

Forestress and Afterstress\*

Arnold M. Zwicky  
The Ohio State University

1. **Introductory remarks.** Of the many combinations of the form N+N, N's+N, and Adj+N in English,<sup>1</sup> some have been classified as compound words, or compounds (*family tree, doctor's dilemma, black board*), others as phrases, or syntactic groups (*family affair, doctor's office, blackboard*). Aside from orthographic considerations, there are two main criteria for classification: (a) whether the combination functions as a word or as a phrase; and (b) whether the combination has primary stress on its first element or on its second.

Criterion (a), which relates the classification of combinations in English to a wider (though inexplicit) general theory of language structure, was favored by the great traditional grammarians of English. This approach treats as compound 'a combination of two or more words so as to function as one word, and a unit' (Jespersen 1942:sec. 8.1<sub>1</sub>), 'a combination of two words forming a unit which is not identical with the combined forms or meanings of its elements' (Kruisinga 1932:sec. 1581), or 'vocables which, though felt and used as single words, are made up of two or more elements each of which may also be used as a separate word; (Zandvoort 1965:sec. 803). The approach is subject to the criticism that notions like **unit** are intolerably vague.

Criterion (b), which appeals to a putative symptom of wordhood vs. phrasehood in one language, was favored by American structuralist grammarians analyzing English. The position was clearly enunciated by Bloomfield (1933:228):

...whenever we hear lesser or least stress upon a word which would always show high stress in a phrase, we describe it as a compound-member: *ice-cream* [ˈajs-,krijm] is a compound, but *ice cream* [ˈajs ˈkrijm] is a phrase, although there is no denotative difference of meaning.

2. **History: largely structuralist.** Approach (b) was elaborated, and further symptoms added, by Bloch and Trager (1942:66):<sup>2</sup>

...a **compound** is a word composed entirely of smaller words. The difference between a compound and a phrase (a syntactic construction involving two or more free forms) must be determined separately for each language; if no formal characteristics can be discussed for distinguishing between them, then the language has no compounds.

In English, compounds differ from phrases in the phonemic modification of their components, in the kind of juncture between them, in the stress pattern, or in a combination of

these features. Thus the compound *blackbird* differs from the phrase *black bird* only in stress; the compound *altogether* differs from the phrase *all together* in both stress and juncture; and the compound *gentleman* differs from the phrase *gentle man* in stress, juncture and modification of the second member from /man/ to /mæn/.

Note that the only formal feature common to all three of their examples is stress.

In Trager and Smith (1951), the stress patterns are factored out as suprasegmental morphemes called **superfixes**; ‘` is a word superfix, ‘` and ‘` phrase superfixes illustrated in *Long Island* and *long island*, respectively. They treat the difference between the two stressings of *ice cream* as ‘simply two different dialects’ (73), but posit a ‘shift morpheme’ moving primary stress forward from the final constituent in a construction. The shift morpheme is seen in *I dón’t know* and *I don’t know* as variants of *I don’t knów*, and also in *kitchen sínk* as a contrastive stressing of *kitchen sínk* (‘a fixture in the kitchen’) or *kftchen sínk* (‘an item in an inventory of items in the kitchen’).

Both types of criteria have been reviewed by Marchand (1960:sec. 2.1), who maintains that stress is criterial for certain combinations, while the ‘underlying concept’—the nature of the syntactic or semantic relationship between the elements in a combination—is a significant factor in others. Quirk et al. (1972:1040) consider prosody, lexicalization/productivity, semantics, and morphological properties all as relevant:

It is usual to emphasize the distinction between the *word*, where convention and semantic interpretation fix a stress and rhythm which the individual cannot alter, and *connected speech*, where the disposition of stresses is subject to the speaker’s will and the meaning he wishes to convey. There is much validity in this but it must not be pressed too far, since it depends on a much sharper distinction between phrases and (compound) words that English grammar and lexicology in fact warrant. It will not do to say that initial stress ... indicates compounds, and final stressing... the syntactic phrases of connected speech. We have seen compounds like *down<sup>1</sup>stairs* which (despite similarity with phrases like *down the<sup>1</sup>street*) we would not wish to analyze as phrases. And, *still<sup>1</sup>life* (in painting), which is usually stressed in BrE as though it was a phrase, shows that it is a compound in having a different plural (*still lifes*) from the simplex noun (*lives*)... So too there are initial-stressed phrases that linguists do not normally regard as compounds, since (as is not general in word formation...) we are as free to form such sequences as we are to form any other kind of syntactic unit:

- (1) The <sup>1</sup>strawberry <sub>1</sub>picking }  
The <sup>1</sup>cabbage <sub>1</sub>weeding } has gone well.

They go on to suggest that 'the stress distribution provides a firm basis for distinguishing not between compound and phrase but different underlying relations between the juxtaposed item', citing pairs like 'toy ,factory vs. ,toy 'factory, 'bull ,fight vs. ,bull 'calf, 'French ,teacher vs. ,French 'teacher, and 'slate ,quarry vs. ,slate 'roof.

**3. History: largely transformational.** Nearly all transformational treatments of phrases and compounds, beginning with Lees (1960), follow Bloomfield in taking stress to be criterial. Thus, Lees limits his study of compounds to combinations with forestress, although he observes that

It is possible that some transformation rules in the grammar differ solely in the kind of unitary stress pattern which they confer (in an as yet unspecified way) upon the transforms, for there are many cases of composites which seem to differ only in this one respect, as for example, *Mádison Strèet* vs. *Mádison Avenue*, or *ápple cåke* vs. *ápple píe*. Perhaps each individual morpheme is characterized by always taking in composition some one of a small number of (syntactic) junctures introduced into the sequence by the transformation itself and yielding then, by phonological rules, in the manner suggested by Chomsky, Halle, and Lukoff [1956], the appropriate stresses. This view is supported by the fact that, at least in the author's speech, all composites in *-street* and *-cake* are compounds, while all in *-avenue* and *-pie* are invariably nominal phrases. These favored junctures would then, presumably, be overridden by certain constructions, so that, e.g., *woman* and *doctor* could combine to yield *both* a compound *and* a nominal phrase, but from differing source-sentences by two different transformational rules, say:

- (2) a. The doctor is a woman. ---> wôman dóctor  
b. The doctor is for a woman. --> wóman dòctor (120)

In an appendix (180-5), Lees reconsiders his earlier complete separation of forestressed compounds and afterstressed phrases, noting that (a) it treats some synonymous pairs with identical syntactic structure as nevertheless in contrast, (b) it fails to explain the contrast between afterstressed combinations like *young genius* and *child prodigy*, only the former having adjectival properties, and (c) it fails to give an account of the ambiguity of phrases like *legal document* and *logical fallacy*. Accordingly, Lees develops the ideas in the long quotation above, suggesting that compounding transformations might assign both forestress and afterstress, while the shift of elements from predicate to prenominal position invariably yields afterstress. He then gives lists of 12 types of afterstressed combinations paralleling some of the 49 types of forestressed combinations treated in the main body of the work.

This proposal by Lees, that compounding transformations assign stress pattern (or, equivalently, that stress assignment rules consider earlier stages in derivations), is developed further by several authors--by Lees himself in two 1970 articles that attempt to reduce the number of source types for compounds, by Gleitman and Gleitman (1970:ch. 3) in the context of a psycholinguistic investigation, and by Levi (1973), who is interested in the derivation of combinations like *electrical engineer*, parallel to *mining engineer* (Adj + N vs. N + N: 'My claim is that both the logical structure of these two NPs, and their derivations are precisely parallel, up to the point where certain compound-initial nouns are converted into derived surface adjectives' (334)). The significance of 'nonpredicate adjectives' like *electrical* in *electrical engineering* for transformational analyses of English was apparently first pointed out by Bolinger (1967).

Levi has explored such data in a number of other publications (1974, 1975, 1977, 1982), with a book-length presentation in 1978. She distinguishes (1978:1-8): 'complex nominals' from a number of other compound constructions--exocentric combinations, whether metaphoric (*ladyfinger*), synecdochic (*razorback*), or coordinate (*participant-observer*); compound proper names like *Istanbul Hotel*; and adverbial compounds like *potential enemy*--and divides the complex nominals into three types:

- (3) a. 'nominal compounds' like *apple cake* (forestressed N+N);
- b. 'nominalizations' like *presidential refusal* and *metal detection* (afterstressed Adj+N, forestressed N+N);
- c. nonpredicate adjective constructions like *musical clock* and *electrical engineering* (afterstressed Adj+N).

She does not address the stress question, however.

A survey of the literature on the semantics of (forestressed) nominal compounds is to be found in Zimmer (1971) (supplemented by Zimmer 1972b), where there is also a criticism of all **positive** characterizations of compounds (by a listing of types or by a listing of compounding rules) and some discussion, further developed in Zimmer (1972a), of a necessary condition for compounding, the existence of an 'appropriately classificatory' relation. Zimmer (1971) includes an appendix on afterstressed combinations, with criticism of Marchand's treatment. Zimmer observes that there is 'a great deal of dialect variation which is not compatible with the neat distinction [between **tranpositional derivation**, involving no addition of semantic elements and resulting in phrases, and semantic derivation, involving addition and resulting in compounds] that Marchand proposes' (C19), that some examples do not square with Marchand's distinction in any event, and that Marchand refers to 'implicit contrast' to save his analysis. Zimmer concludes:

Given that there are a lot of idiosyncratic factors involved in the compound vs. nominal phrase distinction, it is probably

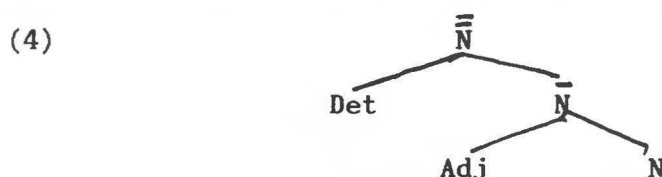
still true that the relations typically embodied in nominal phrases are of a type rather different from what is found in most compounds...And compounds do seem to have a greater tendency to become idiomatized. However, it would appear that the condition of a relation's being "appropriately classificatory" applies to most nominal phrases as well as to compounds. (C19)

The Lees position, however developed or transmuted, involves transformational prediction of stress contours. Consequently it is at variance with restrictive theories about the relationship between syntax and phonology, which would require that only information available in syntactic surface structure can condition phonological rules (the Principle of Superficial Constraints in Phonology of Zwicky 1970). In fact, the description of combinations by Chomsky and Halle (1968:secs. 2.1, 3.9) adheres to a more restrictive theory: they assume that the stress differences correlate exactly with the distinction between compounds (which are Ns) and phrases (which are NPs), so that stress assignment rules need be sensitive only to the surface syntactic distinction between N and NP (plus some indication of exceptionality, for those combinations not subject to the *SPE* Compound Rule; see Chomsky and Halle 1968:156). This very Bloomfieldian analysis is also adopted by Halle and Keyser (1971:sec. 1.2). It is subject to the criticisms put forth by Lees and expanded on by Schmerling (1971), who concludes:

It does seem to be the case that in some instances stress assignment is governed by the choice of head or attribute, in others by syntactic characteristics (whether the attributive has the superficial form of an adjective or a noun). There ought to be rules that capture these generalizations. In other cases stress assignment is an idiosyncratic property of individual compounds and ought to be indicated in the lexicon as such. The fact that stress placement is sometimes predictable should not make us try to predict it always. (60-1)

A significant feature of the Chomsky/Halle analysis is that 'relative prominence tends to be preserved under embedding' (Lieberman and Prince 1977:251), both for compounds and phrases. Both forestressed N+N combinations and afterstressed Adj+N combinations occur freely as constituents of larger constructions, and normally the relative stress levels are maintained: *whale* in *whale-oil* continues to be more heavily stressed than *oil* in an afterstressed compound like *whale-oil lamp*, and *American* in *American history* continues to be less heavily stressed than *history* in a forestressed compound like *American history teacher* (as it will in a syntactic combination like *teach American history*). The Chomsky/Halle analysis generates (a potentially endless series of) numerical values for stress levels. Lieberman and Prince replace this problematic feature by a system in which only relative prominence is assigned, but the essence of the *SPE* treatment is preserved: the Nuclear Stress Rule (afterstress) for phrasal categories, the Compound Stress Rule (forestress) for lexical categories.

4. **Analysis.** I will now assume, with essentially all of the writers cited so far, that there is an unmarked, 'normal' or expected, stressing for particular combinations. I will also assume that the relevant internal structure of NPs, that is to say,  $\bar{N}$ s, is as follows:<sup>3</sup>



(An  $\bar{N}$  marked [+POSS] is one possibility for the  $\underline{\text{Det}}$  position.) The unmarked stressing for the constituents of  $\bar{N}$  or  $\bar{N}$  is then afterstress.

Three types of word-level constructs are at issue: N+N, N's+N, and Adj+N. I will assume that all three types are syntactically  $\bar{N}$ s; all three will then be lexicalizable, and we can expect both productive, novel combinations and semantically specialized combinations. This assumption is not innocuous, at least in the case of N's+N and Adj+N combinations, since formally identical combinations occur at the phrasal level: N's+N constituting  $\bar{N}$ , with N's as a determiner; and Adj+N constituting  $\bar{N}$ . It seems clear that the unmarked stressing for N+N (*dinner table*) is forestress, but that for N of the shape N's+N (*artist's model*), or Adj+N (*American history*) the unmarked stressing is the same as for  $\bar{N}$  or  $\bar{N}$ , respectively, namely afterstress.

The standard treatment of these latter two cases, the possessive and adjective constructions, is to assume that stress is assigned to them by the same principle that applies to  $\bar{N}$  and  $\bar{N}$ , indeed to assume that these combinations are instances of  $\bar{N}$  and  $\bar{N}$ . But  $\bar{N}$  and  $\bar{N}$  do not freely occur in word-like units: an  $\bar{N}$  like *the girl* or an  $\bar{N}$  like *many friends* is simply impossible as a constituent of an N. Rather, the only  $\bar{N}$ -like or  $\bar{N}$ -like things serving as constituents of an N are those that also function as an N.

Indeed, this restriction on the combinations that occur as word-like units is one of Levi's (1977, 1978:sec.3.4) lines of evidence in favor of N as the dominating category. Her other arguments appeal to principles of affixation in English (the prefixes *post-*, *ex-*, *anti-*, and *non-* adjoin to simple nouns and to complex nominals but not to indisputable NPs; the same is true of the suffixes *-ist*, *-ian*, and *-(ic)al*), the internal syntax of  $\bar{N}$ s (predicating adjectives cannot intervene between the components of a complex nominal; complex nominals require a determiner, just like isolable singular common count nouns), and the fact that complex nominals are anaphoric islands (in the sense of Postal 1969).

The proposal is then that an Adj+N combination like *legal document* is ambiguous because it may be either a morphological combination, an N, or a syntactic combination, an  $\bar{N}$ . Much the same can be said for N's+N combinations (although Levi classifies these all as  $\bar{N}$ s): *an artist's model* is ambiguous between a reading in

which *artist's model* is a morphological combination, an N, and one in which *an artist's* is the determiner in a syntactic combination, an N.

Notice now that the prediction of stress follows not from the category of a whole construct, but rather from the categories of its constituents:

- I. [N+N] is stressed on its first constituent.
- II. [N's+N] and [Adj+N] are stressed on their second constituents.

In what follows I will explore genuine exceptions to these principles and additional regularities counter to them. I will treat the principles as default cases; they will assign stress pattern when nothing else does. For genuine exceptions a stress pattern will be associated with a particular combination, that is, it will be part of the lexical entry for that combination. The additional regularities will be of the same form as principles I and II, in that they will predict stress on the basis of the nature of the participating constituents. Thus I am pursuing the program advocated by Schmerling in the quotation in section 3 above.

The tack I am taking amounts to, first, a rejection of criterion (b) in section 1 above as a **definition** of the word/phrase distinction and, second, a sharpening of criterion (a): what is a word and what is a phrase in a language is determined by morphological and syntactic facts of that language; phonological properties can follow from this distinction but do not themselves determine it.

I begin with the larger group of cases, apparent exceptions to principle I. These have been catalogued by the traditional grammarians, in particular Poutsma (1914) and Kruisinga (1932), although their catalogues do not cover all the cases.

**4.1. The branching condition.** One well-known case requires an emendation of principle I. Forestressing is normal only in uniformly left-branching structures like *law requirement*, *law degree requirement* 'requirement for a law degree', and *constitutional law degree requirement* 'requirement for a degree in constitutional law'. But 'if at any stage of the compounding process the righthand element is itself a compound form, then this righthand member will assume the primary stress' (Lieberman and Prince 1977:253, explicating the *SPE* analysis): [*law degree*][*language requirement*] has its primary stress on *language* rather than *law*. The required emendation is

- I'. [N+N] is stressed on its first constituent if and only if its second constituent does not branch.

(see Lieberman and Prince 1977:257 for an alternative statement). Principle II should then be stated as the general default case:

- II'. Otherwise [X+N] is stressed on its second constituent.

**4.2. Constructions that are not compounds.** Another class of cases comprises combinations that are not  $\overline{N+N}$ --for instance, appositional constructions of the shape  $\overline{\overline{N+N}}$ , like *[we][the people]*, *[the lad][Robert Jones]*, and *[my son][the doctor]*, or number constructions of the shape  $\overline{N+N}$ , like *four thousand two hundred*. These simply do not fall under principle I, but have their afterstress predicted by different principles (presumably, by something like Chomsky/Halle Nuclear Stress Rule). The same is true of nouns serving as quantifiers: the afterstressed *one hundred* and *two dozen handkerchiefs* contain instances of Q+N, not N+N, and afterstress is predicted by Principle II'.

**4.3. Proper noun cases.** Now consider the following types, all normally afterstressed:

1. Proper N = Common N + Common N: *City Hall, University College, River City, TV Guide, Radio Times.*
2. Proper N = Proper N + Common N: *the Savoy Hotel, Victoria Station, Buckingham Palace, Iowa City, Madison Avenue, David Hume Tower, Oxford University, Eliot Hall.*
3. Proper N = Common N + Proper N: *the river Rhine, Mount Fuji, Hotel Ritz, Lake Ontario, King Edward, Aunt Jane.*
4. Proper N = Identifier + Proper N: *Mr. Jones, Mrs. Dalloway.*
5. Proper N = Proper N + Identifier: *Arnold Junior, Jones Minor.*
6. Proper N = Proper N + Proper N: *Ann-Margret* (first name); *Longuet-Higgins* (family name); *John Jones* (full name); *Cadillac Riviera; Cambridge, England; Broadway, New York City.*
7. Proper N = Numeral + Proper N: *102 Broadway, 14 January.*
8. Proper N = Proper N + Numeral: *September 16th; September 1973; Columbus 14.*
9. Common N = Proper N + Common N: *Dole pineapple, Vietnam war, Cadillac car, Chicago blues, Mumm champagne, Steinway piano, Gladstone bag, Ceylon tea, Bengal tiger, Cambridge education, O'Brian potatoes, April showers.*
10. Common N = Common N + Proper N: *steak Diane, potatoes O'Brian.*

Evidently, a compound that **is** a proper noun (regardless of its constituents) or **contains** proper nouns (regardless of whether or not it is a proper noun) is normally afterstressed. Such compounds should be exempted from principle I:

I". [ N N ] is stressed on its first  
N [-PROP] [-PROP]  
[...PROP]  
constituent if and only if its second constituent does  
not branch.

II". Otherwise, [X+N] is stressed on its second constituent.



**4.4. Exceptional forestressing in proper nouns.** There is another level of complexity to principle I", since a few proper N+N compounds are forestressed. Compounds ending in *street* are regularly forestressed (*Fifth Street, High Street*), as are those ending in *town* (*Adamstown, Circle Town*), *day* (*Veterans Day*), *brothers* or *sisters* (*Brooks Brothers, the Andrews Sisters*), *club* (*Kiwanis Club*), and a number of other specific words. In British (but not American) English, compounds ending in *college* (*King's College, Cambridge; New College, Oxford*) are often forestressed. These regular, but somewhat dialect-particular, facts hold only for compounds that are proper nouns: *Town Street* and *California Town* are forestressed, but *a town street* and *a California town* have final stress. That is, we have a subregularity of the form

- B. For certain specific nouns N\*, [ N + N\* ] is stressed  
N  
[+PROP]  
on its first constituent.

and this principle B takes precedence over principle I".

There are also some combinations which as wholes constitute lexical exceptions to I": *Brazil nut, Liberty Bell, Pullman car*, for instance, must all be listed as forestressed, since neither principle B nor principle I" would predict this stressing. What we want to say here is that for some lexical N+N combinations, the lexical entry indicates which N is stressed; lexical marking for this feature will then block the application of any rules predicting the feature, and principle II" will (correctly) fail to stress the second N.

- A. There are some lexical entries of the form [  $\overset{\vee}{N}$  + N ]  
[+PROP]

Note that principle I" is a kind of exception clause to the more general principle II". A and B are then, in effect, exception clauses to an exception clause.

**4.5. Exceptional afterstressing with semantic concomitants.** Beyond the exceptional behavior of proper N combinations, there are some further subregularities in the class of unexpectedly afterstressed compounds. These subregularities involve the semantic relationship between the two Ns in a compound. Consider, for example, the stressing of *silver bóx, wood chést, and bead cúrtain*. Here we have relatively clear cases of constructions in which the first N is a noun of **material**: a silver box is one composed of the material silver, and a bead curtain is one composed of the material beads. I believe that all semantically transparent combinations in which N<sub>1</sub> is a noun of material (and so have the paraphrase 'N<sub>2</sub> composed of the material N<sub>1</sub>(s)') are afterstressed, and that this stress pattern is automatically extended to novel combinations of this type: *silver chair, nylon curtain, malachite ewer*, and so on will all be afterstressed, despite the fact that they are common nouns composed of two common nouns.

It might be proposed that the first word in these combinations is an Adj rather than N.<sup>4</sup> This category assignment would automatically predict afterstress by principle II", but it is hard to defend on syntactic or morphological grounds. And, as we shall see shortly, it requires that an enormous number of nouns be convertible to adjectives in very restricted, and sometimes lexically idiosyncratic, contexts. We shall also see that there are several additional types of compound-word formation with exceptional afterstress, and that classifying their first words as adjectives is tantamount to permitting all concrete nouns to be used as adjectives.

Material-noun constructions like *wood chést* contrast with a number of other N+N combinations, some of them involving the same words: *wóod chést* 'chest for (storing) wood', *cóffee cake* 'cake (to be eaten) with coffee', *hérb bread* 'bread with herbs (in it)', *póppy-seed roll* 'roll with poppy-seeds (on it)'.

There is a nearly minimal contrast between **material**-noun combinations and **source**-noun combinations like *whéat flour* 'flour (made) from wheat' and *cóaltar product* 'product (made) from coaltar'. The real-world contrast between something composed of a material and something made out of, or from, a substance is very slight, and there is considerable variation in the stressing of compounds describing sources: forestressed *bean curd*, *soy sauce*, *orange juice*, *garlic powder*, but afterstressed *cherry brandy*, *strawberry jam*, *chocolate pudding*. A large number of source-noun combinations have forestress for some speakers and afterstress for others; I have heard this variation for *chocolate cake* and *beef pie* (for Lees, combinations with *cake* are forestressed, those with *pie* afterstressed, but in these two particular combinations I have the opposite stressings), as well as for *chicken soup*, *onion soup*, *corn meal*, *rye bread*, *mango chutney*, and *chicken curry*. It may be that if you originally conceive of N<sub>1</sub> as the 'main ingredient' in the product, you will use afterstress; forestress would be used otherwise (principle I" is the default case for common-noun compounds), as well as for potential material-noun compounds you have actually heard with forestress. If this is so, then there is a general principle

- C. [N<sub>1</sub>+N<sub>2</sub>] 'N<sub>2</sub> composed of the material N<sub>1</sub>(s)' is stressed on N<sub>2</sub>.

(taking precedence over I") and there are also specific lexical exceptions to C, which can be lumped together with the exceptions in A--

- A'. There are lexical entries of the form [ $\overline{N}$ +N].

The pattern we have seen for material-noun combinations is repeated for several other types of compounds, in particular possessive/locative compounds like *university lawyer*, *church steeple*, *faculty senate*, *kitchen table*, *morning appointment*, and *Christmas morning*, and attributive compounds like *student activist*, *child prodigy*, and *woman doctor*. Afterstress is the

norm here, and it would seem preposterous to me to argue in such examples that the first word is an Adj rather than a N. There are lexicalized forestressed examples--possessive/locative compounds like *cloverleaf* and *garden party* and attributive compounds like *girlfriend*--and there are some N<sub>2</sub>s that seem to be generally associated with forestress, like *man* in the attributive compounds *ape man*, *elephant man*, and *gorilla man*. But the big regularity is that possessive/locative compounds and attributive compounds, like compounds of material, are afterstressed, and this is the stress pattern that extends to novel combinations like *province assembly*, *parlor bidet*, and *gorilla attendant* 'attendant who is a gorilla'.

As in the case of compounds of material, it is not particularly easy to specify the semantics associated with the exceptionally afterstressed combinations in possessive/locative and attributive compounds. Still, it seems clear that, as was implicit in Lees' discussion of attributive *woman doctor* versus nonattributive *woman doctor*, if you can characterize the meaning of certain combinations you know which stress pattern they get.

A further complexity is that there are some afterstressed compounds that do not fall under any of the generalizations so far discussed: *picture window*, *household cleanser*, *life annuity*, *peasoup fog*, *return ticket*, *backseat driver*, *group therapy*, *underarm deodorant*, and a moderate number of others. These I assume have lexicalized stress. For them I extend A':

A". There are some lexical entries of the form [ $\overset{N}{N}+N$ ] and some of the form [ $N+\overset{N}{N}$ ].

Finally, a similar extension of B may also be in order, given the large number of afterstressed compounds with the noun *student* as their first member: for instance, *student affairs/expedition/discipline/rule/vote/plan/power/revolt/grant/teaching/training*. The semantic range is considerable here, and I see no way of grouping these compounds with the three semantic classes considered above. A natural solution would be simply to say that compounds with first constituent *student* regularly take afterstress; some other nouns, among them *faculty* and *government*, seem to fix stress in the same fashion as *student*.

Before entering a new arena of complexities, I will summarize the analysis so far.

A". There are some lexical entries of the form [ $\overset{N}{N}+N$ ] and some of the form [ $N+\overset{N}{N}$ ]; for the remainder, the position of stress is predictable.

B'. For certain specific nouns N<sub>2</sub> (e.g., *street*),  
N  
[+PROP] [ $N_1+N_2$ ] is stressed on its first constituent; and  
for certain specific nouns N<sub>1</sub> (e.g., *student*),  
N  
[-PROP] [ $N_1+N_2$ ] is stressed on its second constituent.

- C'. [N<sub>1</sub>+N<sub>2</sub>] with stress on its second constituent is associated with<sup>5</sup> one of the meanings 'N<sub>2</sub> composed of the material N<sub>1</sub>(s)' (*iron bar*) 'N<sub>2</sub> belonging to N<sub>1</sub>' (*government commission*), 'N<sub>2</sub> located in N<sub>1</sub>' (*bedroom television set*), 'N<sub>2</sub> taking place in N<sub>1</sub>' (*summer holiday*), or 'N<sub>2</sub> who is a N<sub>1</sub>' (*bachelor uncle*).

These three principles describe the cases in which the position of stress is determined by the individual nouns involved or by the meaning of the combination. A" notes the existence of completely idiosyncratic stressings; these of course take precedence over all general principles, including those in B' and C'. Principle B' refers to specific words and takes precedence over the more general semantic principle C'. Principles B' and C' take precedence over the principles referring to morphological structure, which I summarized at the end of section 4.3 above.

4.6. **A weakening of the branching condition.** In my discussion above of the branching condition (section 4.1), I maintained that forestressing was normal only in uniformly left-branching structures. That is true, but forestressing is often awkward even in these structures. *Law degree requirement* is what principle I" predicts in the way of relative stress levels if the compound is parsed *[[law degree] requirement]*. This is certainly a possible stressing, but *law degree requirement* is also a possible (and perhaps even more natural) noncontrastive stressing. Principle I" similarly predicts only *[[[constitutional law] degree] requirement]*, but primary stress on *requirement* or even *degree--constitutional law degree requirement*—is not unnatural. In general, when the first constituent in an N+N combination branches and the second does not, there is more than one noncontrastive stressing. This effect can be obtained if I" only optionally stresses a branching first constituent. I" must still obligatorily stress the first constituent in cases like *law degree*. The reformulation:

- I\*. If the second constituent in N [ N + N ] does  
[-PROP] [-PROP] [-PROP]  
not branch, then stress the first constituent—obligatorily  
if the first constituent does not branch, optionally  
otherwise.

Afterstressed versions seem to have become lexicalized in some of these cases: *back seat driver* (compare *motorcycle driver*) and *ball point pen* (compare *fountain pen*), for instance.

4.7. **The rhythm rule.** There is still another alternation between forestress and afterstress in compounds. Schmerling (1971:63-4) mentions an alternation between afterstress in predicate compound adjectives ((*It's*) *brand new*) and forestress when these compound adjectives appear in prenominal position ((*a*) *brand new car*). The phenomenon has been known for some time; a summary in Bolinger (1965) indicates that 'Jespersen credits James Elphinston with having noted in 1765 the rhythmic shift of stress in words like

*almost, forthwith, therein, for example, the laws written therein versus the laws thérein written'* (139) and lists many examples. Kim (1978:176), citing (*just*) *fourtéén* versus *fóurteen* (*shillings*) and (*quite*) *unknówn* versus *úknown* (*land*), refers the reader to Daniel Jones; Jones (1960:252-4) lists a number of examples, some involving monomorphemic proper nouns, as in *Wáterloo* (*station*) versus (*the train for*) *Waterlóo*.

It should be clear from these few examples that the alternations are in no way limited to compounds, though they do affect after-stressed compounds like *Ohio State* and *cherry jam*, which shift (optionally, but preferably) to forestress in such phrases as *the Ohio State team* and *cherry jam quiche*. There is no shift in the other direction, so we are dealing here with an optional retraction, or fronting, of stress. The recent literature on 'metrical phonology' has been much taken up with this Rhythm Rule, as it has come to be known; see, inter alia, Liberman and Prince (1977:255, 309-23), Kiparsky (1979:424-8), Prince (1983:31-46). For my purposes, the Rhythm Rule is simply a (rule-governed) perturbation in the pattern of compound stressing already discussed.

**4.8. Contrast and context.** Another sort of perturbation in the stress patterns of compounds arises from contrastive stress, as in *Apple cáke is more interesting than apple pie*. Here *apple cake* has afterstress rather than the forestress predicted by the principles discussed above. In *Apple pie is more American than quince pie*, *apple pie* has forestress rather than the afterstress the principles predict. What I want to say about such cases is that in general either element of a compound can be stressed, but that the placement of stress other than by the principles conveys that the stressed constituent has some special pragmatic value in the context (linguistic or otherwise). This treatment predicts, correctly, that contrastive stressing of parts of semantically somewhat opaque compounds like *mud pie* and *boy wonder* will be rather bizarre, since it will be hard for a listener to work out what could be being conveyed by a form like *mud píe* or *bóy wonder*.

**5. Final remarks.** My proposals have built on the assumption that the distinction between compounds and phrases is to be made on syntactic and morphological grounds, though the distinction has considerable phonological consequences. I have further assumed that a particular compound has, for any given speaker, one basic stress pattern, that the basic stress pattern is either associated lexically with the compound or predicted by rule, and that other stressings are either themselves predicted by rule (from the linguistic context) or are freely chosen by speakers (in which case a stressing has special pragmatic value when it is not the one predicted by rule). The rules in question refer to grammatical categories, to morphological structure, to specific words of English, and to (rather unspecific) meanings associated with the construction. The rules apply in sequence in such a way that more specific or exceptional rules take precedence over (and block) more general ones. Apparently, we need at least the ability to state exceptions to exceptions, and possibly more

than that. In addition, by trying to state **general** principles I was led to abandon the (structuralist and orthodox generative) position that forestress is the norm for all compounds. In this analysis, forestress is the expected case only for certain classes of compounds, those covered by the first clause of principle B' or by principle I\*.

In its reference to general principles, much in the style of other generative proposals, this analysis might seem to go against the spirit of Bolinger's (1958, 1972) stress proposals, in which stress (on sentences or on compound words) is assigned by speakers according to what their purposes are in uttering those sentences or words and according to the information content of the words involved. I have emphasized the conventional aspects of the system for compounds, but this does not mean that considerable latitude is not available to speakers. I am inclined to think that this latitude is much greater for phrases and sentences than for compounds, but even for compounds there is some freedom.

I am not suggesting that the rules I've referred to are all utterly arbitrary, without communicative rationale. Some aspects of the system have natural interpretations in terms of **implicit contrast**. The idea here is that certain items are stressed because they are salient; they are in contrast with a number of items from a large set, whereas the less stressed items with which they occur are not, usually serving as unmarked representatives of a whole class of items. For Marchand (1960:sec. 2.1), implicit contrast explains forestress in *bóokstòre*, *hárdware stòre*, and other compounds with the unmarked head noun *store*, as opposed to *hárdware empórium*, *bôok wárehouse*, and the like; the less stressed *store* is the unmarked (and semantically least specified) representative of a class of nouns denoting commercial buildings. Forestress in *Smíth Strèet* and other proper street names with *street* in them, versus afterstress in *Smíth Avenue/Pláce/Térrace/Láne/Wáy/Círcle*, could be explained in a similar way, with *street* as the unmarked (and semantically least specified) representative of a class of nouns denoting thoroughfares. The forestress of *Brazíl nùt*, as opposed to the afterstress of most combinations with proper nouns as parts, could be explained as an implicit contrast of *Brazil* to the first elements of *peanut*, *pistachio nut*, *hazelnut*, *macadamia nut*, etc., all of which have forestress by regular principles. As a final example, afterstress in combinations with *student* as their first element might be attributed to the occurrence of such combinations in contexts where various aspects of students are under consideration, so that only the second element is salient.

Implicit contrast is (part of) a plausible account of the invention of, or historical change in, certain forms. The case for direct reference to implicit contrast in a synchronic account of English is less clear. Perhaps the position of stress in combinations with *street* is simply learned (rather than calculated from other facts about the language and the context of use), and must be indicated as a property of the word *street* in modern English, as in principle B'. Similarly, the fact that *Brazil nut* is

forestressed might also be learned (rather than calculated from other facts about the language and context of use), and must be listed as an exception in a description of modern English, as in principle A".

The larger lesson, on which I do not think Bolinger and I disagree, is that speakers of a language must **both** be able to induce (and behave according to) general principles **and also** have the freedom to deploy linguistic resources strategically. Where we disagree is on the extent of the linguistic conventions at work in one case, the stressing of compounds in English.

### Notes

\*This article is dedicated to Dwight Bolinger and was originally written for a Festschrift in his honor. This is the version of 21 March 1983. The material here is based on an earlier bibliography on forestress and afterstress in noun constructions in English, Zwicky (1973). The financial support of the Royal Society and the John Simon Guggenheim Memorial Foundation during the early stages of this work is gratefully acknowledged. The influence of many helpful and ingenious suggestions by Stephen Isard, Christopher Longuet-Higgins, and John Lyons, not all of which I have taken and most of which have been germinating for over a decade now, runs throughout the article, as does a general indebtedness to Dwight Bolinger and Robert Lees.

<sup>1</sup>The examples that follow are nearly all nominals, but my discussion can be extended to parallel adjectival and verbal constructions.

<sup>2</sup>Bloch and Trager, and nearly all later American writers on the subject of stress levels in English (including generative phonologists), employ a four-level transcription: ' primary, ^ secondary, and ` tertiary, with unmarked syllables understood as weak. British linguists (following Daniel Jones) and Bloomfield transcribe only three levels: ' primary and , secondary, with unmarked syllables understood as weak. Forestressed (word-like) combinations are `` in American transcription, ' , in British; afterstressed (phrase-like) combinations include `` and ^^ in American, , ' and // in British.

<sup>3</sup>This internal structure is considerably less complex, and one bar level smaller than, the proposal of Jackendoff 1977. These simplifications do not affect the points at issue here.

<sup>4</sup>There are a few nouns that clearly have developed adjectival uses for some speakers: *fun* in a (really) *fun time* and *monster* in a (really) *monster billboard*.

<sup>5</sup>I have deliberately stated this principle in such a way that the direction of determination is not settled. It could be read either as saying that if you want to express one of these meanings, choose afterstress, or as saying that if you chose afterstress, you express one of these meanings. All that it says, however, is that these meanings and this bit of form are regularly associated with one another.

### References

- Abe, Isamu and Tetsuya Kanekiyo (eds.). 1965. *Forms of English: accent, morpheme, order*. Tokyo: Hokuou.
- Bierwisch, Manfred and Karl Erich Heidolph (eds.). 1970. *Progress in linguistics*. The Hague: Mouton.
- Bloch, Bernard and George L. Trager. 1942. *Outline of linguistic analysis*. Baltimore: Linguistic Society of America.
- Bloomfield, Leonard. 1933. *Language*. Chicago: Holt.
- Bolinger, Dwight. 1958. Stress and information. *American Speech* 33.5-20.
- Bolinger, Dwight. 1965. Pitch accent and sentence rhythm. In Abe and Kanekiyo 1965:139-80.
- Bolinger, Dwight. 1967. Adjectives in English: attribution and predication. *Lingua* 18.1-34.
- Bolinger, Dwight. 1972. Accent is predictable (if you're a mind-reader). *Lg.* 48.3.633-44.
- Chomsky, Noam, Morris Halle, and Fred Lukoff. 1956. On accent and juncture in English. For Roman Jakobson, 65-80. The Hague: Mouton.
- Chomsky, Noam and Morris Halle. 1968. *The sound pattern of English*. New York: Harper and Row.
- Dingwall, William O. (ed.). 1978. *A survey of linguistic science*. 2nd ed. Stamford, CT: Greylock.
- Gleitman, Lila R. and Henry Gleitman. 1970. *Phrase and paraphrase: some innovative uses of language*. New York: W. W. Norton.
- Halle, Morris and Samuel Jay Keyser. 1971. *English stress: its form, its growth, and its role in verse*. New York: Harper and Row.
- Jackendoff, Ray. 1977. *X syntax: a study of phrase structure*. Cambridge, MA: MIT Press.
- Jacobs, Roderick A. and Peter S. Rosenbaum. 1970. *Readings in English transformational grammar*. Waltham, MA: Ginn.
- Jespersen, Otto. 1942. *A modern English grammar on historical purposes*. Part VI. Morphology. London: Allen and Unwin.
- Jones, Daniel. 1960. *An outline of English phonetics*. 9th ed. Cambridge, MA: Heffer.
- Kim, Chin-Wu. 1978. Experimental phonetics. In Dingwall 1978:159-201.
- Kiparsky, Paul. 1979. Metrical structure assignment is cyclic. *LingI* 10.3.421-41.
- Kruisinga, Etsko. 1932. *A handbook of present-day English*. Part II. English accidence and syntax. Volumes 2 and 3, 5th ed. Groningen: P. Noordhoff.
- Lees, Robert B. 1960. The grammar of English nominalizations. *IJAL* 26.3, Part II.
- Lees, Robert B. 1970a. On very deep grammatical structure. In Jacobs and Rosenbaum 1970:134-42.
- Lees, Robert B. 1970b. Problems in the grammatical analysis of English nominal compounds. In Bierwisch and Heidolph 1970:174-86.
- Levi, Judith N. 1973. Where do all those other adjectives come from? *CLS* 9.332-45.
- Levi, Judith N. 1974. On the alleged idiosyncrasy of nonpredicate NPs. *CLS* 10.402-15.



- Levi, Judith N. 1975. The syntax and semantics of nonpredicating adjectives in English. Ph.D. dissertation, Univ. of Chicago. Distributed by IULC.
- Levi, Judith N. 1977. The constituent structure of complex nominals, or, That's funny, you don't *look* like a noun! CLS 13.325-38.
- Levi, Judith N. 1978. The syntax and semantics of complex nominals. New York: Academic Press.
- Levi, Judith N. 1982. Complex nominals: new discoveries, new questions. Preprints of the plenary session papers, XIIIth ICL, Tokyo, 156-67.
- Lieberman, Mark and Alan Prince. 1977. On stress and linguistic rhythm. LingI 8.2.249-336.
- Marchand, Hans. 1960. The categories and types of present-day English word formation. Wiesbaden: Harrassowitz.
- Postal, Paul M. 1969. Anaphoric islands. CLS 5.205-39.
- Poutsma, H. 1914. A grammar of Late Modern English. Part II. The parts of speech. Section I, A. Nouns, adjectives, and articles. Groningen: P. Noordhoff.
- Prince, Alan. 1983. Relating to the grid. LingI 14.1.19-100.
- Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech and Jan Svartvik. 1972. A grammar of contemporary English. New York: Seminar Press.
- Schmerling, Susan F. 1971. A stress mess. UI SLS 1.1.52-66.
- Trager, George L. and Henry Lee Smith. 1951. An outline of English structure. Studies in Linguistics, Occasional Papers 3. Norman: Univ. of Oklahoma Press.
- Zandvoort, R. W. 1965. A handbook of English grammar. 3rd ed. London: Longmans, Green.
- Zimmer, Karl E. 1971. Some general observations about nominal compounds. Stanford WPLU 5.C1-C21.
- Zimmer, Karl E. 1972a. Appropriateness conditions for nominal compounds. Stanford WPLU 8.3-20.
- Zimmer, Karl E. 1972b. Postscript to "Some general observations about nominal compounds". Stanford WPLU 8.153-5.
- Zwicky, Arnold M. 1970. Auxiliary reduction in English. LingI 1.3.323-36.
- Zwicky, Arnold M. 1973. Bibliography III: forestress and afterstress, compounds and phrases. OSU WPL 16.112-9.