o. Introduction: Nonphonological Conditions on Phonological Rules

The view of phonology that is most restrictive in its use of nonphonological information is one in which the input representation of a sentence is a string of instances of phonological units, where each unit has constant phonetic correlates. In combination with other assumptions (e.g. that the phonetic correlates for a unit are criterial for that unit), this view is characteristic of pronouncements on phonemic theory during recent decades. It is this view which is attacked in Pike's "grammatical prerequisites" articles (Pike 1947 and 1952), which argue that indications of the boundaries between words and between morphemes are also required.

It is well known that much further nonphonological information is required for the correct explanation of various phonological processes. These are (a) not only indications that there are boundaries between units (words or morphemes), but also specifications of the nature of the units separated (morphemes, words, or phrases), and perhaps even finer distinctions, such as the one between the boundaries +, =, and # in Chomsky and Halle (1968, 364–371; see also McCawley 1968, 52–59); (b) specifications of the grammatical categories to which certain words and phrases belong (as in the English stress rules given by Chomsky and Halle; see also Postal 1968, 115–119); (c) specifications of syntactic and morphological features; e.g. [± animate], [± feminine], [± native], (for which see Postal 1968, 119–129); and (d) rule-features, marking certain forms as not undergoing general rules or as undergoing special rules (see Postal 1968, 129–139, where an attempt is made to distinguish simple exceptions from divisions in the vocabulary, and see also Chomsky and Halle 1968, 373–380). In addition, the hierarchical arrangement of phrases within phrases controls the application of cyclical phonological rules, although as Bierwisch has pointed out (1968), stress rules controlled in this way must be assumed to be inapplicable past a certain level (furthermore, it is quite likely that only a few types of rules will require cyclical treatment).

Despite the fact that there are many ways in which information of an essentially

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nonphonological or syntactic nature can determine the applicability of a phonological rule, there are innumerable types of nonphonological information which presumably cannot be referred to in phonological rules, even where the usual assumptions about the relationships between the major components of a grammar do not implicitly prohibit such reference. I give here three classes of cases.

First, semantic information is associated with lexical items, so that unless explicit conditions rule out the carrying along of, or reference to, this information, phonological processes could be conditional upon it. Hence, one might expect to find phonological rules that applied only to nouns customarily referring to females; instead, one finds rules referring to feminine gender. Semantic classes, it seems, have phonological correlates only through the mediation of syntactic classes and morphological markings.

Second, syntactic rule-features, indicating whether or not governed rules may apply, are associated with verbs throughout the syntactic component, so that unless explicit conditions rule out reference to these features, phonological processes could be dependent upon them. Hence, one might expect to find phonological rules that applied only to forms of passivizable verbs; instead, one finds rules referring to verbs that have been passivized.

Third, and most serious, the full power of transformational grammar is available for the formulation of syntactic rules that do nothing more than mark specified constituents as subject to a given phonological rule. Thus, one might imagine a rule identical in form to the English rule Relative Clause Formation, except that rather than moving an NP it merely marks that NP as [+Truncation], where Truncation is a rule simplifying word-final consonant clusters. Or one might imagine a cyclic rule that marks a verb [−Nasal Assimilation] if an NP follows it. The effect of such a rule would be to make Nasal Assimilation inapplicable in any verb that has an “object” at one or more stages in its derivation. Rules of this sort strike me as quite unnatural, in general, although there are familiar processes, regular vowel gradation for instance, that are not very different in form; the difficulty arises in distinguishing impossible utilizations of transformational devices from such common phenomena as the conditioning of phonological rules by “grammatical” (as opposed to “lexical”) morphemes, or by (independently motivated) features that happen to be manipulated by transformational rules. What is required is a substantive theory of syntactic features—and more besides, for if transformational rules can insert material, then the effect of any unnatural rule involving features can be achieved by an equally unnatural rule inserting a “silent morpheme”, one with no phonetic effect beyond the conditioning or blocking of a phonological rule.

The assignment of prosodic features presents a number of problematic cases with respect to the independent motivation of the features or morphemes triggering phonological rules, as well as with respect to the nature of the rules themselves (see Bierwisch 1966 for some discussion of these matters). For example, given that features of em-
phasis or contrast cause certain phonological rules to apply, is the introduction of these features analogous to, say, the marking of certain verbs as [+causative], thereby occasioning the application of an ablaut rule? I have nothing new to say about problems of this type, which I mention here only because the prediction of prosodic features by means of syntactic rules requires either (a) the incorporation of the required features within a motivated theory of syntactic features, or else (b) the identification of processes of this type as a class of exceptions to the generalization that syntactic rules cannot introduce, or otherwise manipulate, features or morphemes which serve only to indicate whether or not a phonological rule is applicable.

With the possible exception of prosody rules, then, I have made it appear that all the nonphonological information needed to determine the applicability of a phonological rule is contained in superficial syntactic structures—call this the Principle of Superficial Constraints in phonology. As just stated the principle is both too weak and too strong. It is too weak because there are considerable restrictions on the extent to which surface syntactic information can be used. I suggest that none of the following can be conditions on the applicability of a phonological rule in a human language: (1) the rule applies only to the fifth word in a sentence (or, to any word but the fifth);¹ (2) the rule applies only to morphemes embedded at least (or, no more than) four Ss deep; (3) the rule applies only to morphemes following (or, before) the last VERB in a sentence; (4) the rule applies only to morphemes dominated (or, not dominated) by an NP, at whatever remove. It is easy to construct impossible processes of this type, not so easy to formulate the appropriate restrictions on phonological theory. Indeed, I shall not attempt these formulations here.

The principle is too strong on several grounds. First, there appear to be some systematic differences between the structures which result naturally from the operation of the syntactic component and those to which certain phonological rules apply. For these cases Chomsky and Halle (1968, 371f.) have suggested, with reservations, the postulation of special “readjustment rules”, the only function of which is to transform the motivated output of the syntactic component into the appropriate input to the phonological component. Next, in one case it has been argued (in Bierwisch 1968) that the correct generalization about the domain of a rule, there a stress placement rule, must be made with respect to structures obtaining prior to the application of a clearly syntactic rule, the positioning of separable particles in German. Finally, it has been argued (in Vennemann 1968) that certain kinds of “paradigmatic” information can determine the applicability of phonological rules. Vennemann’s example is a German syncope rule that is in general inapplicable in one environment, but applies nevertheless in this environment to verbs exhibiting a vowel contrast in the present indicative.

¹ Rules referring to the beginning (or end) of a sentence or clause are, of course, possible, as are rules referring specifically to the first word (e.g. the Sanskrit rule that positions ca ‘and’ after the first word of a coordinate clause).
It should also be noted here that if stress-dependent conditions on English pronominalization are stated in constraints ordered after the rules determining stress levels, then these constraints, located within the phonological component, will refer to predicates not definable from surface structure alone, for instance the predicate antecedent of and the subject-nonsubject distinction (see Lakoff’s ms. 1968).

In the body of this paper I examine the English contraction rule Auxiliary Reduction, by way of investigating the extent to which it and rules related to it are dependent upon information not available in surface structure, or are restricted by complex conditions referring to syntactic and phonological information available in surface structure. Inasmuch as only a handful of problematic cases are presented in detail here (or elsewhere), I shall not attempt to extend phonological theory to accommodate these facts. This extension must wait upon the accumulation of further data of similar type.

1. Preliminaries I: The Rule Glide Deletion

This rule drops morpheme-initial [h] quite generally, [w] only in will, would, was, and were, and [ð] in they, them, than, this, these, that, those, and there. It does not affect [y].

In slow, careful speech the rule does not apply, except for some speakers in the word forehead [fárid]. At moderate rates of speech it applies to certain unstressed pronouns and auxiliaries (he, him, his, her, have, having, has, had, will, would, them; also than), and in faster speech it is extended to the other listed forms with [w] and [ð], and to all occurrences of [h] before syllables with relatively weak stress (e.g. the initials in horrendous, humanity, and Hispanic, and the medial [h] in philharmonic, perhaps also in cathouse; compare inhuman and disharmony, which maintain the [h] except in quite fast or careless speech). In definitely fast speech initial [h] drops in examples like I’m glad John hit me, not George and It was John’s hat, not George’s, that got crushed, where the vowel following the [h] bears stress, but relatively little in contrast to nearby syllables.

Note that Glide Deletion cannot be said to apply to [h ð w] before [-stress] vowels, or before vowels marked [α stress], where α must be greater than some specified integer; rather, the rule applies before vowels that are relatively unstressed with respect to their immediate environment (however this condition is to be formalized). Thus, as already noted, the [h] of hit or hat is deletable when the stress on these words is overshadowed by a neighboring contrastively stressed word. Similarly, the dropping of initial [h] is quite unnatural when it is located at the beginning of a sentence, or after any major juncture, even when the following vowel bears only weak stress (as in He’s my best student, Melvin—he was my best student—flunked the last test, and Melvin,

2 Also, as C.-J. Bailey has pointed out to me, the rule applies obligatedly in toward, leeward, and Greenwich, if an analysis of these forms as containing morphemes beginning with [w] can be justified.

3 The dropping of [ð] in Atta boy! and the like seems to be truly anomalous.
**Auxiliary Reduction in English**

having flunked the last test, joined the French Foreign Legion. Also, Glide Deletion is less acceptable before not than in the corresponding positive sentences (cf. Tess’s been here with Tess’s not been here); the explanation of these examples is that the main stress of the positive sentence is on the word immediately following has, whereas in the negative sentence the main stress is further away from has.

The stress condition on deletion of [h] should be contrasted with the stress conditions on vowel reduction. Thus, although the [h] can drop in sentences like That’s my hat, stupid!, the word hat maintains its vowel [æ], even in quite fast speech. It should also be emphasized that, given the required stress environment and the appropriate style and speed of speech, any initial [h] drops, without regard for the syntactic features of the morpheme it begins. Here Glide Deletion contrasts with Auxiliary Reduction, which applies only to have, has, and had in certain senses (and not at all to having), even when these forms occur in contexts where their initial [h] drops (see the next section for details).

The restriction of Glide Deletion to only a few forms in [ə] and [w] does not seem to have an explanation in terms of other facts about English, although considerations of general phonological theory are undoubtedly relevant here, [h] being, in general, more likely to drop than [ə] or [w], and [w] more likely than [y]. More puzzling is the division of the forms in [ə] and [w] into two classes, with Glide Deletion applying to will, would, them, and than in slower speech than to the remaining forms. Thus, although the stress patterns are identical in I saw them and I saw that, the first reduces more readily than the second; similarly for She will go and She was gone. The complete exclusion of the from the domain of Glide Deletion—despite the fact that the typically occurs in the best environment for the rule, namely unstressed and preceding a stressed word—is perhaps to be explained as avoidance of extensive homonymity between the and a, although explanations of this sort are extremely weak (many languages manage without an obligatory distinction of definiteness, and English permits homonymity as a result of other contraction rules, as when him and them reduce to [m] and when how did you, how had you, and how would you are all realized as [hawjə]).

2. Preliminaries II: Initial Observations on Auxiliary Reduction

This rule and NOT-Contraction are the most familiar contraction rules of English, the ones regularly represented in the orthography.7

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4 There are, of course, dialects in which Glide Deletion is much more widespread than it is in mine. Cockney is a famous example. But even there [h] tends to be preserved after junctures: “It is mostly likely to occur in heavily stressed syllables, under emphasis, and it is always preceded by a juncture” (Sivertsen 1960, 141).

6 See Zwicky (to appear) for a short discussion of hierarchies of this type.

7 Some speakers find the reductions of was and were unacceptable at any rate of speech.

7 There are several interesting aspects to NOT-contraction. First, in my dialect not appears either in its full form [nat] or in its completely reduced forms [nt]. There is no intermediate form [nat]: *[pay kenat/wilnat gow]. This lack of an intermediate reduced form can be explained by having some occurrences of not enter the
Auxiliary Reduction applies to eight forms only: is and has, which reduce to [z]; would and had, which reduce to [d]; have, which reduces to [v]; am, which reduces to [m]; are, which reduces to [r]; and will, which reduces to [l]. Of the remaining forms of be, have, and will that begin with vowels, [h], or [w]—having, was, were, and all forms with enclitic n't (isn't, hasn't, etc.)—none are subject to the rule.

It is clear that Auxiliary Reduction is to some extent dependent upon the prior application of Glide Deletion, for the reduction is never applicable in environments in which the deletion is blocked; contrast She's been here and ?She's not been here, which exhibit differential acceptability because of the stress conditions on Glide Deletion, with She's here and She's not here, which are equally acceptable because Glide Deletion is not involved. Moreover, the assumption that Glide Deletion precedes Auxiliary Reduction permits the latter to be stated fairly simply, as a rule deleting word-initial unstressed lax vowels, rather than as a rule deleting vowels together with (in some cases) preceding glides:

\[
\begin{array}{c}
V \\
-\text{tense} \\
-\text{stress}
\end{array} \rightarrow \phi / \#\# \quad [+\text{cons}] \#\#
\]

A few comments on the form of the rule (which will be considerably revised in subsequent sections): the condition that only one segment follow the vowel to be deleted prevents the rule from applying to the forms with enclitic n't, or to having;

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phonological component as affixes to verbs, like the "neutral" suffixes -ness, -able, and the inflectional endings of nouns and verbs. These instances of not will then remain stressless because of their affixal character, and we require an obligatory vowel-deletion rule, stated below in a fairly general form (although it is a very minor rule applicable only to the lexical item not):

\[
\begin{array}{c}
V \\
-\text{tense} \\
-\text{stress}
\end{array} \rightarrow \phi / \quad \text{C \#}_\text{VERB}
\]

The further phonological alternations exhibited by not, namely the variation between [nt] after obstruents (has, had, is, was, does, did, could, ought, need, must) and [nt] after vowels and [r] (may, do, are, were, dare), are accounted for by an independently required rule syllabifying resonants in the environments C-C and C-C# (cf. shown and proven).

Second, a number of verbal forms have special obligatory variants before n't, and only there. In two cases these forms are predictable by familiar obligatory rules, if n't is treated as an affix: can't [kænt], instead of the otherwise expected *[kænt], shows a simplification of geminate stops (Chomsky and Halle 1968, 148–151), a rule that can be supposed to apply before the syllabification rule; mustn't [maːnt], instead of the otherwise expected *[maːnt], shows an application of the obligatory [t]-deletion also operative in moisten, soften, and similar examples. The form don't [dɔnt], replacing the expected *[dʌnt], is anomalous in not undergoing the vowel shift, although [dɔw] (from /dɔ/ does. Next, will and shall drop final [l] before [nt] just as they do before "past" [d] (would, should), while will exhibits an additional, apparently truly anomalous, shift of [i] to [ow]. Finally, am lacks the expected negative *[ənt], for which a more general form ain't [ənt] serves in some dialects. These facts, although ranging from the regular to the arbitrary, indicate that n't and should be treated as a verbal affix.

8 Auxiliary Reduction is not the only rule reducing auxiliaries in English. Did contrasts to [d] quite extensively (Who'd [huwɗ] he see?, When'd [wɛnd] they go?, What'd [wɔd] he want?), do largely before you only (Who do you ([huwɗ(ə)ɔ] or [huwɗ]) know around here?, but What do you [wɔd]a want? and Who do you [huwɗa] our supporters favor?). Also, have (and of) has the reduced form [ə], e.g. would have [wudə(v)] and might have [mədə(v)] (similarly a friend of mine [ə frenda(v) mayn]). The restrictions on these rules, which deserve further study, are quite different from those on Auxiliary Reduction.
there are no double contractions of the type *John'sn't (only John's not and John isn't) or *we'ren't (only we're not and we aren't). The condition that ## precede the vowel to be deleted prevents the rule from reducing sentence-initial auxiliaries, even when unstressed. In dialects in which was and were are not subject to Glide Deletion, the exclusion of these forms from the domain of Auxiliary Reduction is automatic. In other dialects, Auxiliary Reduction would appear to be sensitive to the distinction between those forms that readily undergo Glide Deletion and those that are subject to the rule only in very fast speech.

Although the application of Glide Deletion to forms beginning in [h] or [w] is a necessary condition for the application of Auxiliary Reduction to these forms, it is not a sufficient condition, since Auxiliary Reduction does not affect words like him and his, even unstressed and in fast speech; Those who know him have loved him can be contracted to [ðəwz uː now m əv lʌv m], but the first him must maintain its syllabicity: *[ðəwz uː nowm əv lʌv m] (note that the further reduction is not at all difficult to pronounce). The restriction is that the only forms subject to the rule are [+auxiliary] forms, where the feature [±auxiliary] is assigned as required by independent facts having to do with word order. In this assignment, all uses of be bear the feature [+auxiliary], whereas only certain uses of have bear this feature. Thus, is contracts in all of its uses: e.g. progressive be (He's going), passive be (He's criticized every day), be of identity (January's the first month of the year), be of obligation (He's to go right away), and predicative be with following adjective (He's a sick), noun phrase (He's a farmer), adverbial of place (He's in town, He's from Idaho), or adverbial of time (The concert's tonight). The uses of have, on the other hand, fall into three classes: perfective have; the main verb have in its central senses of possession, location, availability, and the like; the main verb have in various restricted, idiomatic, or derived usages (e.g. have 'hold, give' in He has a party every night, have 'give birth to' in She has a baby every twelve months, have of obligation in I have to write a letter, causative have in Mildred has Frank pick her up every day at noon). Forms of perfective have contract freely (He's been looking at that, He's been hurt), forms of have in its central senses do not normally contract in my dialect, although they do in some British dialects (*He's some money left, *I've a wart on my nose, *Cecilia'd a car at her disposal), and the forms of have in its special senses do not contract at all (*He's a party every night, *She's a baby every twelve months, *Mildred's Frank pick her up every day at noon).

This division of have into three classes of senses on phonological grounds correlates with a well known classification on the basis of whether have or do (or both) occurs in the tags of tag questions (and on the basis of related facts concerning Subject-Verb Inversion, the placement of NEG, etc.). Perfective have is tagged only by have (He

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9 One case is not quite so clear. It seems to me that to the question Who is the king? the response George the Second's the king is natural, but that ?The king's George the Second is questionable, although the uncontracted versions, George the Second is the king and The king is George the Second, are both acceptable.

10 The contraction is somewhat more acceptable in the environments which especially favor Glide Deletion. ?I've no money left at all is better than *I've a little money under the mattress.
has been looking at that, hasn’t he?/*doesn’t he?), have in its central senses occurs with both
tags (He has some money left, hasn’t he?/doesn’t he?, I have a wart on my nose, haven’t I?/don’t
I?, Cecilia had a car at her disposal, hadn’t she?/didn’t she?), and have in its special senses
is tagged only by do (He has a party every night, *hasn’t he?/doesn’t he?, She has a baby
eye twelve months, *hasn’t she?/doesn’t she?, Mildred has Frank pick her up, *hasn’t she?
doesn’t she?).

The fact that these familiar syntactic phenomena have phonological correlates
occasions some difficulties for the treatment of have and be suggested by Bach (1967).
He proposes that both have and be are introduced by transformational rule, so that the
distinction between different types of have (also be) is determined by whether it
happens to have been inserted under the node Aux or under the node Predicate.
Aside from the problem that only two types of have are thereby distinguished without
special devices, there is the difficulty that in Bach’s analysis perfective have is differen-
tiated from main verb have in the same way that progressive and passive be are
differentiated from predicative be, namely by the dominating node. In consequence,
Auxiliary Reduction must somehow be made applicable to have only when it is dominated
by Aux, but to be regardless of the dominating node. What seems to be required is a
pair of ad hoc rules, one marking all occurrences of be as [+auxiliary], the other
marking have as [±auxiliary] according to whether or not it is dominated by Aux.
Whatever special device is the appropriate one within Bach’s framework, the fact that
some such device is required undermines the principal support for his insertion anal-
ysis, which is that it treats all uses of have (similarly, all uses of be) as arising from a single
source, thereby explaining, rather than merely noting, the appearance of the “same”
verb in disparate functions.¹¹

One further preliminary remark on Auxiliary Reduction: the application of this
rule is a necessary condition for the application of a rule I shall call Phonetic Laxing,
which sends [iː y eː uː w] to [i e u], and [aː y aː w] to [ay aw].¹² Phonetic Laxing applies
only to pronominal forms ending in vowels (he, she, we, me, they, you, who, I, why, how)
when these forms are followed by a contracted auxiliary other than [z] (from is or
has). There is considerable dialectal variation with respect to this rule; some speakers
do not have it at all, others have it in only a few forms. I supply here brief comments
on my own speech, in which the following occur: [hiːyd goːw ~ hid goːw] He’d go,
but not *[hi (w)ud goːw] He would go; also *[ðeː(ː)y]l siː y] They’ll see, [huː(ː)m aː y to
siː y] Who’m I to see?, [a(ː)ym ʃuː wr] I’m sure, [haː(ː)wɔ duː w it] How did you do it?
Phonetic Laxing does not apply to nonpronouns, even when they are of the same phonolog-
ical shape as pronouns; compare [ðed goːw] They’d go with *[ked goːw] Kay’d go.
Nor does it apply before [z]: [ʃiːyz goː wiŋ] She’s going, not *[ʃiz goː wiŋ].¹³

¹¹ Related, but unformalized, proposals are made in Lyons (1967).
¹² Indications of vocalic length are provided only in this short discussion of Phonetic Laxing.
¹³ I do not exclude the possibility that rather than there being a rule Phonetic Laxing, the independently
required rule Final Tensing (which tenses the underlying lax vowels at the end of words like radio, kinkajou, and
3. Restrictions on Auxiliary Reduction: Preceding Context

The reduction of *is* and *has* takes place regardless of the nature of the preceding word: *Who’s Pete seen?, The man I told you about’s here, What I say’s no business of yours, Neither Gloria nor Godfrey’s ever been to Pakistan, The man I told you about that Jerry said he was going to send his review to’s going to answer your question, I’ve always known that Sam’s crazy.* Note that reduced *is* and *has* are realized as [s z iz] (*Dick’s/John’s/Butch’s here*), in the same way as the third singular present ending of verbs and the genitive and plural endings of nouns.14 The occurrence of [s] for [z] is the result of a straightforward rule *Progressive Voicing Assimilation.* The maintenance of a syllabic in [iz] might be explained either by a restriction on *Auxiliary Reduction* or by a vowel insertion rule applying after *Auxiliary Reduction,* and the choice between these two analyses does not affect the discussion immediately following, although I shall return briefly to the question later.

It is natural to suppose that just as the reduced forms of *is*/has correspond to the [s z iz] inflectional endings, so the reduced forms of *would*/had would correspond to the [t d id] inflectional endings, the regular past tense and past participle endings. But although *would*/had contract after vowels—*He’d go, Mary’d go, Anyone who knows Sue’d go, Who’d gone?, Kermit and Kay’d gone by the time we arrived*—they contract in no other contexts: *John’d [jand], *Sam’d [səmd], *Bill’d [bild], *the mob’d [ðə məbd]. The worst cases are those in which both *Auxiliary Reduction* and *Progressive Voicing Assimilation* would apply: *Russ’d [rəst], *a bush’d [ə buʃt], *Pop’d [pəpt]. Some cases with [r] are marginal: *?The car’d been destroyed, ?Homer’d go if you let him.*

The restrictions on contraction of the remaining forms (*will, have, am, are*) are even more severe. First, *Auxiliary Reduction* does not apply to these forms after non-pronouns, even those ending in vowels: *Sue’ll [suːl], Diana’ll [daɪənəl], *the foci’ve [ðə foʊsəv], *the car’ll [ðə kərl], *the phenomena’re [ðə fənəmənər]. Next, it does not apply after some pronominal forms: *how’m [həm], as in How am I to answer?*

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14 There is, however, a difference between reduced *is*/has and the genitive ending: the genitive ending is subject to a length-and-complexity constraint, but reduced *is* and *has* are not. Compare *The man I told you about that Jerry said he was going to send his review to’s brother will answer your question* with the similar example in the text. The length-and-complexity constraint applies to a syntactic rule involved in the derivation of the genitives; no such rule is involved in the reduction of *is* and *has.*

The essential identity of the reduction of *is*/has and the selection of the genitive ending is noted by the compendious grammarians (see, e.g. Jespersen 1942, 252f). That the form of the contraction rule provides evidence about the underlying form of the genitive ending was first pointed out to me by R. P. V. Kiparsky and has recently been emphasized by Luelsdorff (1969).
*where'll [weyrl], as in Where will you go?, *me're [miyɾ], as in Those who know me are surprised, *her'll [hrl], as in Those who know her will be surprised. Thus, it seems that the rule applies to these forms only after I, you, he, she, we, they, and who (e.g. I'm, you've, he'll, we're, who'll). Yet Auxiliary Reduction fails to apply after these forms when they are the last nouns in coordinate subjects—You and I have (*[ayv]) gone there once too often, Grace and you will (*[yuwl]) like it in Manitoba, Neither we nor they have (*[deyv]) been very pleasant about it—or the final words in relative clauses—Everyone who hears you will (*[yuwl]) be impressed, The two men who said it was they are (*[deyɾ]) arriving on the midnight plane—or the final words in embedded complements—The fact that it was she will (*[siy]) be a blow to the party, Knowing who will (*[huwl]) help us, To see you will (*[yuwl]) be nice—or the final words in various types of reduced relatives—All the residents but you have (*[yuwv]) painted their houses, The guy next to you will (*[yuwl]) speak first, Anyone saying it was I will (*[ayl]) be in deep trouble, The ones knowing who are (*[huwɾ]) going to be closely questioned, The tallest of you are (*[yuwɾ]) being shipped off to Frederick the Great, A man as tall as he will (*[hiyl]) probably be shipped off to Frederick the Great.

The correct generalization is that Auxiliary Reduction applies to will, have, am, and are only after one of a small set of pronominal forms (not quite, as we shall see, the set of forms given in the previous paragraph), and then only when these NPs are immediately dominated by an S. It may be significant that this S is always the one to which the auxiliary belongs (where a node X is said to belong to an S if that S is the lowest S dominating X), although I know of no cases in which it is necessary to require that this be so (and, because of the cases with coordinate subjects and those with reduced relatives, the belonging condition is not sufficient by itself). Note also that, because of the cases with coordinate subjects and those in which the embedded clauses are equative, it would not be sufficient to require that the pronouns be nominative rather than accusative, even though in some of the examples with you the difference in case happens to correspond to a difference in acceptability.

An attractive alternative to the restriction in terms of immediate dominance is the following: the reduction occurs only when the pronoun is the complete subject of the auxiliary. This condition would cover all the examples given above, but there are further facts that indicate that the first formulation of the condition is correct. Crucial evidence is provided by sentences like Who have you seen? and Who will you see?, where who is an object, in contrast to Who will see it?, where who is the subject. I find the contractions acceptable in all three sentences—[huwv yuw siyn], [huwl yuw siy], [huwl siy it]—contra the formulation in terms of complete subjects. These facts are confused by the relative unacceptability (to me, at least) of contracted am in similar environments: Who am (?[huwm]) I to see? But the reduction of am (except after I) is, in general, less acceptable than the reductions of have, will, and are; for notice that

15 The relation belong to also functions as an auxiliary concept in the definition of the relation command discussed by Langacker (1969): node X commands node Y if X belongs to an S that dominates Y.
although *who'm is paralleled by *how'm, already cited, and *why'm (*Why am I to do this?*), the contracted forms who've and who'll are paralleled by the contractions in sentences like *How'll you ever finish that?*, *Why're you staring at her?*, *Why've they given up so soon?*\(^{16}\) *How* and *why*, though pronominal in some sense, can hardly be subjects in these examples. Note that the reduction of *have*, *will*, and *are* takes place before any pronominal form ending in a vowel (subject to the dominance condition).

I now restate the rule *Auxiliary Reduction*, incorporating the observations of this section:

\[
\begin{bmatrix}
  \text{V} \\
  -\text{tense} \\
  -\text{stress} \\
  +\text{auxiliary}
\end{bmatrix}
\begin{bmatrix}
  \text{[+cons]} \\
  \#
\end{bmatrix}
\]

Restrictions

(a) If 4 is not \([z]\), then 1 is a vowel;
(b) if 4 is not a coronal obstruent \([z]\) or \([d]\), then 1 is a segment of a pronominal NP immediately dominated by S;
(c) if 4 is \([m]\), then 1 is a segment of the pronoun I.

A more informal statement of the restrictions is that there are four classes of auxiliaries undergoing reduction—(i) *is* and *has*, (ii) *would* and *had*, (iii) *have*, *will*, and *are*, and (iv) *am*—and that the reduction takes place only after vowels for classes (ii) through (iv), only after pronouns immediately dominated by S in classes (iii) and (iv), and only after the specific pronoun *I* for class (iv). The differentiation of the classes by the final segment of the auxiliary (*[z]*, *[d]*, *[v l r]*, *[m]*) is adopted here with some misgivings, in the absence of any satisfying explanation for the rather peculiar distribution of the forms into the four classes. Another basis for the distribution, namely that the class (i) forms contain the third singular present morpheme, the class (ii) forms the past morpheme, and the class (iii) and (iv) forms neither, seems equally arbitrary.

One further revision of *Auxiliary Reduction* has some support. It is not unreasonable to suppose that the optional rule *Auxiliary Reduction* merely makes the auxiliary clitic to the preceding word, by reduction of the intervening \(\#\#\) to \(\#\).\(^{17}\) The deletion of the vowel would then be accomplished by an obligatory rule also operative in the plurals of nouns, the past tense of verbs, etc. In this framework, the restrictions discussed in the present section continue to be conditions on *Auxiliary Reduction*, not on the vowel-deletion rule (because of the differences between the treatment of *would*/*had* and the

\(^{16}\) *Have* contracts even after where, as in *Where've [werv] you been?* This example is the more remarkable in that *would* and *had* do not contract after where: *Where'd he gone?*, *Where'd you go if you had a chance?* Where'd in the grammatical *Where'd he go?* is reduced from *where did*; not *where would*.

\(^{17}\) Some general convention is then required to make the necessary adjustments in superficial constituent structure.
treatment of the past tense morpheme), and the inflectional endings must be set up with underlying forms /Vz/ and /Vd/, where V is some lax vowel (cf. Luelsdorff 1969).

4. Restrictions on Auxiliary Reduction: Following Contexts.\(^{18}\)

Consider the following examples, all containing unacceptable contractions of *is: *Tell me where the concert's this evening (cf. The concert's in Royce Hall this evening), *I just realized how happy Kurt's these days (cf. Kurt's very happy these days and I just realized how happy Kurt's been these days), *Do you know who the king's now?, *Bert is more distinguished than Jean-Claude's (cf. Bert is more distinguished than Jean-Claude's ever been), *Herman is as fond of peanuts as Gloria's of almonds (cf. Herman is as fond of peanuts as Gloria's enamoured of almonds), *Fafnir is nasty when you tickle him, and Fasolt's when you tell jokes, *Bruce is thin, and Thelma's too (cf. Bruce is thin, and so's Thelma). Similar examples are easily constructed for other contracted forms.

It is clear that the failure of Auxiliary Reduction to apply in these cases has nothing to do with the preceding context. It might seem that the stress on *is is too heavy for the contraction rule to apply, even though it can scarcely be maintained that the principles that predict these occurrences of relatively heavy stress are familiar. I shall argue, however, that the correct explanation does not depend upon stress considerations.

Consider first some cases in which failure to contract correlates with relatively heavy stress, for instance *Tell me where the concert's this evening, where is in Tell me where the concert is this evening bears a major stress. Here, as in *I just realized how happy Kurt's these days, *Do you know who the king's now, and *I wonder where Sparkman's now, *is bears stress because it is the last constituent within the VP, other material that originally followed *is having been removed by transformational rule, and adverbs of the type this evening, these days, and now not falling within the VP (see Chomsky 1965, 101f. and Lakoff and Ross 1966). But note that the stress on *is in examples like I wonder how tall he is (*he's) is not very heavy.

Similar explanations can be offered for *Bert is more distinguished than Jean-Claude's and *Fafnir is nasty when you tickle him, and Fasolt's when you tell jokes, but not for *Herman is as fond of peanuts as Gloria's of almonds, where almonds bears the major stress in its VP (and, in fact, in the entire sentence), or for the contrast between *Bruce is thin, and Thelma's too and Bruce is thin, and so's Thelma, where Thelma is too and so is Thelma have identical stress patterns. In fact, Glide Deletion, which has already been noted to be dependent on stress, can apply in some examples where Auxiliary Reduction cannot: Tweedledum has gobbled more oysters than Tweedledee (h) as versus *Tweedledum has gobbled more oysters than Tweedledee's (and cf. Tweedledum has gobbled more oysters than Tweedledee's consumed clams); similarly, Gerda has been to North Dakota as often as Trudi (h) as to Arkansas.

\(^{18}\) The central data in this section were pointed out to me by George Lakoff and J. R. Ross, and the explanation of them first suggested by Harold King (see King 1970).
versus *Gerda has been to North Dakota as often as Trudi’s to Arkansas. In my speech the vowel of has in these examples is reducible, so that has may appear as [əz], but not as [z] (there are speakers of English who disagree with me on this point).

The starred examples considered thus far, with the exception of the contrast between Thelma is too and so is Thelma, have a common property besides the (rather inconstant) occurrence of a major stress on the vowel to be deleted: in every case, the constituent following the auxiliary form has been deleted or moved away. Several different transformational rules are responsible for these deletions and movements—a rule which fronts questioned constituents, as in I wonder how tall he is (*he’s), and exclamatory phrases, as in How tall they are! (*they’re!); some rule or rules reducing comparative and equative clauses, as in I am more evil than he is (*he’s) and He is at least as evil as I am (*I’m); a rule Gapping (see Ross 1967) yielding sentences like I am nice to Leda, and you are (*you’re) to the swan and I am as nice to Leda as you are (*you’re) to the swan; a rule VP Deletion (see Ross ms. 1967) generating sentences like Mike is building a house, and Tom is (*Tom’s) too and Akira is tall for a Japanese, and Samoset is (*Samoset’s) for a Mic-Mac; various rules generating other tags, as in Horace said that his brother is seven feet tall, and so he is (*he’s) and that he is (*he’s) and he is (*he’s) that/which he is (*he’s); and a topicalization rule, as in A great man my father is (*father’s).

It seems that Auxiliary Reduction is barred from applying to a form when the constituent following that form has been removed.

This is not to say that stress is not a factor in the conditioning of Auxiliary Reduction, only that the no-deletion condition seems to be required independently of the stress restrictions. A case in which stress restrictions are clearly operative is the distinction between How is (how’s) the weather in Boston? and How is (*how’s) it in Boston? where is in the second sentence receives greater stress because of the stresslessness of pronouns like it (however these facts are to be represented in a description of English phonology).

An unsolved problem is the contrast between the behavior of inverted auxiliaries in questions and tags, as in Who has (who’s) Pete seen? and I’m going, and so is (so’s) Pete, and their behavior after preposed negatives, as in Nobody has (*nobody’s) Pete seen and Never has (*never’s) Pete seen her. Note that a careful statement of the no-deletion condition must distinguish between cases in which a constituent following the auxiliary is moved and cases in which the auxiliary itself moves. In any event, the no-deletion condition is inoperative here, and reference to stress levels will not explain the contrast either, since a perfectly normal pronunciation of Never has Pete seen her is [nevərz piyt siynər], with a reduced and unstressed has.

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