
JB	.57	0.40	0.58	0.71	1.00

The correlations in Table 1 are statistically significant at the .01 level, except for the .22 cells which are significant at the .05 level. The correlations with my judjements are significant at the .001 level. These results illustrate a tendency for the subjects to agree with the stress patterning predicted by the stress rules in Chapter 4, with regard to left and right predicted stress patterns.

Some of the disagreement may be attributed to subjects' creating contrastive contexts to decide their stress preferences. Of the 50 examples in which right stress would be predicted, there were 10 examples where two or more subjects disagreed with the predicted stress pattern. Seven of these 10 examples could be said to have straightforward right

stress. These are listed below.

(8) a. *civil* **engineer**
b. *chemical* **engineer**

(9) a. *electrical* **circuit**
b. *electrical* **outlet**

(10). *chemical* **weaponry**
(11). *industrial* **toxins**
(12). *nuclear* **power**

In examples (8)-(12), since no context was provided, it is possible that subjects were using contrastive contexts to choose a preferred stress pattern. For instance a subject may have created a sentence such as, "I'm a **mechanical** *engineer*, not a **chemical** *engineer*.", and then decided that the example "chemical engineer" was left stressed. Therefore, subjects' use of context may have interfered with their decision. If one were to run this experiment again, it might be useful to present stimuli with a carrier sentence, e.g., "She is a *mechanical* **engineer**.", to avoid the subjects creating their own contexts.

The 3 remaining items with which 2 or more subjects disagreed had nonheads which may also be Ns.[8] This syntactic factor may have affected their decisions.

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[8]This was pointed out to me by Martin Chodorow.

(13) a. musical ear
b. musical talent
c. criminal adolescent

For 11 of the 50 examples in which left stress would be predicted, 2 or more subjects disagreed with the predicted left stress. Seven of these 11 stimuli were predicted to have left stress according to the Nominal-Occurrence-Only Rule stated in Chapter 4. These stimuli are listed below.

(14) a. **medical** *procedure*
b. **medical** *cure*
c. **medical** *van*
d. **surgical** *gloves*
e. **surgical** *technique*
f. **technical** *association*
g. **technical** *representative*

The Nominal-Occurrence-Only Rule originally applied to Adj N constructions in which the nonhead was the Adj *technical*. However, I have since found numerous examples of Adj N constructions with Phrasal Stress in which *technical* is the nonhead and it is clearly adjectival both syntactically and with regard to stress, e.g., $[[\textbf{technical}]_{Adj}\ [\textit{design}]_{N}]_{N'}$. Therefore, *technical* has been eliminated from the set of Adjs

to which the Nominal-Occurrence-Only Rule may apply. This might explain subjects' disagreement with predicted left stress for Adj N constructions in which *technical* is the nonhead.

We looked for possible biases in the cases where ambiguous stress is predicted, e.g., *legal work*. A strong indication of bias in the data might imply that the stimuli claimed to have ambiguous stress might not be ambiguous. As is indicated below in Table 2, we found no bias in the results.

Table 2

Analysis of Stress Bias for Stimuli with Predicted Left and Right Stress

R = subject preferred "right" stress
L = subject preferred "left" stress
Total = Total number of stimuli presented

	subj 1	subj 2	subj 3	subj 4
R	26	30	27	19
L	24	20	23	31
Total	50	50	50	50

The results in Table 2 illustrate that none of the subjects showed a stress bias, where p>.05 by sign tests. Only 10 of these 50 stimuli had unanimous judgements. Of the 10 examples, three were judged unanimously for left stress, and 7 for right stress. Perhaps, for these 10 examples the unanimously judged stress pattern has a more frequent usage. Out of a sentential context, it may have been difficult for the subjects to find a second reading. The remaining 40 stimuli may be said to be cases in which ambiguous stress may be predicted by the Ambiguous Structure Rule in Chapter 4. The 10 examples judged unanimously for a particular stress patterning are listed below.

Unanimous right stress preference:

(15). *atomic* **building**
(16). *provincial* **behavior**
(17). *atomic* **site**
(18). *provincial* **speech**
(19). *professional* **dress**
(20). *nuclear* **component**
(21). *provincial* **cuisine**

Unanimous left stress preference:

(22). **solar** *building*
(23). **athletic** *club*
(24). **industrial** *area*

Correlations between subjects were taken for the same 50 examples in which ambiguous stress was predicted. To calculate the correlations binary values, -1 and +1, were assigned to "left" and "right" stress preferences, respectively. These correlations are in Table 3, below.

Table 3

Between-Subject Correlations for Ambiguous Stimuli

	subj 1	subj 2	subj 3	subj 4
subj 1	1.00	0.36	0.80	0.75
subj 2	0.36	1.00	0.15	0.56
subj 3	0.80	0.15	1.00	0.72
subj 4	0.75	0.56	0.72	1.00

The correlations show a significant amount of agreement between subjects. The agreement shows that subjects stress preferences for these stimuli are consistent, which suggests that they are basing their decisions on the same variables. It may be the case that without a sentential context to clearly reveal a particular meaning, subjects may have a difficult time finding both possible meanings. Therefore, the significant amount of agreement illustrated in Table 3 may be

a result of a factor, such as usage frequency.

5.4.2 Experiment 2

Stimuli

The stimuli for this study were exactly the same as for Experiment 1 with the exception of 2 items (see Appendix One). The stimuli in this experiment were presented visually.

Task

Five volunteer subjects were used. All of the subjects work in the Linguistics Research Department at AT&T Bell Laboratories. Two of the subjects had a Ph.D. in Linguistics, one subject is working toward a Ph.D in Linguistics, one subject is an electrical engineer, and one is a computer scientist.

Subjects used the CRTs in their offices to do the experiment. They were instructed that they would be seeing a series of two-word items for which they would have to make a judgement about stress placement. The instructions also asked subjects specifically not to place each item in any particular context. Rather, they should try to base their response on a

neutral context. This was an effort to prevent them from placing the sequences in contrastive contexts where they would use stress patterning.

Subjects were presented with an isolated Adj Noun sequence. They were asked whether or not they would say this sequence with heavier stress on the first or the second word in the sequence. They were instructed to hit "L" on the keyboard if they preferred stress on the first word, and "R" if they preferred heavier stress on the second word. After the subjects made a choice, they were prompted to rate how strongly they felt about their response on a scale of "1" to "3". "1" indicated that they had no preference at all, and "3" indicated that they felt strongly about their choice.

Results

The results were calculated from 100 stimuli, namely, 50 in which right stress is predicted, and 50 in which left stress is predicted. We used binary values, +1 and -1, for "rightmost," and "leftmost" stressed stimuli, respectively, to calculate the results. Correlations between subjects showed statistically significant results, at the .01 level, except the .19 cells which are significant at the .05 level. The following table illustrates the correlations.

Table 4

Between-Subject Correlation for Left and Right Stressed Stimuli.
JB=myself

	subj 1	subj 2	subj 3	subj 4	subj 5	JB
subj 1	1.00	0.53	0.55	0.35	0.31	0.77
subj 2	0.53	1.00	0.58	0.37	0.25	0.70
subj 3	0.55	0.58	1.00	0.38	0.33	0.72
subj 4	0.35	0.37	0.38	1.00	0.19	0.32
subj 5	0.31	0.25	0.33	0.19	1.00	0.29
JB	0.77	0.70	0.72	0.32	0.29	1.00

Correlations between my judgements and those of Subjects 4 and 5 (.32 and .29, respectively) were considerably lower than subjects 1, 2, and 3 (.77, .70, and .72, respectively). Before the experiment, Subject 4 had claimed that she was not sensitive to stress variation. She also claimed that it was difficult for her to make choices for "left" and "right" stress during the experiment. Though Subject 5 never claimed that she was not sensitive to stress distinctions, both she and Subject 4 disagreed with stimuli whose stress patterns would appear straightforward, especially with regard to examples for which right stress would be predicted. This is illustrated in Table 5.

Table 5

Disagreement with Predicted Left and Right Stress or Subjects 4 and 5

	Subject 4	Subject 5
Predicted Right Stress (Disagreed)	electrical engineer mechanical engineer	
	atomic bomb	civil engineer
Predicted Left Stress (Disagreed)	medical excuse	
	surgical gloves	medical building

Since cases in Table 5, such as *electrical* **engineer**, have straightforward stress patterning, it may be that subjects 4 and 5 may not be sensitive to stress distinctions. For the cases in which they disagreed with "right stress," subjects 4 and 5 may have been placing some items in a contrastive context to decide their stress preference. This is also indicated by the fact that these subjects had considerably more disagreement on items that would be predicted to have "right" stress, than those that had "left" stress. If these

subjects were using contrastive contexts to make stress distinctions, this may explain their noticeably lower correlations. Subjects 1, 2, and 3 showed considerably more disagreement for items predicted to be "left" stressed, which implies that they were probably not using contrastive contexts in their decisions.

Regarding stimuli with "ambiguous" stress Table 6 shows that only 1 of the subjects showed a statistically significant right stress bias. Interestingly, this subject also agreed with the right stressed stimuli 100%. The other 4 subjects showed no significant bias. Table 6 shows the number of times that subjects preferred either "left" or "right" stress for stimuli in which ambiguous stress patterns are predicted.

Table 6

Analysis of Stress Bias for Stimuli with Predicted Left and Right Stress

R = subject preferred "right" stress
L = subject preferred "left" stress
Total = Total number of stimuli presented
"*" indicates a statistically significant bias at the .05 level

	subj 1	subj 2	*subj 3	subj 4	subj 5
R	32	23	35	22	27
L	18	27	15	28	23
Total	50	50	50	50	50

Twelve of these 50 items had unanimously judged stress patterning. Four were judged as having left stress and 8 were judged as having right stress. For this group of subjects, the remaining 38 examples may be said to have ambiguous stress which may be predicted by the Ambiguous Structure Rule in Chapter 4. The examples in which stressed was judged unanimously are listed below. Only 2 of these examples were also judged unanimously with the same stress by subjects in Experiment 1. These examples are marked with "#". Since all nine subjects agreed on a single stress pattern for these examples, it is likely that the alternate stress pattern is relatively obscure.

Unanimous right stress preference:

#(25). athletic club
(26). legal field
(27). legal papers
(28). legal system

Unanimous left stress preference:

#(29). atomic building
(30). atomic component
(31). industrial region
(32). legal revenue
(33). musical genius
(34). nuclear component
(35). professional behavior
(36). provincial attitude

Between-subject correlations were calculated for these 50 examples in which ambiguous stress would be predicted. Binary values, -1 and +1, were assigned to "left" and "right" stress preferences, respectively. These correlations are in Table 7, below.

Table 7

Between-Subject Correlations for Predicted Ambiguous Stress

	subj 1	subj 2	subj 3	subj 4	subj 5
subj 1	1.00	0.27	0.24	0.50	0.06
subj 2	0.27	1.00	0.17	0.31	0.03
subj 3	0.24	0.17	1.00	0.49	0.18
subj 4	0.50	0.31	0.49	1.00	0.25
subj 5	0.06	-0.03	0.18	0.25	1.00

What is most interesting about these correlations is that they are considerably lower that the correlations for ambiguous items in Experiment 1. There are two possible explanations for this. First of all, the subjects in this experiment had no auditory stimuli. This variable may have contributed to the resultant low correlations. Secondly, in Experiment 1 none of the subjects had formal linguistic training. In Experiment 2, however, three of the subjects were linguists, and the other two subjects had a background in Linguistics from their work in the Linguistics Research

Department at AT&T Bell Laboratories. It may be the case that the subjects with no linguistic training were less sensitive to the possible ambiguities than those who have had formal linguistic training.[9] Overall, these correlations show that the stimuli here are ambiguous. Furthermore, these results suggest that the ambiguity present here is driven by the syntax, and not usage frequency.

5.5 Conclusion

Bolinger (1972) argues that the criteria which assign accent in a syntactic structure are purely a function of a "speaker's intent," and therefore, cannot be accounted for systematically in terms of structure. The results of Klavans, et al (1985), and the experimental work presented in

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[9] Hirsh-Pasek, Gleitman, and Gleitman (1978) cite results from an experiment involving a task for "paraphrasing" certain nominal compounds. The two groups of subjects were from two different educational groups. The results of the experiment showed no overlap in the performance or error scores. It was suggested from this that different levels of linguistic experience may reveal different abilities for linguistic analysis.

this dissertation, show that relationships do exist between structure and stress. Alternating stress patterns for Adj N constructions previously appeared to be just an inconsistency. There was no theory to explain why *electrical* **engineer** has Phrasal Stress, while **electrical** *system* receives CS. The syntactic theory in Chapter 4 accounts for this seemingly erratic stress patterning. The significant amount of agreement between subjects' stress preferences and stress patterning predicted by the stress theory in Chapter 4 is consistent with the syntactic rules proposed in Chapter 4.

In considering the overall disagreement for all nine subjects in the two experiments, I found that the subjects most commonly disagreed with items for which left stress would be predicted, such as examples with the nonheads, "medical," "surgical," "clerical," and "technical". "Medical," "surgical," and "clerical" are all members of the class of Adjs which are claimed only to have "nominal" occurrences[10]. Disagreement with examples with predicted right stress, e.g., **electrical** *engineer*, may also be attributed to subjects' use of contrastive contexts to make decisions about stress

[10]"Dental" and "postal" are also members of this class. However, subjects seemed to agree with the predicted "left" stress in two-word items in which "dental" or "postal"was the nonhead, e.g., "dental appointment," and "postal rate".

preferences. The unanimous agreement on a stress pattern for structures predicted to have ambiguous stress may be due to the usage frequency of a particular reading of the structure.

Overall, the results of the experiments are consistent with the notion that stress patterning for Adj N sequences may be predicted by structural rules. The syntactic rules proposed in Chapter 4 may therefore be used to distinguish N's and N as *syntactic objects*, especially when they have identical underlying constituents.

Appendix One

Stimuli By Predicted Stress

*=used only in Experiment 1
@=used only in Experiment 2

Predicted Right Stress

electrical engineer
mechanical engineer
civil engineer
chemical engineer
medicinal tea
photographic chemicals
legal recourse
professional growth
electrical wiring
musical ear
musical competency
electrical circuit
atomic bomb
chemical weaponry
chemical warfare
legal imprisonment
legal alien
professional clown
professional student
professional escort
legal drugs
medical mediocrity
governmental powers
electrical outlet
nuclear power
industrial waste
industrial toxins
athletic teenager
athletic adult

Appendix One - continued

nuclear medicine
criminal adolescent
criminal mind
musical talent
provincial foreigner
athletic professional
musical pioneer
musical genius
financial genius
@legal sex
*photographic lens
industrial pollution
musical decay
medicinal remedy
nuclear potato
nuclear waste
atomic scientist
atomic reactor
electrical energy
nuclear energy
photograghic eye

Predicted Ambiguous Stress

athletic group
professional behavior
professional dress
electrical building
atomic site
atomic building
electrical store
solar building
professional organization
legal system
legal job
legal work
legal organization
professional association
legal counsel
legal arrangement
athletic instructor
legal excuse
industrial region

Appendix One - continued

electrical component
atomic component
nuclear component
chemical component
legal component
legal club
marginal note
industrial area
legal revenue
athletic club
marginal width
electrical source
legal exam
criminal act
criminal behavior
provincial manners
provincial behavior
provincial dress
provincial speech
provincial governor
provincial cuisine
provincial attitude
solar museum
electrical museum
legal papers
medicinal ointment
musical class
musical industry
legal field
legal career
professional union

Predicted Left Stress

solar system
solar panels
nuclear zone
nuclear area
legal scholar
medical procedure
*medical history
medical degree
medical association
medical building

Appendix One - continued

surgical gloves
surgical mask
medical cure
medical excuse
surgical technique
surgical wound
electrical job
electrical work
electrical system
dental appointment
dental assistant
dental work
clerical error
clerical job
clerical function
chemical tray
athletic facility
athletic organization
vocal range
vocal tract
nervous system
aerial shot
technical assistant
technical association
technical representative
technical field
technical fee
industrial zone
circulatory system
regulatory system
electrical code
atomic zone
professional building
postal service
postal rate
postal worker
postal fee
@medical van
medical fee
dental fee
acoustical tile

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