English Compound Stress

ENGLISH COMPOUND STRESS

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1. It has generally been assumed in descriptions of English at least throughout this century that the stress patterns on expressions like those in (1) are somehow a direct consequence of their syntactic structure. (e.g. Poutsma 1914, part II p. 22; Trager & Smith 1951:67-77; Lees 1960:120; Quirk et el. 1972:915, 1019; Chomsky & Halle 1968: 91ff). In many cases (e.g. gréenhouse vs. green hóuse), this can be attributed to the difference between compound and phrase in surface structure; hence the common names 'phrasal stress'and 'compound stress'. This is the analysis formalized in the Chomsky-Halle Compound Rule (shown in 2), which presupposes a syntactic analysis such that 'compound' is defined as a branching structure of the sort

The treatment of cases like stéel warehouse vs. steel wárehouse under this analysis is somewhat obscure, since both seem to be noun-noun compounds; here, however, reference is often made to deep syntactic differences--i.e. 'warehouse made of steel' vs. 'warehouse for storing steel'--and though details of such an analysis have never

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(1) Minimal Pairs

'Phrasal Stress' (weak-strong)	'Compound Stress' (strong-weak)
green house 'house that is green'	greenhouse 'glass building for growing plants'
French teacher 'teacher from France'	French teacher 'teacher of French'
steel warehouse 'warehouse made of steel'	steel warehouse 'warehouse for storing steel'
woman doctor 'female doctor'	woman doctor 'gynecologist'

(2) Chomsky-Halle Compound Rule (SPE p. 92)

$$V \longrightarrow [1 \text{ stress}] \; / \; [\# \; \# \; X \begin{bmatrix} \text{------} \\ 1 \text{ stress} \end{bmatrix} \; Y \; \# \; \# \; Z \; \# \; \#]_{NAV}$$

(3) Typical Problem Cases for Compound Rule

'Phrasal Stress'	'Compound Stress'
apple pie	(cf. apple cake)
chocolate cake	
town meeting	(cf. faculty meeting)
Franklin Stove	(cf. Skinner Box)
Madison Avenue	(cf. Madison Street)
student union	(cf. trade union)
ballpoint pen	(cf. fountain pen)
French Toast	
city hall	
whisky sour	
barefoot doctor 'Chinese paramedical person'	
weekend warrior 'army reservist'	

actually been worked out, the assumption continues to be held that ultimately the whole phenomenon will be shown to depend on syntax at one level or another.

The tenacity of this assumption is quite remarkable in view of the existence of large numbers of problems such as those shown in (3), distinctions which, in the words of Chomsky & Halle, are 'widely maintained but syntactically unmotivated'(1968:156). In general, analysts seem content to write off the exceptions to lexical arbitrariness --Chomsky and Halle suggest the possibility of treating them in the 'readjustment component'--or, in short, to take the syntax-based analysis as far as it will go and then fix up the rest of the data ad hoc. As long as the number of leftovers is not overwhelming, the basic hypothesis about the relation of syntax and prosody is effectively unfalsifiable.

My goal in this paper is not to try to patch up the syntactic analysis, but simply to abandon it and present an explanation of a different kind. As I will show, this explanation predicts the existence of the exceptions to the syntactic treatment and accounts for the types of cases in which they occur. The paper is divided into two parts: first it shows how compound stress is not just a footnote to the normal stress rules, but part of the larger phenomenon of deaccenting; then it goes on to discuss a large amount of data to which the analysis applies.[1]

2.1. It is important to present as background the outlines of the general view of stress that the analysis presupposes. This is the view developed in Ladd (1980), which is a combination of a more or less Hallidayan conception of the function of stress with the Liberman-Prince theory of its phonological form (Halliday 1967; Liberman & Prince 1977). Specifically, we need an illustration of the way these two views work together to provide a clear account of the particular type of marked or non-'normal' stress often known as deaccenting. This is seen in the following dialogues:

(4)

a. A: Has John read Slaughterhouse-Five?
   B: No, John doesn't read books.

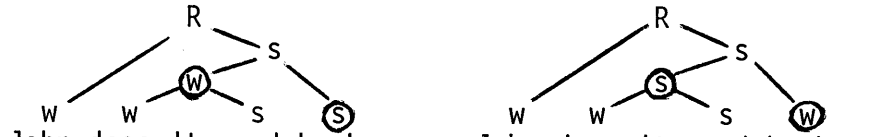
b. A: Have you talked to John recently?
   B: No, I can't stand the man.

The stress patterns in Speaker B's replies in these exchanges would often be called 'normal'. Yet it is obvious that the meaning of B's reply in (4a) is not something like 'John doesn't read books, he burns them'--that is, it is not contrastive in any explicit sense. Instead, the point of the stress pattern is to move the stress off books, to deaccent it and refer it to the context.

The Liberman-Prince theory makes it possible to represent

deaccenting very elegantly as the simple reversal of the s and w assigned to a given pair of sister nodes in the rhythmic structure. Thus the normal stress on B's reply in (4a) (John doesn't read bóoks) would be represented as shown in (5a). For the deaccented version (John doesn't réad books), we simply reverse the circled nodes in order to put the w on books; if the contrastive version were intended, (John doesn't réad books, he búrns them) we would, in effect, reverse the circled nodes in order to put the s on read. What the Liberman-Prince representation makes plain is that there is only a single phenomenon of marked stress, with contrastive and deaccenting as two different functions (5b).[2] (Notice the Hallidayan viewpoint at work in the notion of "functions" of a stress pattern.)

(5)



a. 'normal'

b. 'marked' (deaccented or contrastive)

The view of stress presented here also makes it possible to talk of deaccenting applied within constituents smaller than the sentence. This is seen in a pair of examples from Schmerling (1976: 55-6):

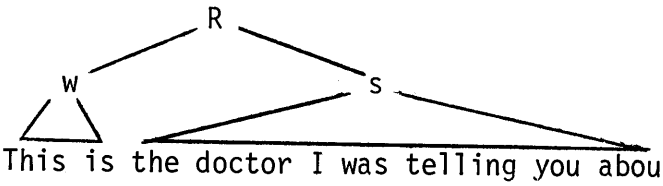
(6) a. This is the dóctor I was telling you about. ('normal')
b. This is the doctor I was télling you about. ('normal' in medical context)

The problem that Schmerling points out is that both of these are in some sense 'normal stress'; out of context (6a) seems "normal", but (6b) seems just as normal in the context of a hospital or a medical convention. Confined as she is to the Trager-Smith-Chomsky-Halle view of normal stress as a merely automatic consequence of the syntax of a sentence, Schmerling is prepared to use examples such as these as the basis for abandoning the notion of normal stress altogether.

But to do that would be to throw away a valuable concept. Indeed, the first step toward treating this puzzle is to take 'normal stress' in the Hallidayan sense of the stress pattern that signals an unmarked focus.[3] This makes it possible to speak of both stress patterns as normal, in the sense that both convey the focus this is NP. This focus is reflected in the rhythmic structure by the fact that at a higher level in the tree both versions, as expected by the normal stress rules, have the s assigned to

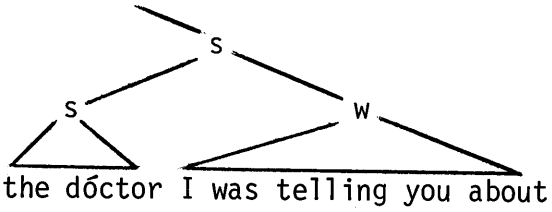
the rightmost NP:

(7)

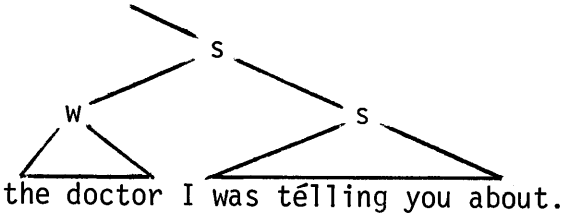


With the focus assigned, we can go on to assign either marked or normal stress within the strong NP constituent; doctor is either weaker or stronger than telling depending on whether it is or is not deaccented to refer to some medical context. Thus:

(8) a.



b.



In short, the answer to Schmerling's puzzle is simple: sentences can exhibit both normal and marked stress at different levels of structure simultaneously.

2.2 This is the idea to be applied to the problem of compound stress. Specifically, my thesis in this paper is that compound stress represents the deaccenting of the head of the compound. Thus the normal or unmarked stress for the type of structure in e.g. green house would be as follows:

(9)

They live in a green house. ("normal")

The reverse of this could be contrastive

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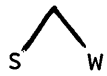
(10) 

They live in a green house, not a gray one. ('marked'--contrastive)

or, as in other cases of marked stress, it could also represent deaccenting, as in

(11) 

I grew them in a greenhouse. ('marked'--deaccented)

As I just showed, the deaccenting can apply within the compound without affecting the focus information conveyed at a higher level in the rhythmic structure of the sentence; that is, compound stress can be treated as marked or non-normal without in any way implying that it is thereby impossible for it to occur in a sentence with "normal stress".

2.3 At this point it is worth spending a paragraph or two to explain why it is specifically deaccenting that I think is involved in compound stress. As I showed in Ladd (1980), deaccenting cannot be seen simply as e.g. a syntactic rule that interacts with the normal stress rules in cases for coreference. In fact, it occurs in a wide variety of situations, and must be treated as making some independent semantic/pragmatic contribution to the interpretation of the sentence, like Hallidayan 'normal stress'. Unfortunately, space permits only a two-sentence summary of my earlier findings; the interested reader is referred to Ladd (1980, Chs. 3 & 4) for more detail. In brief, what deaccenting signals is that some specific reference to the context is necessary for a full or exact interpretation of the deaccented constituent. The actual details of the inference made in individual cases, such as 'co-reference' or 'this is a medical context', are left to pragmatic interpretive strategies.

This meshes very well with recent work on the semantics of compounds by Downing (1977)[4], Kay & Zimmer (1976), and Dowty (1979). What distinguishes these writers from earlier generative work on compounds (notably that of Lees (1960, 1970), Levi (1978), and Motsch (1970)) is that they do not seek to explain the specific relationships seen in compounds by positing some sort of underlying predicate relation between the two parts of the compound. (For instance, stéel warehouse is not represented as being underlying 'warehouse for steel', nor ápple tree as derived from 'tree with apples'.) Instead, they posit a single general compounding relationship that leaves the specific relation to be inferred on the basis of the individual lexical items involved. To put it another way, the compound construction does not convey an explicit meaning that fully determines the interpretation of each

compound, but only a rather inexplicit set of guidelines, as it were, for pragmatically inferring an interpretation.

Relevant quotes from Kay & Zimmer, Dowty, and Downing are the following:

> The prototypic use of nominal compounds is to narrow the semantic coverage of the head noun to a smaller class. (Kay and Zimmer, 4).
>
> A novel compound $\alpha\beta$ denotes some set (exactly which one we do not know) such that all members of this set are β's and are typically associated by some appropriately classificatory relation to an α. (Dowty, 319).
>
> The speaker tends to create the compound on the basis of a parameter significant for his categorization, rather than merely his description, of the entity in question. (Downing, 838).

The common thread running through these is something like the following: The compound construction signals that there is some relation between the attribute and the head which is relevant for classifying or categorizing the head, not merely describing it; a compound thus names some entity or category distinct from the entity or category named by the head alone.

This meshes very nicely with the function of deaccenting as described above. In general, deaccenting signals that some specific reference to the context is essential for a full or correct interpretation of the deaccented constituent; specifically in the case of a compound, the deaccenting of the head signals that in order to determine the category named by the compound, the head must be understood in the light of what Dowty calls the "appropriately classificatory relation" between it and the attribute. In green house, for example, nothing special is signaled about the interpretation of house in this context; house is more precisely described, but not newly subcategorized. In greenhouse, on the other hand, house is deaccented to signal that it contributes only part of what is necessary for identifying the new category of things named by the compound as a whole.

3.1 The hypothesis just presented is a fundamentally different type of analysis from the traditional description of compound stress. One of the reasons that the traditional description cannot accout for exceptions is that, in effect, it cannot account for the regularity either. That is, it suggests no particular explanation of why compounds should be stressed one way or the other; it merely states an observed correlation between syntax and prosody. The analysis proposed here, by contrast, suggests an actual reason for this correlation, namely, a certain congruence between the information conveyed by the stress pattern and the information con-

veyed by the compound relation itself, as just illustrated with the case of green house and greenhouse.

One way to test this explanation, then, should be to see whether exceptions to the traditional rule exhibit some kind of mismatch between what the compound relation and the stress pattern convey. If my explanation is correct, then compounds with phrasal stress ought to be cases where the information conveyed by the deaccenting would be somehow inappropriate--say, cases where any subcategorizing effect of the attribute is relatively small. I will discuss three groups of cases which I think show this quite clearly.

3.2 The first set involves place names like those shown in (12). We might predict that these would take phrasal stress, since the head (Avenue, Road, etc.) is in no sense subcategorized by the attribute: Madison Avenue does not name a particular type of avenue, Olin Library does not denote a special category of library, the Golden Gate Bridge is a bridge, etc. As the data in (12) show, the prediction of phrasal stress on these is largely borne out. There are, however, a few nouns that are deaccented in such compounds: street, house, town, land, and perhaps a few others. Considering these each in its own general semantic group, though, one can see that they are always the least specific or least marked. In city thoroughfare names, for example, we get at least vague expectations about the nature of the thoroughfare being named from most of the possible head nouns--we would expect an Avenue or Boulevard to be wide or important; a Road probably leads out of town; a Place or a Crescent is probably residential; and so on. Street, however, gives us no such information. It could be State Street, in the heart of downtown, or it could be Dogwood Street, in some quiet suburb. There is, in other words, a real sense in which we do get less information about the category of things being named from Street than from any of the others, and hence more from the attribute; this is more typical of ordinary compounds, and is exactly what is signalled by the stress pattern.

Comparable observations can also be made about the cases in (13), in which the head is the proper name of the inventor or discoverer of the entity or category named by the compound. The case of disease names is typical here: the relatively vague Syndrome and Disease (like Street) are deaccented but more specific words like Chorea and Palsy are not. While I cannot go through each of these cases in detail, it is nonetheless important to emphasize the nature of the prediction being made: the analysis does not claim to be able to make predictions about individual cases, which is what the traditional analysis purports to do, but only implicational predictions about groups of cases. If Syndrome and Disease and Street actually worked like all the others in their respective groups, the validity of the analysis would not be affected. The analysis predicts only that if one or two members of a particular semantically related group of head nouns are deaccented,

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(12) Compound Place Names

'phrasal stress'	'compound stress'
Madison Avenue	State Street (downtown)
Trumansburg Road	Dogwood Street (suburban)
Maple Drive	
Kingsford Crescent	
Marvin Gardens	
Park Place	
Olin Library	Eastman House (Rochester museum)
Morrill Hall	Blair House (U.S. Govt. Official Guest House)
Gannett Clinic	Andrews House (Brown Univ. Infirmary)
Johnson Museum	Faunce House (Brown Univ. student union)
McGraw Tower	Dunster House (Harvard dorm)
Rockefeller Center	
New York City	London Town (big)
Enfield Village	Middletown (little)
Tompkins County	
New York State	
Baffin Island	Baffin Land (old name for Baffin Island)
Cayuga Lake	Marie Byrd Land (section of Antarctica)
(the) Charles River	Chicagoland (area around Chicago)
(the) Atlantic Ocean	Disneyland (California amusement park)
(the) Sahara Desert	
(the) Golden Gate Bridge	
Walt Disney World	
(the) Erie Canal	
(the) Houston Astrodome	
Shea Stadium	
Fenway Park	
Penn Station	
Harvard Square	
Schoellkopf Field	

(13) Compounds with Proper Names in Attribute Position

'Phrasal Stress'	'Compound Stress'
Halley's Comet	(the) Van Allen Belts
Planck's Constant(?)	(the) Peter Principle
Grimm's Law (?)	(the) Sapir-Whorf Hypothesis (?)
(the) Monroe Doctrine (?)	
Occam's Razor	
Huntington's Chorea	Downs' Syndrome
Bell's Palsy	Parkinson's Disease
Franklin Stove	Skinner Box
Coleman Stove	Allen Wrench
Morse Code	Plimsoll Line
Gutenberg Bible	
Phillips (Head) Screwdriver	

(14) Culinary Compounds

Phrasal Stress	Compound Stress
apple pie	mud pie (?)
blueberry pie	apple cake
cherry pie	carrot cake
chocolate cake	coffee cake
vanilla ice cream	peanut butter (?)
strawberry ice cream	apple butter
cheese soufflé	sweet roll
chocolate soufflé	egg roll
lemon soufflé	jelly roll
grilled cheese sandwich	ice cream sandwich (?)
peanut butter & jelly sandwich	tomato sauce
lemon sherbet	hot sauce
raspberry sherbet	Worcestershire Sauce
coffee milk shake	white sauce
whole wheat bread	date and nut bread
rye bread (?)	zucchini bread

NB: stress on ice cream varies -- what's indicated above is stress on the whole word ice cream without regard to which syllable.

they will be the least marked or least specific. Thus it is only if Palsy were deaccented and Syndrome were not that we would call the analysis into question or look for some further factor.

3.3. A second set of cases (shown in 14) involvesthe classification of culinary terms. As can be seen from just three cases--chocolate cáke, ápple cake, and apple píe--it is futile to try to explain the exceptions to the traditional Compound Rule in terms of individual lexical items, since apple can be either stressed or unstressed in attribute position, and cake can be either stressed or unstressed in head position, depending on the compound. Moreover, since all three seem to represent an underlying relation B made of A, the stress cannot be explained in Levi- or Lees-style syntactic terms either. Instead, what seems to be involved here is classification in terms of what one might call 'flavors' vs. 'categories'.

Things to eat often come in a variety of flavors--ice cream, milk shakes, sandwiches, and soufflés are all examples. For most purposes in the culinary taxnomy, the different flavors all count as 'the same'; that is, in the terms we have been using to discuss compounds and deaccenting, naming the flavor further describes, but does not further categorize. This is why many of these culinary compounds have phrasal stress. In chocolate cáke and apple píe, in other words, cake and pie are the categories, and chocolate and apple are merely flavors. In ápple cake, on the other hand, we do have a different category; the deaccenting signals something like 'this thing is cake only to the extent circumscribed by something else in the context, namely, apple'. The effect of the deaccenting here is thus like what we saw in gréenhouse.

If this seems too facile, there is a simple pragmatic test that seems to suggest that the distinction between flavors and categories is a real one. If the head of such a compound can be inserted into the frame 'Do you want a _____?' or 'Do you want some _____?' without misleading the addressee about what is being offered, then the attribute is a flavor. For instance, 'Do you want a sandwich?' is fine even if all the speaker really has available is, say, a cheese sandwich. On the other hand, if both the attribute and the head must be included in order not to mislead the addressee, then a separate category is involved; Do you want some bread? is decidedly infelicitous if what the speaker has in mind to offer the addressee is banana bread. The reader is invited to try this test on the data in (14); while the results are not 100% consistent with the stress patterns, the correlation is quite considerable.

3.4. The final group of cases is provided by expressions where the head names an artifact of some sort, and the attribute names the material of which it is made. In general these also have phrasal stress, as shown in (15). This suggeststhat in these

(15) Material + Artifact compounds

'Phrasal Stress'	'Compound Stress'
paper bag	glassware
cardboard box	leather goods
silver candelabra	gingerbread man
gold watch	cedar chest (?)
tweed jacket	aluminum foil (?)
wool suit	
cotton shirt	
steel warehouse (made of steel)	
silk stockings	
carbon steel	
glass jaw	
tin ear	
silk purse	
wooden nickel	

cases, as in those involving culinary flavors, the category named by the compound is essentially the category named by the head alone. To put it another way: the material of which an artifact is made generally is not relevant for classifying or categorizing it.

There is independent evidence for this in Downing's study of the creation of new compounds. She suggested that naturally existing entities (plants, animals and natural objects) are typically classified ... on the basis of inherent characteristics; but synthetic objects are categorized in terms of the uses to which they may be put. This would seem to correlate with the fact that synthetic objects are typically created with some goal in mind, while natural entities generally are not (831). In those few cases of (15) which do have compound stress, it seems for the most part--e.g. glassware, leather goods, gingerbread man--that the material really is relevant for specifying the category being named.

3.5. At this point we are in a position to explain the minimal pair stéel warehouse / steel wárehouse. Since, to repeat Downing's words, we are more likely to categorize synthetic objects on the basis of the uses to which they may be put rather than on the basis of inherent characteristics , it follows that we categorize warehouses according to their intended contents, not the material of which they are made. Thus we interpret steel wárehouse as 'warehouse made of steel', because the stress pattern tells us that no subcategory is being named, whereas we interpret stéel warehouse as one for storing steel, first because the stress pattern tells

us that warehouse is indeed being classified into some subcategory by steel, and second because B made of A is a reasonable classificatory relation to infer between those two nouns. No underlying syntactic difference or abstract predicate need be posited to explain the interpretations here; they follow quite simply from inferences based on what we as speakers know about stress and about compounds.

Once again it is important to emphasize the relative or implicational nature of the prediction made by the analysis presented here. I believe it is in principle impossible to predict stress patterns in individual cases solely on the basis of the two lexical items involved, or solely on some underlying syntactic relation between the two. The relevant factor is whether the attribute categorizes or merely describes the head; to determine that, we may have to consider individual cases against the background of other possible attributes or other possible heads. Both ápple cake and steel wárehouse represent B made of A, but in the case of cake, the fact that it is made of apple categorizes it, when compared to other possibilities, whereas for warehouse, the fact that it is made of steel only describes, especially when compared to other possible relations between the two lexical items warehouse and steel.

4. The foregoing analysis of stress patterns in compounds has several points of interest. First, it explains rather than merely describes the rough correlation between compound syntax and so-called compound stress. Second, it makes the description of English simpler, by removing compound stress from the cases to be covered under 'normal stress' and subsuming it under the independently needed rubric of deaccenting. Third, it tends to provide independent confirmation of analyses of compounds like Dowty's which have a relatively impoverished semantics and a richer pragmatics, and gives no support to generative models like those of Levi and Lees. Finally, it may be possible to turn the analysis around--as in the case of 'flavors' vs. 'categories'--and use it as a tool for investigating taxonomies and markedness relations in the structure of the lexicon. For all these reasons I think it provides some genuine new insight into an intractable old problem.[5]

Footnotes

*A number of colleagues at Cornell & Bucknell read an earlier version of this paper and gave me much useful criticism, while both Ruta Noreika and the Wednesday night intonation seminar at Penn gave me their reactions as the present version took shape. To all, my thanks; blame only me.

[1]A number of caveats must be entered into the record at this point. First: I will be discussing only compounds whose head is a noun (complex nominals, in Levi's term), but the approach, if not the specific analysis, can be extended to cover other cases as well. Like Levi, I find no difference relevant to my concerns here between compounds where the first member (henceforth the 'attribute') is also a noun and those where it is an adjective. Second: I am ignoring differences in the weaker or less-stressed half of the compound, differences often analyzed as distinctions between 'secondary' and 'tertiary' stress, e.g. long island vs. Long Island (Trager and Smith 1951:69) or butter cup 'cup for butter' vs. buttercup 'type of flower' (Kingdon 1958:195). This decision is based in part on the implicit claims of the Liberman-Prince stress analysis, but it also follows most earlier studies of compounds. Ultimately, of course, an explanation will have to be given for these distinctions as well. Third: It is well known that there is a certain amount of individual and dialect difference in assigning stress patterns to compounds. The data here reflect my own speech, but I have checked with other informants to avoid basing my statements on some idiosyncratic usage. In particular, I have checked not only individual items, but, in accordance with the analysis presented here, pairs and groups of items as well (e.g. I have checked chocolate cake and apple cake together and find that many speakers make the distinction noted here.) Question marks next to individual items in the data tables indicate those items in which there seems to be considerable disagreement about the stress pattern.

[2]Any discrepancies between standard Liberman-Prince trees and those here are intentional, but cannot be justified here.

[3]For stress and focus see Halliday 1967; Chomsky 1971; Jackendoff 1972; Wilson & Sperber 1979; Ladd 1980.

[4]While Downing's experimental study was primarily concerned with the creation of novel compounds, she found little support for the underlying-predicate approach to compound semantics; I do not feel that I distort her findings by including them here.

[5]Limitations of space make it impossible for me to do more than mention the existence of two complicating factors that were discussed during the question period following the presentation of this paper at the conference. First is the likelihood that any treatment of the semantics of compounds must distinguish between the 'ordinary' semantic opacity in a compound like, say greenhouse, and the semantic opacity involved in what may best be described as idioms, such as white elephant, French letter 'condom' (so also a number of other expressions involving ethnic slurs), swan song, wallflower, etc. (Note that both stress patterns are found in these.) Levi 1978:11-12 argues for just such a distinction in connection with the semantic opacity of compounds. The implications of this for the analysis presented here are not entirely clear.

The second complication is that purely phonological factors are sometimes involved to at least some extent in determining compound stress patterns. At least two types of cases come to mind. First, there is a tendency to stress very long compounds farther to the right than might otherwise be expected (e.g. travel expense reimbúrsement voucher, not trável expense reimbursement voucher, or maple syrup contáiner distributor, not maple sýrup container distributor). Second, it is likely that the leftward shift in short, common compounds such as ōatmeal and īce cream (which are still pronounced oatméal and ice créam by conservative speakers) is related to the general leftward shift in nouns in general (e.g. cígarette, still pronounced cigarétte by conservative speakers). One might say that such cases are being treated in effect as non-compounds. This explanation is entirely consistent with the fact that many monomorphemic words in present-day English are known to have arisen from earlier compounds (e.g. daisy ⟨ day's+eye, hussy ⟨ house+wife).

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