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# Settling on an underlying form: The English inflectional endings

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D. Cohen & J. R. Wirth (eds.), Testing Linguistic Hypotheses. Washington D.C.: Hemisphere, 1975.

## 1. THE GENERAL PROBLEM

It happens again and again in doing linguistic analysis that some perfectly simple hypothesis about a specific language resists solution and leads to a series of alternative analyses, attempts at justifying or rejecting one or another of these hypotheses, and intense examinations of fundamental assumptions about both the language in question and the linguistic theory in which the analysis is to be framed (even about the justifications for this theory itself). For every language that has received the attention of linguists, there is a set of such problems—the "tough nuts" for that language. In phonological analysis, the tough nuts turn up when we ask what the underlying form for some morpheme should be, or just what the form of some rule is; examples are listed in Zwicky (1974b), from which some of the discussion below is drawn.

This work was supported in part by the John Simon Guggenheim Memorial Foundation. An earlier version appeared in Zwicky (1974a).

What happens when we are faced with a tough nut is that we question our reasons for maintaining one analysis over another, and we question the support for those reasons: we ask, in the terms of Toulmin (1958), for the *warrant* for an argument, and for the *backing* for the warrant.[1] In fairly complicated cases, we can see a claim, a warrant for this claim, a response to this warrant, a counter to this response, a response to this counter, and so on, in true dialectic fashion. I have not given so explicit an analysis of the arguments below,[2] although it could be drawn from my presentation, a survey of the literature on the underlying forms for the English inflectional endings.

## 2. THE PARTICULAR PROBLEM

English expresses a small number of nominal and verbal categories by inflectional morphemes:

(a) for nouns
  (i) plural: Pl
  (ii) genitive: Gen
(b) for verbs
  (i) third-person singular present: Prs
  (ii) present participle: PrsP
  (iii) past: Pst
  (iv) past participle: PstP

For completely regular items, the stems are unchanged and they have suffixes with one of three phonological forms:

(a) S, realized as
  (i) /ɨz/ after /s z š ž č ǰ/
  (ii) /z/ after other voiced segments
  (iii) /s/ after other voiceless segments
(b) T, realized as
  (i) /ɨd/ after /t d/
  (ii) /d/ after other voiced segments
  (iii) /t/ after other voiceless segments
(c) G, realized as /ɪŋ/

[1] Analysis of linguistic arguments in Toulmin's terms has been undertaken in Botha (1970, 1971).

[2] Though I intend to do so at a later date for the problem I actually discussed at the conference this volume reports on, the formulation of the so-called "*ruki* rule" in Classical Sanskrit.

The pairing of morphemes and phonological forms for completely regular items is as follows:

| *Category* | *Suffix* |
|---|---|
| Pl, Gen, Prs | S |
| Pst, PstP | T |
| PrsP | G |

Most of the presentation below revolves around the innocent-sounding question: What are the underlying forms of S and T? This query splits into several others—for each of the suffixes S and T:

(I) Is the underlying form *syllabic* (does it contain a vowel?) or *nonsyllabic* (vowelless)?
(II) Is the underlying consonant *voiced* or *voiceless*?
(III) If the underlying form is syllabic, which of the various English lax vowels is it—//ɪ ɛ ə ʌ ɨ//[3]—or some vowel not fully specified?

Questions (I) and (II), taken together, give four sorts of underlying forms to be considered: //V̆z z V̆s s// for S and //V̆d d V̆t t// for T. Question (III) multiplies these possibilities; but the problem for choosing an underlying lax vowel hasn't been attacked seriously. None of the writers I have surveyed gives an argument for a particular vowel in the endings. The vowels favored by supporters of the syllabic analyses are //ĭ// (Lightner, 1970; Hoard and Sloat, 1973b) and //ɨ̆// (Luelsdorff, 1969; Lightner, 1968; Miner, 1975). Supporters of the nonsyllabic analyses write epenthesis rules that insert "neutral" vowels, /ɨ/ or /ə/ (for a complex solution, see the discussion of the Southworth-Daswani analysis in Section 10 below).

So much for question (III). Questions (I) and (II) taken together could have twenty different answers (four different answers each for the five distinct morphemes regularly realized

[3]The double slashes indicate putative basic, or underlying, forms.

as S or T). In fact, most writers assume the following two *hypotheses of parallelism*:

(IV) S has the same underlying form in all of its functions (Pl, Gen, Prs), and T has the same underlying form in both of its functions (Pst, PstP).
(V) The underlying forms for S and T are parallel, in that they both are syllabic/nonsyllabic, and they both are voiced/voiceless.

These hypotheses—which are not however, accepted by all investigators—narrow the possible underlying forms to four sets: //V̆z V̆d//, //z d//, //V̆s V̆t//, //s t//.

In addition to the question of underlying forms, there are also problems in stating the *location* of the inflection within a syntactic phrase; thus, roughly, the Pl is attached to the head of its phrase, as in *fathers-in-law* and *the kings of France*, whereas the Gen is attached to the final element in its phrase, as in *my father-in-law's business* and *the king of France's properties*. I do not explore these matters below, but concentrate instead on the literature about choosing underlying forms. Since this literature touches on many different issues, I must first outline some salient facts about the English inflections; the next Section surveys these data.

## 3. SURVEY OF FORMS

Four nouns, there are various subregular and irregular formations. In the case of the Pl, these are as follows:

(a) "internal" Pls, like *leaves, paths, houses*, in which /f θ s/ are voiced, giving altered stems (Stem's)
(b) zero Pls, like *sheep* and *fish*
(c) truly irregular Pls:
  (i) exceptional Pl suffixes, as in *oxen* and *seraphim*
  (ii) internal changes in Pl, as in *mice* and *feet*
  (iii) Pl terminations paired with distinct singular terminations, as in
    *phenomenon–phenomena*
    *addendum–addenda*
    *crisis–crises*
    *virtuoso–virtuosi*

*formula–formulae*
*focus–foci*

Regular nouns have only two phonologically distinct forms:

Stem (nominative singular): *boy*
Stem+S (nominative plural, genitive singular, genitive plural): *boys, boy's, boys'*

Zero Pl nouns also have only two distinct forms:

Stem (nominative singular, nominative plural): *sheep*
Stem+S (genitive singular, genitive plural): *sheep's*

Internal Pl nouns have three distinct forms:

Stem (nominative singular): *knife*
Stem+S (genitive singular): *knife's*
Stem'+S (nominative plural, genitive plural): *knives, knives'*

Truly irregular nouns have four distinct forms:

$Form_1$ (nominative singular): *child*
$Form_1$+S (genitive singular): *child's*
$Form_2$ (nominative plural): *children*
$Form_2$+S (genitive plural): *children's*

Note that S representing the Gen doesn't occur along with S representing the Pl. Otherwise, the Gen forms are entirely regular, except for (a) a vacillation, for some speakers, between zero and S genitives for a few proper names ending in /s z/, especially in readings of these forms (probably because of the orthographic convention calling for the spelling *Jones'* to represent /jonziz/, etc.); and (b) a zero Gen in idiomatic expressions with *sake*, obligatorily in *for goodness/gracious/Christ sake* (with nouns ending in /s/) and optionally in *for God('s) sake*.[4]

For verbs, there are also various subregular and irregular formations. The PrsP, however, is essentially regular,[5] as is the Prs:

[4] To judge from the citations in Jespersen (1942, sec. 16.8), the zero Gen in both these contexts was formerly much more frequent than it is in standard British and American English today.

[5] Although G varies between /ɪŋ/ and /ɪn/, depending on stylistic, lexical, and phonological factors; see Fischer (1958) and Labov (1972c, pp. 238–244).

(a) "internal" formations, ending in /t d/; these are of a number of subtypes, illustrated by *hit, hid, bet, burnt, crept, built, left*
(b) subregular formations of some vitality (indicated by their tendency to pick up new members), like the pattern in *(sink)–sank–sunk*
(c) irregular formations in which the Pst and PstP are identical, as in the regular examples–for instance, *(fight)–fought–fought*
(d) truly irregular formations, like *(come)–came–come* and *(go)–went–gone*, or, for that matter, the forms of *be*, which is more highly differentiated than any other verb

Regular verbs have three phonologically distinct forms, other than the PrsP:

Stem (infinitive, present other than third-person singular): *jump*
Stem+S (present third-person singular): *jumps*
Stem+T (past, past participle): *jumped*

Internal-Pst verbs have the same three forms distinct (*build, builds, built*), as do many irregular verbs (*fight, fights, fought*); some irregular verbs have four distinct forms other than the PrsP (*drink, drinks, drank, drunk*). One irregular verb distinguishes the infinitive (*be*) from three different present forms (*am, is, are*), two distinct past forms (*was, were*), and the past participle (*been*), as well as the regular PrsP *being*.

## 4. SOME EXCLUSIONS

The literature I discuss concerns only analyses in which there is some attempt to fix on a single underlying form, or at least to argue that several distinct forms are needed. That means I do not survey many American structuralist analyses of English, which merely list the alternants of morphemes.[6] Nor do I treat analyses in which two or more distinct underlying forms are set up for the regular alternants of the Pst and PstP suffixes because

[6] As when Bloch (1947) simply lists the automatic alternants of the Prs suffix; Prs is represented as /z/, but Bloch says in sec. 3.2 of the paper, this is merely "to simplify the listing."

of internal Psts like *dwelt* and *put*, in which the /t d ɨd/ alternations are nonautomatic.[7]

I also do not explore in any detail possible wider implications of the facts about English inflectional endings for general problems in morphology—for the question of whether inflectional categories are to be treated as separate formatives or as features (or perhaps sometimes as one and sometimes as the other),[8] for the question of what formal mechanisms should be used to describe subregularities and irregularities of various types, and for the question of whether the selection of all morpheme alternants can be done by principles that operate in a group, or whether these are interspersed among syntactic or phonological rules.

## 5. STRUCTURALIST DISCUSSIONS

A careful statement of how the allomorphs of some morpheme are distributed typically takes the form of an ordered list, with the more restricted and exceptional allomorphs preceding the more general ones (the alternative in structuralist analyses is simply to list the allomorphs with mutually exclusive environments). Thus totally idiosyncratic allomorphs will precede allomorphs that are regularly determined by morphological environment, and these in turn will precede allomorphs that

[7] Analyses like those of Bloch and of Juilland and Macris (1962, chap. 2), which set up three morphemes for Pst (one for the alternants /d/ and /ɨd/, one for /t/ in both regular and internal Psts, and one for ∅ in both internal and irregular Psts) and four morphemes for PstP (the three above plus N, for the alternants /n/, as in *shown*, and /ɨn/, as in *broken*).

[8] This the the question of whether the ordering of affixes and the selection of morpheme alternants should be given an account by principles that refer to *formatives* like Pl, Prs, Neg, Nml, etc., that are generated by syntactic rules (phrase structure or transformational), or whether such principles should refer to *features* of major categories, features that are "segmentalized" (realized as affixes) by morphological rules. The formative approach is the only one taken in early transformational grammar, which attempts to set up "a fictitious agglutinating analog" (Lounsbury, 1966; p. 380) for the actually occurring forms. Various versions of the feature approach have been offered by Bierwisch (1967), Wurzel (1970), Matthews (1972), and Hoard and Sloat (1973b). A further development of the feature approach is Postal's 1966 proposal that some *clitic* elements—in particular, the English definite article *the*—are segmentalized; this position is reviewed in Stockwell, Schachter and Partee (1973, pp. 67–70).

General issues in generative morphology have been discussed recently by Halle (1973) and Matthews (1974, chap. 12).

are regularly determined by phonological environments; within each group, allomorphs with narrower distributions precede those with wider distributions. In the case of Pl, such a list would begin with the irregular formations, continue with zero and internal plurals, and end with S. For S, the list would certainly begin with /ɨz/, as in Section 2 above, but the ordering of /z/ and /s/ is not so easily determined. Similarly for T. It is clear that the *phonemes* /s t/ have wider distribution than the *phonemes* /z d/; the latter occur only after voiced segments, while /s t/ occur not only after voiceless segments, but also after vowels (*compass, parrot*), liquids (*pulse, court*), and nasals (*pence, pint*). However, as *allomorphs* of the Pl and Pst, /z d/ have wider distribution than /s t/, since /s t/ occur only after voiceless consonants, while /z d/ occur after the much larger class of voiced segments, which includes vowels, liquids, and nasals. It is this latter criterion of wideness that is customarily used, as in the lists given in Anderson (1974b, pp. 54–57), which are of the form:

(VI) S: /ɨz/ after /s z š ž č ǰ/;
otherwise, /s/ after voiceless segments;
otherwise, /z/.

T: /ɨd/ after /t d/;
otherwise, /t/ after voiceless segments;
otherwise, /d/.

The selection of a basic or underlying form is then governed by the following principle:

(VII) The basic form is the "otherwise" or "elsewhere" case in a listing by wideness of distribution; that is, it is the least determined allomorph (Bloomfield, 1933, p. 164; specifically rejected by Wells, 1949, p. 101fn.).

However, this is not the only principle for selecting basic forms; Nida (1949, p. 45) refers also to "comparison with other similar series" (which I take up below in discussing Bloomfield's proposal) and "congruence with general patterns of phonological change," by which Nida means simplicity in the statement of the principles that derive the nonbasic forms from the basic one, that is,

(VIII) The basic form is the allomorph from which the other phonologically determined allomorphs can be most simply derived.

In the case at hand, Nida opts for syllabic basic forms because the derivation of /z s/ from //əz// by loss of a segment is simpler than the derivation of /əz/ from //z// by addition of a segment, in at least two ways: (a) a principle of loss wouldn't have to state that the vowel in question was a specific vowel, whereas a principle of addition would have to mention the specific vowel to be inserted; and (b), loss is *in general* simpler than addition "in that the loss of a phoneme is a more commonly observed phonological process than the addition of one" (Nida, 1949, p. 45fn.). This general criterion can be elevated to the status of an analytic principle:

(IX) Where there is a choice of deriving X from Y or Y from X, select the direction that involves the more commonly observed sort of phonological process.

I remarked above in Section 2 that given the hypotheses of parallelism (IV) and (V), the selection of underlying forms for S and T narrows down to //V̆z V̆d//, //z d//, //V̆s V̆t//, and //s t//. These hypotheses seem to have been accepted by structuralist linguists in general. In fact, the selection was, for many analysts, narrowed still further by virtue of their rejection of "fictive forms" (Wells, 1949, pp. 113–115), basic forms distinct from all occurring allomorphs, like the form //nigws// 'snow' assumed by Hockett (1947, p. 329) to be basic to Latin /niks/ and /niwis/; that is,

(X) The basic form of a morpheme must be one of its allomorphs.

Even linguists who do not accept (X) do assume that deviations from this principle require justification. Consequently, most of the discussion about the underlying forms for S and T concerns itself with choosing one of the three sets, //V̆z V̆d//, //z d//, or //s t//.

Finally, virtually all analysts have accepted some version of a principle favoring phonological determination of alternants over morphological determination. Thus, the German adjective *rund* 'round' clearly has the basic allomorph //rund// rather than //runt// because the occurrences of /runt/ can be predicted from basic //rund//, whereas the occurrences of /rund/ could be predicted from basic //runt// only by principles that refer to specific morphemes or morpheme classes, that is, by principles

involving considerable morphological conditioning. In general:

(XI) Basic forms should be chosen so as to minimize morphological conditioning of allomorphs.

(See Matthews, 1972, chap. 6, and Section 16 below.) In the case of S and T, this criterion argues against //s t// as basic forms because of the occurrence of these phonemes after many voiced segments (vowels, liquids, and nasals); if //s t// are basic, then the difference between *pence* and *pens, pent* and *penned* must be accounted for by having the statements of allomorphic distribution refer either to the specific elements S and T (rather than to the phonemes /s t/) or to some property of the distribution or nature of the morpheme boundaries associated with certain occurrences of the phonemes /s t/. In either case, the conditioning is morphological. It turns out, then, that most of the discussion about the basic forms for S and T tries to decide between syllabic //V̆z V̆d// and nonsyllabic //z d//.[9]

The nonsyllabic analysis for S is defended by Hockett (1958, p. 282) on the grounds that setting up //əz// as the basic form would make it difficult to predict that /z/ is the form that occurs after vowels, since English permits both /z/ and /əz/ after vowels, as in *bows* and *boas*. This is an appeal to principle (XI): only with underlying //z// would the selection of allomorphs be automatic (Wells, 1949). In Hockett's words, "The discovery that an alternation is automatic, and the discovery of the base form, go hand in hand, each implied by the other" (1958, p. 282).

The syllabic analysis was first defended by Bloomfield (1933, p. 212), who cited "an exact parallel in English syntax," namely the forms of the verbal auxiliary *is*, which shows the same alternants as S and in the same phonological environments. Nida (1948, sec. 3.03) gives the argument in some detail. Since the position depends upon (a) the appearance of /z s ɨz/ in both cases under the same conditions, and (b) the obviously syllabic underlying form of *is*, a linking assumption is required:

(XII) If two morphemes have parallel alternants and if the basic form of one of them is determinable, then the basic form of the other should be parallel, if possible.

[9] Some further possible criteria for choosing basic forms are downgraded or rejected by most analysts. See Wells (1949, p. 101fn.) for references to discussions of the criterion that the basic form should occur in isolation or be more pronounceable in isolation.

This is another sort of simplicity assumption: do not assume processes with opposite effects unless forced to.

Clearly, S and *is* are not totally parallel—merely parallel in the phonological conditions on their alternants. The failures of parallelism are much discussed in the generative literature cited below.

In fact, despite hypothesis (IV) the parallelism between S as an exponent of Pl and S as an exponent of Gen is not perfect, either. I pointed out above that Pl and Gen are located in different parts of the noun phrase; the location of Gen means that it can occur with words that are not even nouns, as in *that man over there's* and *a friend of mine's*, cited by Gleason (1961, p. 97). Moreover, as traditional grammarians have regularly pointed out, many nouns that occur with Pl do not occur with Gen; abstract Gens like *the solution's complexity* are much rarer than concrete formations like *my father's moustache*. Gleason concludes from these facts that the Gen S "is much better handled in the syntax than in the inflection," as opposed to the Pl S, which is inflectional. It is also true, of course, that the Gen S is quite regular, in contrast to the manifold complexities of the Pl S. We can conclude from these differences that while Pl in English is an inflection, Gen is much more like a clitic. This difference does not necessarily bear on the selection of basic forms, however (but see Section 22 below).

One final complexity treated by structuralist analysts is the fact that the morphemes Gen and Pl usually exclude one another; in the regular case, Gen Pl = Pl = Gen.[10] Hill (1958, p. 139) argues in detail that in the Gen of internal and zero Pls (e.g., *wives'* and *sheep's*) it is the Gen rather than the Pl that must be assumed to be zero. He summarizes all the Gen Pl variants by the following statement: "the number suffix [Pl] is always given first and . . . of two homonymous suffixes, the second is always reduced to zero." I return to the Gen Pl in Section 20 below.

## 6. S, T, AND AUXILIARY REDUCTION

Both the nonsyllabic and syllabic analyses of S and T are represented in the generative literature. The nonsyllabic analysis

[10] Although Delack (1971, fn. 7) reports forcing items like *Joneses'* [jównzəzəz] from informants.

is assumed without argument by some writers (for example, Labov, 1969). The syllabic analysis is maintained by Luelsdorff, 1969, and Zwicky, 1970a, p. 333f., who give Bloomfield's argument appealing to the parallel between the forms of S and those of *is* (also *has*).

Lightner (1970) refines the discussion in several ways. First, he exposes the difficulties with the //s// and //V̆s// analyses for S. Next, he attacks the identification of Auxiliary Reduction (the contraction of *is* and *has*, along with *would, had, will, are, am*) with the selection of alternants of S. To this end, Lightner cites a number of conditions on Auxiliary Reduction (from King, 1970; Lakoff, 1970a; Zwicky, 1970a; and Baker, 1971), which do not apply to S. In particular, Auxiliary Reduction is never obligatory,[11] while there are no options in selecting the alternants of Pl. More particularly,

> the conditions for contraction of auxiliaries are by no means simple, and involve numerous strange restrictions on the syntactic environment of the elements involved. These restrictions are unrelated to the operation of [the rule selecting alternants of S], and to attempt to combine the auxiliary reduction rule with [this one] will lead to an enormous increase in complexity of the total rule system. I think, therefore, that this justification for preferring the syllabic variants of the affixes as the phonemic forms must be discarded. (Anderson, 1974b, p. 59)

Lightner also mentions the problems that come from treating *is* and *has* as themselves containing occurrences of S, so that in a syllabic analysis a double deletion is required to get from something like //kæt#ɪ#ɪz// for *cat#be*#Prs to /kæts/; this difficulty could perhaps be avoided by treating *is* and *has* as having zero forms of Prs (like the modals *can, will, may*, etc.), or by having the contraction apply in the phonological cycle.[12]

The former difficulty Lightner discusses—the problem of the lexical, syntactic, and stylistic differences between the conditions on Auxiliary Reduction and the selection of the

[11] This is not quite true—for, as Silva and Zwicky (1973, sec. 2.2) point out, certain idioms with a markedly casual style require Auxiliary Reduction, since failure of Auxiliary Reduction indicates formal style: *You're telling mé!, So's your old man!, How's your ass?, What's up?, What's with yóu?*

[12] There would be some problems with the cyclical hypothesis, in that cyclical application of phonological rules is by no means well established (see the survey in Zwicky, 1973). In this case the cyclical rule would apply once, obligatorily, within the word, and once again, optionally, between words; it might be useful to try to collect similar phenomena.

alternants of S—is more serious, especially if we cannot adduce parallel cases of rules that are obligatory for certain morphemes but hedged with nonphonological conditions for others. But in fact there are many variable rules that are categorical for certain morphemes; one such case in English is the syncope rule that gives /áprə/ rather than /ápərə/ *opera* versus /àpərǽtɪk/ rather than /àprǽtik/ *operatic*, but both /fáynəli/ and /fáynli/ *finally* (see Zwicky, 1972, sec. 2).

Lightner's comments do not, however, decide between the nonsyllabic and syllabic analyses; the nonsyllabic analysis would require a deletion rule (Auxiliary Reduction) plus an insertion rule or rules (for S after /s z š ž č j/, for T after /t d/), while the syllabic analysis would have two deletion rules (Auxiliary Reduction plus a deletion *except* in the cases just mentioned). Neither of these solutions is necessarily suspect on universal grounds, since a number of languages have been claimed to have two or more somewhat similar deletion rules (see the English examples in Zwicky, 1972, for instance) and others to have deletion and insertion rules with related effects, despite principle (XII) (compare the treatment of German unstressed //e// by Wurzel, 1970, part 3).[13]

Lightner (1970, p. 516) also claims that "poetic forms like *winged chariot* (with disyllabic *winged*) are of no help here because the extra vowel of [-ɨd] could be derived equally well by relaxing the conditions either of vowel-insertion or of vowel-deletion." But Miner (1975, p. 357) points out that if such poetic forms—and disyllabic adjectives like *crooked, wretched, aged, jagged*—are taken to have underlying //ɨd//, then these forms are simple exceptions to a vowel deletion rule, whereas if the underlying representation is //d//, then (a) some vowel insertion rule must be extended to apply in new environments, and (b) the forms *crooked, wretched,* etc., must be marked to undergo the extended rule. These arguments clearly involve an appeal to principle (XI), since the final morpheme in *crooked* and *jagged,* call it AdjEd, clearly is not the PstP, for AdjEd combines with nouns to form adjectives meaning "possessing . . . s" or "like . . . s" whereas PstP combines with verbs to form passive participles. What both Miner and Lightner are trying to do is avoid references to the difference between PstP

[13] On the other hand, it has sometimes been argued that facts that might seem to motivate rules with opposite effects do not really do so, as when Eliasson (1972) maintains that Swedish alternations between unstressed /e/ and zero do not motivate both a syncope and an epenthesis rule, but only several syncope rules.

and AdjEd in phonological rules. Instead, they propose to mark AdjEd in some way as an exception to a phonological rule (in the manner of Lakoff, 1970b).

Let us return now to the differences between Auxiliary Reduction and the selection of forms of S. One way around the difficulty is suggested in Zwicky (1970a, p. 333), where it is proposed that Auxiliary Reduction is, in effect, a syntactic rule that provides the input for a late phonological rule: "the optional rule Auxiliary Reduction merely makes the auxiliary clitic to the preceding word. . . . 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." Auxiliary Reduction would then be an operation forming "phonological words" by cliticization—presumably a readjustment rule (Chomsky and Halle, 1968, pp. 9-11 and elsewhere) which reorganizes constituent structure without adding, deleting, or permuting elements (a "rewiring transformation," in the terminology of Humberstone, 1972[14]); a similar treatment is suggested for Negative Contraction (as in *can't*) in Zwicky (1969, sec. 7; 1970a, fn. 7) and for a wide range of casual speech phenomena in Selkirk (1972).

Nevertheless, as Shibatani (1972, p. 121) points out, no independent arguments for a rewiring transformation of Auxiliary Reduction have been adduced. On the other hand, it is not clear just what would constitute "independent evidence" for a

[14] There is some question about what sorts of rewiring transformations should be permitted. Chomsky (1973, p. 254) suggests a separation between cyclic rewiring and rewiring in the readjustment component:

> One might . . . raise the question whether cyclic transformations should not be constrained so as to forbid operations that never change the terminal string of a phrase marker but only its structure, as in the original formulations of subject raising to object position (see, for example, Kiparsky and Kiparsky (1970)). . . . Perhaps all such operations can be restricted to the readjustment rule component of the grammar, which relates syntax and phonology. . . . There is no reason to suppose that such rules of regrouping will receive a natural formulation within the theory of grammatical transformations. One might expect such regrouping to apply most regularly to form words from syntactically separate items, and it may be that some languages (Japanese is a case that comes to mind) make much greater use of regrouping rules than of transformations in a strict sense.

Postal (1974) defends in detail a cyclic rewiring rule of Raising to object position in English; Roldán (1972) gives support for the corresponding rule in Spanish. The distinction between cyclic transformations and regrouping rules has been further challenged by Morin (1974), who argues that the cliticization of French *en* 'of it' is cyclic.

cliticization rule, other than the actual associations of surface words into larger units, as evidenced by the phonological behavior of these words (including accentual phenomena). In the case of the English auxiliaries, they were assumed to be clitic to the elements preceding them (as in the orthography), until Bresnan (1971 Ms.) challenged this assumption by maintaining that the auxiliaries are, in fact, clitic to *following* elements.[15] Lakoff (1972) defends the traditional encliticization proposal, drawing largely on the parallels between S/T and the reduced auxiliaries and on the failure of reduced auxiliaries to behave phonetically as if they began the following syllables. Most of these matters are summarized in Selkirk (1972, sec. 2.3.1).

In this section Selkirk treats another aspect of the parallels between S/T and the auxiliaries: that both show *progressive* assimilation, as opposed to the *regressive* assimilation of voicing seen word-internally in *width* /wɪtθ/ and *length* /lɛŋkθ/ (presumably also in internal Pls like *wolves* and in internal Psts like *bent, left, lost,* although she doesn't mention these; see the further discussion in Sections 9 and 20 below). This is not a new observation, but rather one made by nearly everyone who has examined the English inflectional endings; it is this difference, among other things, that led Chomsky and Halle (1968, pp. 85, 367) to posit a # (rather than +) boundary before *-ed -(e)s, -ing, -ly,* agentive *-er, -ness*, and a few other suffixes (which in general, cause no alterations in the stems to which they are suffixed, except that these stems show the same forms as before pause). What Selkirk does is point out the significance of some other well-known facts to the progressive/regressive distinction: the regressive assimilations in some other cliticizations, for instance, *have to* /hǽftu/, *has to* /hǽstu/, *of course* /əfkɔ́rs/, which Selkirk takes to indicate that if the reduced auxiliaries are enclitics rather than proclitics, then we should expect them, too, to cause regressive assimilation. But the facts are more complex, since other cliticizations show progressive assimilation (*had to* /hǽdu/), and some show both in alternation (*What do you see?* /wʌ́čə sí/ or /wʌ́dəyə sí/). In any case, it would still be open to say that some cliticizations are closer than others, even within the same language—here, to say that certain cliticizations, like certain suffixes, have the boundary + associated with them, while other cliticizations, like other suffixes, have the boundary

[15] Bresnan also maintains that the procliticization is cyclic; see the previous footnote.

# associated with them. That is, we might have here another case in which "the diversity of sandhi laws denotes a gradation of the *syntagmemes*. . .according to the degree of their coalescence" (Jakobson, 1971a p. 108). Jakobson cites the Bohemian Czech imperative enclitic *me* (before which consonants show the same forms that they do before pause; they do not assimilate in voicing) versus proclitic prepositions in the same language (which assimilate in voicing to a following *ř*).

## 7. NONSTANDARD DIALECTS

Shibatani (1972) defends the nonsyllabic analysis of S by reference to two new sorts of considerations—forms from nonstandard dialects (considered in this Section), and the effects of surface phonetic constraints (in the next Section). First, Shibatani cites the observation of Labov (1969) and others that many Black English speakers distinguish contracted forms from inflected ones—*fish is* being realized as either /fɪš/ or /fɪš+z/, but the Pl of *fish* as /fɪš+z/ only. This difference argues against the direct identification of the two rules in Black English, although it is consistent with Auxiliary Reduction as a readjustment rule. Second, Shibatani mentions a discussion by Wolfram (1970) of final stop clusters in Black English, a discussion in which Wolfram notes that the final /t/ and /k/ in words like *test* and *desk* are regularly deleted, but that these stops often remain before words beginning with vowels or before suffixes beginning with vowels; however, the final stop is *always* deleted in the Pl. Thus, /tɛs/ *test* and /tɛs+z/ *tests*, similarly /dɛs/ *desk* and /dɛs+z/ *desks,* although *test is* may be pronounced either /tɛst+z/, /tɛs+z/, or /tɛs/, and *desk is* either /dɛsk+z/, /dɛs+z/, or /dɛs/. These facts indicate that the Pl affix has no vowel, since final /t k/ do not show up before it. I see no satisfying way to account for these data in the syllabic analysis, even if it is supplemented by Fasold's 1971 proposal that the optional nonappearance of S in Black English is the result of a "syntactic" (i.e., morphological) deletion rule, while the nonappearance of T results from phonological deletions.[16]

[16] The distinction between morphemes that are absent because of "syntactic" deletions—deletions of specific morphemes or sequences of morphemes—and those that are absent because of a series of phonological reductions is not always clear; in still other cases morphemes may be absent because they were never inserted in the first place. Labov (1969) argues in detail that the absence of *is* in various contexts in Black

These arguments from Black English do not necessarily bear on the underlying representations for the standard dialect, of course. We are not obliged to posit identical underlying forms for all dialects—see the brief discussion in St. Clair (1973) and the longer treatment in Hausmann (1974)—although the distribution of forms and rules throughout the dialects should be capable of historical explanation. In this connection, an account of the history of Modern English S from Early Middle English *ĕs* might illuminate our problems (see the remarks by Miner, 1975, pp. 350-351 on both S and T, and compare the discussion of the Southworth-Daswani analysis in Section 10 below); if a nonsyllabic analysis is correct for any modern dialects, then the historical development illustrates *rule inversion* in the sense of Vennemann (1972b), in this case from some stage with syncope to the modern dialects with epenthesis.

## 8. SURFACE PHONETIC CONSTRAINTS

Shibatani's 1972 reference to SPCs, independent constraints representing the phonetic pattern of a language (Shibatani, 1973), permits him to revive Hockett's argument for the nonsyllabic analysis of S.[17] If English has the SPCs

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English is not a syntactic matter (deletion of *be* or failure to generate it in remote structures) but rather the standard English phonological rule of Auxiliary Reduction carried one step further. Examples of absent morphemes that are clearly *not* the outcome of phonological deletions are easy to find (though it is not so easy to determine whether these are syntactic deletions or noninsertions); from English inflectional morphology, here are two dialect examples:

> Nouns expressing time, space, weight, measure, and number when immediately preceded by a cardinal number gen[erally] remain unchanged in the plural in the dialects of Sc[otland] and Eng[land]. (Wright, 1905, sec. 382)

> The sign of the genitive, both singular and plural, is generally omitted when one noun qualifies another in all the north Country dialects and occasionally in the north Midlands, as *the Queen cousin, my father boots, the lad father stick.* (Wright, 1905, sec. 387).

[17] Compare the discussion by Mulder (1968, p. 196), where the failure of automatic alternation is taken to motivate distinct phonological forms for the regular English Pl:

> The English forms 'eggs' /egS/ and 'sacks' /sakS/ are straightforward cases of neutralization of opposition between /s/ and /z/, because such forms as /...gs/ and /...kz/ are structurally not possible.
>
> However, in the English forms 'sins' /sinz/, 'ells' /elz/, and 'plays' /pleiz/, matters are different, because such forms as 'since' /sins/, 'else' /els/, and 'place'

(1) $\sim \begin{bmatrix} -\text{son} \\ \alpha\text{vcd} \end{bmatrix} \begin{bmatrix} -\text{son} \\ -\alpha\text{vcd} \end{bmatrix} \#\#$

(2) $\sim \begin{bmatrix} +\text{stri} \\ +\text{cor} \end{bmatrix} \begin{bmatrix} +\text{stri} \\ +\text{cor} \end{bmatrix}$

then

> the base form or phonological representation of the plural must be /z/. This is because it is the only representation that involves processes which can be accounted for by the phonotactic conditions. . . . The underlying form is derived just in case it comes in conflict with [(1)]. A schwa is inserted when two sibilants come next to each other [(2)]. No other processes are involved. (Shibatani, 1972, p. 123)

The force of this argument depends on (a) the degree to which the need for SPCs in general has been motivated, (b) the arguments that (1) and (2) must be stated as SPCs in a phonological description of English, and (c) the implicit claim that SPCs should correspond to positive effects of rules rather than negative conditions (i.e., restrictions) on rules. Concerning point (c), note that a restriction on a vowel deletion rule would express SPC (2) just as much as the operation of a vowel insertion rule would, although the existence of the rule *as a whole* would not be motivated by (2). But we cannot expect rules as wholes to be motivated by SPCs; standard examples of *conspiracies* (in the sense of Kisseberth, 1970) involve the achievement of a target both by the positive action of some rules and by restrictions on others (note the discussion of the Yawelmani clustering condition by Kisseberth, 1970, p. 299, applied to the deletion and insertion analyses for the English inflectional endings by Miner, 1975, pp. 359-360). This same point—that rules can be both "positively" and "negatively"

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/pleis/ can also occur. The expression of the plural morpheme in English apparently has three regular forms: /S/, /z/, and /iz/. Because /S/ represents both /s/ and /z/, however, /S/ and /z/ are not allomorphs in respect to each other. In fact, therefore, the English plural morpheme has only two regular phonological forms, i.e. /S/ or /z/ on the one hand and /iz/ on the other. The prediction of /z/ and /iz/ belongs to the domain of morphophonology; the prediction of /S/ belongs to phonology proper.

In respect of /iz/, though /s/ cannot follow a phoneme of the *hissing* or *hushing* order, there is, however, no phonological rule which prohibits /s/ from following /i/. Therefore, also /iz/ is a *phonologically determined* variant of a *certain morpheme*, i.e. it is a case of *semi*-phonological determination.

motivated by phonotactic constraints—is emphasized by Sommerstein (1974).

In a response to Miner's criticisms of the nonsyllabic analysis for S and T, Hudson (1974, pp. 180-181) suggests that the SPCs be understood as constraining the output of *individual* phonological rules (not merely the phonological component as a whole), at least in the sense that the SPCs function to determine the intrinsic ordering of rules. Hudson would like to support //z// as the underlying form for S, since this is the analysis that makes all the alternations automatic (principle (XI) again), and he rejects extrinsic ordering of rules, so that he must defend himself against Miner's arguments summarized in Section 16 below (that the Unordered Rule Hypothesis favors a syllabic analysis). He says:

> There are two P-rules to resolve the occurrence of [sequences violating (1) and (2)] which arise in derivations due to the positing of the abstraction *z* for the plural suffix. Epenthesis will resolve the disallowed sequence thus: *hisz* ⟶ *hisiz*. Application of voicing assimilation will not help, but yields instead another sequence disallowed by the SPCs: *hisz* ⟶ **hiss*. The SPC of English which prohibits the sequence *ss* disallows the latter step in derivations. . . . The unordered application of SPCs, by disallowing voicing assimilation, clears the way for the correct derivation via epenthesis. (Hudson, 1974, p. 181)

All Hudson proposes to do here is show that //z// is *possible* as an underlying form, given the rest of his assumptions. The argument does not provide positive support for the nonsyllabic analysis.

## 9. NONPARALLEL ANALYSES

All of the authors cited so far appear to hold the hypotheses of parallelism (IV) and (V), that S and T each has the same underlying form in all of its functions, and that the underlying forms of S and T are parallel. However, some analysts—notably Hoard and Sloat in a number of papers—reject these assumptions. First, there is the 1971 Sloat and Hoard paper, which fixes on //z// for Pl, //s// for Gen and Prs. and //t// for Pst; all underlying forms are nonsyllabic, but they are not otherwise parallel. The arguments Sloat and Hoard give are based on two considerations: markedness à la Chomsky and Halle (1968, chap. 9), and the properties of internal Pls and Psts.

Markedness considerations would favor voiceless underlying consonants over voiced ones. To accommodate internal Pls and Psts, Sloat and Hoard suppose that they differ from the regular formations only in the boundary intervening between stem and suffix (# for regular formations, + for internal cases; recall the discussion in Section 6 above). This decision leads them to select a voiced underlying form for Pl, because of *lives, baths,* and *houses*, but a voiceless underlying form for Pst, because of *built, bet,* and *slept.*

Miner (1975, pp. 362-364) notes a difficulty with assuming that the internal formations result from a change of boundary from # to +: sometimes it is the stem, sometimes the suffix, that is responsible for this change. Moreover, such a manipulation of boundaries goes beyond the proposal put forth by Stanley (1973, pp. 202-206), according to which only *affixes* could trigger the demotion of boundaries. In fact, Pyle (1972) explicitly argues against any language-particular manipulation of boundaries (and see the discussion in Section 23 below).

Hoard and Sloat (1973a) reassess the role of internal Psts in deciding on underlying representations for the Pst suffix:

> In Sloat and Hoard 1971, we posited /t/ as the underlying form for the regular preterit marker; this is suggested by the internally suffixed preterits *dealt, spelt, burnt*, etc. However, we failed to assess correctly the role of such internally suffixed preterits as *sold, told, said,* and *heard.* Both these groups of preterits can be accounted for in a general way by positing an underlying /d/ for the preterit suffix, plus a rule of devoicing. The devoicing rule can be stated informally as d → t/[+consonantal, -syllabic] + ___ #. (p. 113f.)

They continue to assign the same underlying segment to the regular and internal Pst suffixes (and to the regular and internal Pls), so that regular verbs (plus the irregular *bring, teach, think, catch, seek,* and *beseech*) have the suffix //#d//.

In their latest treatment of the English inflectional endings, Sloat and Hoard (1973) maintain //d// for Pst, but opt for //ɨz// instead of //z// for Pl (perhaps for Gen as well; I have not seen a written version of this paper, and various details of the analysis are not clear to me). Their rejection of //z// is based primarily on the nature of the schwa insertion rules in their earlier analyses:

$$(3)\quad \emptyset \rightarrow \text{ə} / \begin{bmatrix} -\text{son} \\ +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} - \# \begin{bmatrix} -\text{son} \\ +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#$$

They hypothesize that two paired variables cannot both occur in the environment of a rule, as is the case with the paired variables [αstri] in (3). Their new analysis also eliminates two other peculiar features of the earlier treatments: (a) the insertion of schwa by (3) as part of the *stem* rather than the suffix (note the criticism in Miner, 1975, p. 361), and (b) the assimilation rule:

(4) [αvcd] ⟶ [−αvcd] / [−αvcd] # ___

All the Hoard and Sloat analyses treat internal Pls as involving an intervocalic voicing rule also manifested in forms like *worthy, brevity, mischievous*, and (in some dialects) *greasy*. As Delack (1971, p. 206) points out, using intervocalic voicing in this way, with an underlying //+z// for internal Pls, requires including /z/ as a possible second "vowel," which is quite unnatural; this difficulty is avoided with underlying //+ɨz//, as in Sloat and Hoard (1973). But the intervocalic voicing analysis is not the only one that has been suggested. Lightner (1968, pp. 58-60) reviews three others: (a) an analysis with a morphophoneme //F// in *knife* (as opposed to //f// in *chief*); (b) one in which the morpheme *knife* is marked as undergoing voicing of its final spirant before the Pl suffix, while the morpheme *chief* is marked as not undergoing such a rule; and (c) one in which *knife* is marked as undergoing a minor rule (Lakoff, 1970b, chap. 5) voicing final spirants before Pl. The first analysis follows comments by Swadesh and Voegelin (1939) and Harris (1942), the second is essentially an alternative analysis offered by Harris, and the third is Lightner's revision of this; all three violate principle (XI). The Sloat and Hoard 1973 solution differs from all three of these approaches in that their voicing rule is phonologically motivated rather than arbitrary (instead, *their* minor rule is the morphological rule that specifies a + rather than a # boundary before Pl for certain morphemes).

## 10. ABSTRACTNESS AND OPACITY

An unusual nonparallel analysis is the one given by Southworth and Daswani (1974, pp. 146-149), which is closer to a recapitulation of history than any analysis I know, although it is by no means an exact recapitualtion. They assume //d// for regular Pst, //t// for internal Pst, //s// for Pl, and /əs/ for Gen, *has*, and *is* (from unstressed //hɪs//, //hæ-s//, //ɪ-s//, respectively).

They also assume that internal-Pl nouns have an underlying final schwa that is deleted if no consonant follows, and that nouns ending in /ə/ have underlying forms with nonneutral vowels. Their full set of rules, disregarding the subclasses of internal Psts, is as follows, in order:

(5) $ə \rightarrow \emptyset \; / \; \_\_ \; \#$

(6) $\left\{\begin{matrix} f \\ \theta \\ s \end{matrix}\right\} \rightarrow [+vcd] \; / \; V \; \_\_ \; V$

(7) $\left\{\begin{matrix} hɪs \\ hæ\text{-}s \\ ɪ\text{-}s \end{matrix}\right\} \rightarrow əs$

(8) $\text{-}əs\text{-}əs \rightarrow əs$

(9) $ə \rightarrow \emptyset \; / \left\{\begin{matrix} C \; \_\_ \; s \text{ except for } C = \{s \; z \; š \; ž \; č \; j\} \\ C \; \_\_ \; d \text{ except for } C = \{t \; d\} \end{matrix}\right\}$

(10) $\left\{\begin{matrix} s \\ t \end{matrix}\right\} \rightarrow [+vcd] \; / \left\{\begin{matrix} [+cons] \\ [+vcd] \\ ə \end{matrix}\right\} \_\_ \; \#$

(11) $ə \rightarrow \dot{+}$

(12) $\begin{bmatrix} V \\ -stress \end{bmatrix} \rightarrow ə$

Rules (11) and (12) are designed for forms like *Rosa's*, which is analyzed, approximately, as

//rosa-hɪs// ⟶ /roza-hɪs/ by (6)
⟶ /roza-əs/ by (7)
⟶ /roza-s/ by (9), suitably extended
⟶ /roza-z/ by (10)
⟶ /rozə-z/ by (12)

and *roses*, which is analyzed, approximately, as

//rosə-s// ⟶ /rozə-s/ by (6)
⟶ /rozə-z/ by (10)
⟶ /roz$\dot{+}$-z/ by (11)

The rules and underlying forms are not really argued for (and some details of the analysis are not clear to me). Many aspects are controversial—the crucial use of extrinsic ordering,

particularly in having rules (5) and (11) precede, and bleed, rule (12); the underlying form //hɪs// for Gen; the negative environments in rule (9); the two apparently unrelated clauses in the voicing assimilation rule (10); and an absolutely general rule of intervocalic voicing for /f θ s/, rule (6), which would force the analysis of surface occurrences of these continuants as underlying clusters, which would then have to be degeminated after rule (6) has had its chance to apply. The crucial use of extrinsic ordering (see Section 16 below) is tied to the considerable abstractness of this analysis—principle (X) is violated for Gen, *has, is*, all nouns with internal Pls, most nouns ending in /ə/, and all words with intervocalic /f θ s/—and to the fact that so many of the rules are opaque, in the sense of Kiparsky (1973a, sec. 2)—this is true of rule (5), since there are word-final schwas in English; of rule (6), since there are intervocalic voiceless /f θ s/; of rule (9), since /Cəs/ and /Cəd/ sequences occur for many speakers, even word-finally, as in *minus* and *synod*; of rule (10), since word-final /əs/ and /əd/ occur for many speakers; and of rule (11), since all speakers have some occurrences of /ə/.

An analysis that is close to Southworth and Daswani's in its employment of extrinsic ordering, its abstractness, and its opacity is offered by Householder (1971, pp. 111–113), also without detailed justification. Householder takes //z// as the underlying form for Pl. Like Southworth and Daswani, he treats surface schwas as derived from underlying full vowels (e.g., final //a// in *sofa*). On the other hand, instead of treating internal-Pl nouns as exhibiting voicing in the plural, he treats them as exhibiting *de*voicing in the singular; *wolf* ends in //v//, and there is a rule of final devoicing. Since there is final devoicing, nouns that actually end in voiced obstruents must be protected from devoicing, so they are assumed to have a final //ə// that is deleted in word-final position, but only after devoicing has applied. After this protective schwa has been deleted, unstressed nonneutral vowels are reduced to schwa.

Householder also discusses the trade-off between extrinsic ordering and special morphophonemic symbols: if there is a "labeling or indexing procedure . . . which marks differently a /v/ which may become /f/ from one which may not, or an /f/ derived from a /v/ from one not so derived" (p. 112), then the rules do not have to be extrinsically ordered. The first alternative—marking differently those //v//s that alternate with /f/ from those that do not—involves what Kiparsky (1973b, p. 16) calls "the phonological use of diacritic features" and is suspect on

metatheoretical grounds. The second alternative—distinguishing /f/s derived from //v// from those not so derived—amounts to embracing some version of derivational constraints (Section 24 below); the connection between rule ordering and this sort of derivational constraint is treated by Kenstowicz and Kisseberth (1970).

## 11. OTHER VOICING ALTERNATIONS

The spirant voicing in internal Pls like *wolves* might or might not be related to other voicing alternations in English. Chomsky and Halle (1968, pp. 213, 232f.) consider both possibilities, without coming to a decision, for pairs like *choice/choose, cloth/clothe, safe/save, life/live*: either their rule devoicing //z// before the suffix *-ive* (as in *abusive, evasive*) is extended to devoice spirants in derived forms, marked [+ $\phi$]; or else their rule voicing //s// in an assortment of positions, largely intervocalic, is extended to voice spirants in the environment $\overline{V}$ ___ V, in which case the voicing rule is triggered by a final lax //ĕ//, later elided, in forms like *clothe*.[18]

In a longer discussion of the problem of derived forms, Chambers (1971) rejects the extension of intervocalic voicing to the $\phi$-subclass, arguing that instead there is a special voicing rule that applies to deverbal nouns. If Chambers' analysis is correct, then the $\phi$-subclass has no bearing on the inflectional endings. The problem treated here is one of a sort that recurs quite often: should we collapse rules that have similar forms? Kiparsky (1968, pp. 172-174) notes that just because two rules can be ordered next to one another and share some formal features, it doesn't follow that they should be combined by abbreviatory conventions and treated as parts of a single rule. And as I pointed out in Section 6 above, many languages seem to have several distinct rules performing similar operations.

## 12. ACQUISITION OF SUFFIXES

Delack (1971) criticizes the analysis in Sloat and Hoard's 1971 paper (Pl //z//, Gen and Prs //s//, Pst //t//) on three

[18] It is also possible, of course, that some forms require one treatment, some the other.

grounds: the nature of the rules involved (pp. 205–208), acquisitional facts (p. 208f.), and the characterization of voiceless consonants as unmarked in English (p. 209f.). With respect to acquisition, Delack notes Berko's 1958 observation that different functions of S are mastered by children at different ages—Gen and Prs before Pl.[19] But he concludes that this fact does not necessarily bear on the choice of underlying forms in adult speech. He does not discuss Berko's further observation that different alternants are mastered at different ages (/z/ and /s/ before /ɨz/), which might conceivably be taken as evidence against //ɨz// as the adult underlying form. But to argue in this way would require, first, a demonstration that the underlying form for the children who have only the nonsyllabic allomorphs is itself nonsyllabic; and, second, an assumption that children do not change their underlying forms once they have fixed on them (for otherwise the children's forms would be irrelevant to the adult analysis).[20]

It is also extremely unlikely that all English-speaking children go through the same stages in their acquisition of the inflectional endings. Berko's data give averages for age-groups, but longitudinal data for a number of children would be more illuminating. In the case of my own daughter Elizabeth's acquisition of the endings, I have recorded (Zwicky, 1970c) a striking and quite regular overgeneralization in the PstP, giving doubly marked forms like *tooken, wroten*, and *roden*; some of these forms have been reported for other children, but it is doubtful that many created them with such regularity, and probably quite a few children *never* overgeneralize the way Elizabeth did. Elizabeth also had a series of anomalous plurals—first, some plurals with overgeneralized /ɨz/, like /kætɨz/ *cats* and /hændɨz/ *hands*, and later, occasional plurals with phonologically anomalous overgeneralized /s/, like /dɪšs/ *dishes*—which doubtless are not shared by many children. If there can be this much individual variation in the acquisition of allomorphic alternations, then no firm conclusions can be drawn about the adult grammar.

In general, the implications of acquisitional studies of English morphology (for instance, the items cited by Ferguson and Slobin, 1973, p. 210f. introducing Anisfeld and Tucker, 1968) for phonological analyses have not been carefully examined.

[19] He does not mention the reduced auxiliaries—nor do I know of any studies on their acquisition.

[20] I am thankful to Donald Churma for bringing this problem in argumentation to my attention.

## 13. MARKEDNESS

In considering this topic, Delack (1971) uses differences in voicing onset time in different languages to suggest that voiceless stops might be unmarked in some languages, voiced stops in others (English, for instance). The implicit principle here and in Sloat and Hoard (1971) is that phonologically less marked underlying forms should be preferred to more marked ones. This is the explicit position of Schane (1968), who recommends the principle as a means of reducing arbitrariness in selecting underlying forms. Schane's position has been disputed by Malone (1970) and Vennemann (1972a). In any case, Schane merely maintains that the principle would apply when other considerations fail, so that we have no reason to suppose that markedness, whether universal or language-particular, will clarify the question of what the underlying forms of S and T are.

A very different approach to the underlying forms for S in terms of markedness is taken by Shapiro (1972, pp. 359–361), following up ideas due to Andersen. Shapiro's analysis is not easily summarized, especially since his initial assumptions are different from those of most of the writers I discuss in this review of literature; for instance, his notion is that markedness is "aprioristic, logically based" (p. 345fn.), and he explicitly casts doubt on a markedness theory based on phonetic considerations (as in Delack's 1971 article).

In his treatment of S, Shapiro asks two questions: how are the three alternants ranked with respect to markedness, and which alternant is basic? To the first question, Shapiro answers: /ɨz/ is the unmarked alternant, /s/ the most marked alternant (that /ɨz/ is the unmarked alternant is indicated, for Shapiro, by the fact that it occurs with stems ending in *multiply* marked segments; there is a principle of complementation in markedness between stems and affixes). To the second question, the answer is //s//, because the phonological markedness of the form will then mirror the morphological markedness of plurals in English. To evaluate these proposals, I whould have to explore in detail Shapiro's hypotheses of complementarity, iconicity, and also of assimilation of markedness (not to mention the specific feature system used and the assignments of markedness values within this system). Such a task is beyond the scope of this paper; but his proposals deserve careful study.

## 14. UNIVERSAL CONSTRAINTS ON EPENTHESIS AND SYNCOPE

Thus far, we have seen the presentation of the syllabic analysis by Luelsdorff and Zwicky, followed by counter-arguments and reanalyses by Lightner, Shibatani, Delack, and Hoard and Sloat. In return, some support for the syllabic analysis has been advanced recently by Guile (1972) and Miner (1975), and the latter has been responded to by Cohen and Utschig (1973). I now review this material briefly.

Guile's defense of the syllabic analysis (essentially a refinement of principle (V) above) arises from his hypothesizing that vowel epenthesis rules always break up some "nonobstruent" clusters (consonant clusters containing at least one nonobstruent consonant) and that vowel syncope rules creating consonant clusters always create some nonobstruent clusters. These hypotheses are putative universals. Guile cites rules in English (the fast speech rule also discussed in Zwicky (1972) under the name Slur), Georgian, and Old Norse to support the syncope hypothesis, and concludes his article by remarking that in the case of the English inflectional endings

> a putative rule of vowel epenthesis would have introduced a vowel breaking up exclusively obstruent clusters. But this runs counter to the independently motivated principle of universal grammar which defines what a possible rule of vowel epenthesis is. Hence, the facts of English must be accounted for by a rule of vowel syncope. (Guile, 1972, p. 468)

However, the two universal hypotheses need careful validation. There is a possible counterexample to the syncope hypothesis in Japanese; see Ohso's 1973 discussion of a fast speech deletion of high vowels in the environment

$$[-\text{vcd}] \_\_ \left\{ \begin{matrix} [-\text{vcd}] \\ \# \end{matrix} \right\}$$

—the rule is an extension of a devoicing rule (p. 13). Moreover, an epenthesis rule restricted to obstruent clusters would not be phonetically implausible, though I have no good examples.

## 15. OTHER FORMATIONS IN *-ed*

Miner (1975) carefully reviews most of the literature on the English inflectional endings and presents two new arguments for the syllabic analysis—one from ordering considerations and one from the phonology of forms in *-edly* and *-edness*. Miner (sec. 5) uses these formations to argue for //ɨd// rather than //d// in the Pst (and PstP). He notes that contrasts like *resignedly* versus *determinedly* indicate that the realization of *-ed* (before *-ly* or *-ness*) as /ɨd/ or /d/ is correlated with ultimate or penultimate stress on the root, respectively. He then argues that an insertion rule for Pst = //d// and *resignedly* is much more complex than a deletion rule for Pst = //ɨd// and *determinedly*. Nevertheless, even Miner's deletion rule is scarcely simple:

$$(13)\quad \text{ɨ} \rightarrow \emptyset \;/\; \langle -\text{stress}\rangle\, C_0 \begin{bmatrix} +\text{son} \\ -\text{cor} \\ +\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#\_\_ \begin{bmatrix} -\text{son} \\ +\text{cor} \\ -\text{dist} \\ -\alpha\text{stri} \end{bmatrix} \# \langle +\text{seg}\rangle_1 \#$$

It is, however, true that Miner (1975, pp. 360-361) points out that much of the complexity of (13) disappears if (1) and (2) are seen not as SPCs, but rather as derivational constraints in the manner of Kisseberth's 1970 treatment of conspiracies (which is itself controversial). In Section 18 below I will discuss still another possibility for rationalizing the statement of (13).

## 16. ORDERING AND MORPHOPHONEMICS

Miner (sec. 3) also argues that, given the Unordered Rule Hypothesis (URH) (Koutsoudas, Sanders, and Noll, 1971, and other items cited by Miner), the underlying forms //ɨz// and //ɨd// (for the regular cases) lead to the simplest grammar. This follows on the assumption that rules apply whenever their structural descriptions are met.

Cohen and Utschig (1973, sec. 2.2) object to Miner's use of the URH, pointing out that Miner's syncope rule and the English rule of *t/d*-flapping should, under the URH, apply simultaneously, to yield *[bæDz] from //bæt#əz// *bats*. There are at least two responses to this objection.

First, it is possible to maintain, with King (1973, p. 567f.), that languages have both *phonological* rules and ("low-level") *phonetic* rules, and that all of the former precede all of the latter.[21] If the inflectional syncope rule is a phonological rule and flapping is a phonetic rule, then there is no ordering problem. Alternatively, we could maintain that some or all of the rules determining the forms of the English inflectional endings are *morphophonemic* rules (or simply *rules*), while flapping is a (phonological or phonetic) *process*, and that all rules (in this special sense, due to Stampe, 1973) precede all processes. In either case, we would have an intrinsic ordering determined from an overall classification of phonological substitutions into subtypes. Such a classification is assumed by many writers on phonology; Anderson (1974a, 1974 Ms.) finds that at least three types (morpholexical rules, phonological rules, phonetic rules) are distinguished by generative phonologists. Moreover, it would be very desirable, on metatheoretical grounds, for rules to be ordered in blocks by type, since such an organization of grammars would be considerably more restrictive than intercalation of rules without regard to type (see Section 25 below). Anderson maintains, however, that the three-way classification does not correspond to any ordering restrictions, that rules do not group together in blocks subject to universal ordering statements. Instead, he argues, the rules are frequently interleaved, although he holds out the hope that there might be differences in the *formal* conditions on the three subtypes. For the moment, however, I will explore the standard (though usually implicit) assumption that there are at least two subcomponents of phonology.

Notice that Miner's syncope rule (13), like the Southworth-Daswani rule (9), does not mention specific morphemes like Pl or Pst, but that (13) mentions word-internal and word-final # boundaries and consequently manages to apply only to regular Pl, Gen, Pst, and PstP by virtue of their being the only morphemes in English that (a) are associated with # rather than + and (b) have exactly two segments, the first a neutral vowel and the second an alveolar obstruent. That is, although (13) doesn't mention specific morphemes it manages to refer to a small set of specific morphemes by indirection. Rule (9),

[21] For King, this assumption eliminates a large number of putative historical changes in which rules would be added *within* the phonological component of a language.

properly formulated, would similarly pick out the right morphemes by indirection. We must be able to keep the rule from applying to morpheme-internal /ɨz/ and /ɨd/ or to the morpheme *-ous*, which takes + rather than #. I conclude that an inflectional syncope rule is a morphophonemic rule rather than a phonetic process.

Even if we make no appeal to a phonological/phonetic or rule/process distinction, there is still a way to account for the interaction between flapping and the inflectional syncope rule. We could use the fact that flapping is optional for some speakers in some contexts, whereas the inflectional syncope rule is obligatory for all speakers. Then, by a principle of applicational precedence due to Ringen (1972), in forms to which both rules would be applicable the obligatory rule (here, syncope) applies first; after this the optional rule (here, flapping) may apply if its conditions are still satisfied. In the inflectional case, flapping would no longer be applicable, for syncope would have removed the conditions for its application.

Now, consider the nonsyllabic analysis of the inflectional endings and the epenthesis rule that goes along with it. There is a potential conflict, pointed out by Cohen and Utschig, between this analysis and the URH: if //čə^č#z// underlies *churches*, then both epenthesis and *de*voicing ought to apply simultaneously, giving *[čə^čəs]. Here Cohen and Utschig appeal to a distinction between the *phonological* rule of epenthesis and the *phonetic* rule of progressive devoicing; devoicing, they claim (following Harms, 1973) is not only phonetic but also universal, hence not really a "rule" of English at all but rather a physiological process. Miner (1975, p. 342, fn. 4) disputes this treatment of devoicing, pointing out that the physiological requirements would be equally satisfied by the voicing of a stem-final voiceless obstruent or by the insertion of a vowel[22] as by the devoicing of a suffixal voiced obstruent. That is, *some* process is required to eliminate the offending clusters in (1) above, but there is no a priori reason why progressive devoicing should be the process used. But this is not to say that devoicing cannot be treated as a phonetic, rather than phonological, rule of English, like flapping in the discussion above.

In contrast to the syncope analysis, the epenthesis analysis requires no morphophonemic rule, hence would be preferred by

[22] Simplification of the final clusters /tz/, etc., would be yet another possibility, though this would eliminate the only mark of the inflectional morpheme.

principle (XI); this is Hockett's argument from automatic alternation and Shibatani's from surface phonetic constraints. Of course, principle (XI) itself needs backing. I know of no place where the prejudice against morphological conditioning is justified in detail, although such conditioning is often stigmatized as "unrevealing" or as "missing generalizations" or as "duplicating phonological constraints"; and since the set of morphological features or elements that could figure in phonological rules has nowhere been listed, but is obviously sizable, most investigators seem to feel that morphological conditions are a good deal more "unconstrained" than phonological conditions (which refer to a small set of distinctive features), hence should cost more, that is, should be avoided whenever possible. However, once it is recognized that there *are* morphophonemic rules, there is no justification for assuming ahead of time that properly phonological rules are the norm (or, for that matter, for assuming ahead of time that morphophonemic rules are the norm). Instead, decisions on particular cases should be made on their merits.

## 17. PLAUSIBILITY OF RULES

Though the voiceless analyses for the inflectional endings are not very popular, they are given by a few writers (for instance, Southworth and Daswani), and several analysts have formulated objections to them, primarily on the grounds that the rules required in these analyses are implausible. Thus, Cohen and Utschig (1973, sec. 2.1) begin their discussion of the endings by arguing against //s// and //t// underlying S and T. They maintain first of all that the voicing assimilation rule required in this analysis, namely,

(14) [-son] $\longrightarrow$ [+vcd] / [+ vcd] # ___ #

is implausible for two reasons: (a) because it claims that //s// and //t// voice by virtue of the voicing of preceding sonorants, even though English permits both voiced and voiceless obstruents after sonorants (recall the discussion in Section 5 above); and (b) because it claims that //s// and //t// voice by virtue of the voicing of the preceding stem-final vowels, a "specious generalization." They continue with a version of an argument also given by Lightner (1970) against the voiceless

analysis: (c) that either the vowel in /ɨz/ and /ɨd/ must be inserted as part of the stem (which gives a counterintuitive division into morphemes on the surface), or else //s// and //t// must be made to assimilate in voicing to the epenthetic vowel as well as to stem-final vowels.

Criticism (a) seems to me to be the weakest of the three, since assimilation in voicing to any preceding sonorant (including vowels) is not unparalleled. A Classical Sanskrit (regressive) analogue is well known: "In external combination . . . an initial sonant of whatever class, even a vowel or semivowel or nasal, requires the conversion of a final surd to sonant" (Whitney, 1960, sec. 157c).

Cohen and Utschig also object to //əz// and //əd// on the grounds that the associated syncope rule is implausible. The rule, adopted from Sloat and Hoard (1971), is a subpart of Miner's rule (13):

$$(15)\quad \text{ə} \rightarrow \emptyset \,/\, \left[\left\{\begin{matrix}+\text{son}\\-\text{cor}\\+\text{dist}\\ \alpha\text{stri}\end{matrix}\right\}\right] \# \_\_ \left[\begin{matrix}-\text{son}\\+\text{cor}\\-\text{dist}\\-\alpha\text{stri}\end{matrix}\right] \#$$

(This is the inverse of rule (3).) Their objections are as follows: (a) the rule is ad hoc and implausible, a result of the fact that the contents of the curly braces in (15) don't constitute a natural class; (b) the rule fails to collapse with another syncope rule presented by them (see Section 19 below); and (c) the combination of alpha variables and curly brackets in the rule is uninterpretable according to the conventions of Chomsky and Halle (1968). The first and third of these problems are intimately connected. Moreover, objections (a) and (c) are well taken, since the disjunctive expression in (15) does not describe a class of segments that is likely to recur in the description of the world's languages, and in fact (15) cannot be interpreted by unpacking the curly brackets and the Greek-letter variables. These implausibilities result in part from an attempt to use a single rule for syncope in both S and T, and in part from an attempt to build a pair of negative conditions—essentially (1) and (2)—into the statement of the rule rather than giving them separate expression (see the next Section).

Simplicity considerations speak strongly for the collapsing of the syncope for //əz// and the syncope for //əd// into one rule—but only so long as we are independently convinced of the

unity of the rules (rather than trusting entirely in formal simplicity), and only so long as the rules are not morphologically conditioned. For if the rules are properly stated so as to apply only to certain named morphemes, or only in certain morphological categories, then it is not clear that standard simplicity arguments apply (we have nothing like a theory of what morphologically conditioned rules are like, or of how they should be evaluated by a simplicity metric). In fact, there is some evidence that morphologically conditioned rules are in general sets of distinct subrules (one for each morpheme or cluster of morphological categories involved), and that these subrules may be separately ordered, may have quite distinct conditions on them, may differ vastly in productivity, and may undergo historical change independently of one another; this position is argued for one of the classic cases of morphologically conditioned rules, umlaut in modern German, by Robinson (1974, Ms.).

## 18. NEGATIVE ENVIRONMENTS

Cohen and Utschig's first and third objections to (15) would essentially disappear if the syncope rule could be stated negatively, rather than positively as in (15). The formulation in (15), in fact, is transparently an attempt to avoid stating the negative environments, as in rule (9) above. It is like stating a rule that applies everywhere except in word-final position as a rule that applies before [+seg], or like stating a rule that applies before all obstruents except /f v/ as a rule that applies before obstruents that are either noncontinuant, coronal, or nonanterior.

Letting ~ stand for logical negation, (15) can be reformulated as

$$(16)\quad ə \rightarrow \emptyset \;/\; \sim \begin{bmatrix} -\text{son} \\ +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#\_\_ \begin{bmatrix} -\text{son} \\ +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#$$

or, better, as

$$(17)\quad ə \rightarrow \emptyset \;/\; \#\_\_ [-\text{son}]\ \#\ \text{EXCEPT}\ /\ \begin{bmatrix} +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#\_\_ \begin{bmatrix} +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix} \#$$

or, perhaps, best, as

$$(18)\quad \begin{array}{cccccc} [\ ] & \# & ə & [-\text{son}] & \# & \\ 1 & 2 & 3 & 4 & 5 & \\ & \downarrow & & & & \\ & \emptyset & & & & \end{array}$$

$$\text{EXCEPT WHEN 1 and 4 are } \begin{bmatrix} +\text{cor} \\ -\text{dist} \\ \alpha\text{stri} \end{bmatrix}$$

Negative environment statements in phonology have been proposed by Zwicky (1970b) and Sampson (1973), among others.[23] Zwicky (1970b) notes that negative environment statements and curly brackets can be traded for one another in many cases (as in (15) and (16)), while Zwicky (1970e) observes that curly brackets and paired alpha variables can be traded for one another in certain cases. Consequently, the question of negative environments is closely tied to the curly brackets question; see McCawley (1971) for an attack on curly brackets (hence, support for negative environments).

## 19. OTHER SYNCOPES

Cohen and Utschig's second objection concerns the failure of (15) to collapse with another syncope rule presented by them, namely, a deletion in the final syllable of *titan, metal, atom, angel, minister* (cf. *titanic, metallic, atomic, angelic, ministerial*). But this objection is not necessarily weighty, since a language might have several distinct syncope (or epenthesis) rules. I have already pointed out that English probably has several syncope rules anyway. Moreover, the Cohen-Utschig syncope rule for *titan* et al. is not very plausible phonetically—it deletes /ə/ between C and $\begin{bmatrix} +\text{cons} \\ +\text{sons} \end{bmatrix}$#. Neither is Miner's syncope rule (13) (simplified in (15)), of course, but Miner's rule refers to word-internal # and is therefore a morphophonemic rule rather than a phonological, or "allophonic," rule. A phonetically

[23] I am preparing a separate bibliography on negative conditions on rules (semantic, syntactic, and phonological).

plausible alternative analysis of the *titan* cases would be to derive the final syllable resonant (R̥) from a full vowel plus resonant (VR) via vowel reduction (əR), vowel assimilation (RR), and monophthongization (R̥); this is the "pseudo-syncope" treatment given by Semiloff-Zelasko (1973).

Thus, I see no reason to suppose that (15) *should* be collapsible with the *titan* rule.

## 20. ASSIMILATION RULES

Bailey (1974) suggests a novel reanalysis of the English inflectional endings, an analysis in which there is no progressive assimilation in the forms customarily analyzed as ending in //z d//. Instead, Bailey supposes that word-final //z d// are devoiced to /s t/, by the "well-known [fact] that most varieties of English devoice underlying voiced consonants before external word boundaries" (p. 138), and that English speakers' *perception* of [z] and [d] in words like *loves* and *loved* is not of actual voicing but rather follows from the greater length of vowels before underlying voiced consonants and consonant clusters than before underlying voiceless consonants and consonant clusters. The proposal is then that the *phonetic* processes of final devoicing and shortening of vowels before voiceless consonants are sufficient to explain the apparent alternations of voicing. An epenthesis rule is needed for the syllabic alternants, but there is no progressive assimilation. The only assimilation in Bailey's analysis is a *regressive* assimilation for forms like *built,* derived from //bɪld+t//, as in Sloat and Hoard (1971). Apparent progressive assimilations in internal Psts like *speed*, derived from //spēd+t//, are for Bailey just like the apparent progressive assimilation in *muffs*, derived from //mʌf#z// (except, of course, for the vowel laxing induced by the internal consonant cluster in //spēd+t//).

Bailey maintains that *loves* is phonetically [lʌ·fs] and that *loved* is phonetically [lʌ·ft], and that "these facts [have been] long known to phoneticians in England, Scotland, and America" (p. 138). But standard phonetic descriptions do not identify the final continuant of *loves* with that of *muffs*; the following statements are typical:

> With many speakers the stop itself is partially or even completely devoiced [in final position]. In the latter case the consonants are

> very weak voiceless plosive consonants, or sometimes weak "ejective" sounds. (Jones, 1964, p. 154)

> In initial and especially in final positions, i.e. following or preceding silence, /b, d, g/, while remaining lenis, may be only partially voiced or completely voiceless . . . /b, d, g/ may be realized . . . finally as [b̥, d̥, g̊]. (Gimson, 1970, p. 152)

Similarly, Pulgram (1970, pp. 60-61fn.) emphasizes that the voiced obstruent phonemes may have voiceless—though still lax—allophones and adds (p. 61fn.):

> Even though most textbooks distinguish carefully the English plural allomorphs in the noun /s/ and /z/, as in *kits* /kɪts/ [kɪts] and *kids* /kɪdz/ [kɪdz], it cannot be gainsaid that the latter is not infrequently, especially in prepausal position, pronounced [kɪd̥z̥] or [kɪd̥s̥].

Which is to say that while *cubs* is likely to be [kʌ·b̥z̥] phonetically (though [kʌ·b̥z] and [kʌ·b̥s] are also possible), *cups* is [kʌps]. To exclude *[kʌpz̥] for *cups*, given underlying //z// for Pst and Prs, we would apparently need a rule progressively assimilating *tenseness* rather than voicing. There seems to be no escaping some progressive assimilation corresponding to the constraint (1). Under the circumstances, one might even want to say that there is a progressive assimilation of *phonemic* voicing (with laxness a redundant concomitant of voicing), followed by *allophonic* devoicing in final position (laxness being unaffected by this change). Or perhaps, as Pulgram hints, the distinctive feature is tense versus lax, with voicing being contextually determined; this is the assumption of Shapiro (1972, p. 360).

In addition to his phonetic argument in favor of an analysis without progressive assimilation, Bailey also objects to "the complex assimilations which otherwise have to be postulated" (p. 138), citing not only internal *hid* and *built* alongside of regular *skidded*, but also irregular *pence* and *dice*,[24] which are presumably to be contrasted with internal Pls like *leaves*. But, contra Bailey, even if *pence* and *dice* do end in some allomorph of the Pl (which is not obvious), it seems innocuous to posit a //+s//, parallel to the //+t// of *built* and *dreamt* and contrasting with the //+z// of *loaves*, while for voiced internal Psts like *hid*, a //+d// would serve. Since we are dealing with rather small

[24] Also *lice* and *mice*, though these are dubious examples of an //s// allomorph of Pl.

classes of exceptions—indeed, classes that show no inclination to pick up new members—we are not obliged to see the differences in allomorphic shape as differences in rules, but can comfortably assign them to alternative underlying forms. There would still be a regressive assimilation operating across + and a progressive assimilation operating across #, but these two rules scarcely constitute a "complex" set of operations.

## 21. THE GENITIVE PLURAL

The problem here, as Dr. Latham's *English Language* (cited by Bombaugh, 1961, p. 256) so confusingly puts it, is that "in the plural number, however, [the genitive] is rare; so rare, indeed, that whenever the plural ends in *s* (as it always does) there is no genitive." Kruisinga (1932, sec. 829) echoes this conclusion, without the contradiction:

> The genitive suffix is never added to nouns with a plural suffix, no matter whether this is final or not. Thus the plurals *fathers, fathers-in-law*, and such groups as *the queens of England* never take a genitive suffix, although the groups *father-in-law* or *queen of England* do. . . . We can state this in another way: English has no genitive plural. The explanation of the apparent exceptions *men's, women's, children's* has already been given. . . . It may be added here that the plurals *lice, mice*, and *geese*, though formally isolated from the noun-stems, do not take a genitive suffix either.

That is, regular nouns have the GenPl identical to the Pl (but see footnote 10), a fact that could be given a generative account in several ways—by a rule simplifying the sequence of morphemes S+S (as Hill, 1958, suggests in the passage quoted in Section 5 above), by a rule simplifying the clusters /sz zz šz.../, or by a condition preventing segmentalization of the Gen suffix in regular Pl forms. I return to this question shortly. Kruisinga, however, maintains that Gen and Pl do not occur together even in irregular forms; of the umlaut plurals *men, geese, teeth, feet, lice, mice,* and *women*, he says

> These plurals with vowel-change must be looked upon as suppletive, rather than inflectional, forms. All of them that denote persons: *men, women*, and *children*, are so completely isolated from the corresponding singular that they can take a sibilantic suffix to serve as a genitive: *men's, women's, children's*. (1932, sec. 761)

I do not understand this claim. Moreover, as pointed out in

Zwicky (1969, p. 419), there are other acceptable irregular GenPls: *oxen's, addenda's, both sheep's, seraphim's*, etc. Apparently all zero Pl nouns, and all those irregular Pl nouns with Pls ending in *sonorants* have GenPl forms, while the few irregular Pls ending in *obstruents* (*feet, teeth, mice, geese, lice*) do not (**feet's, teeth's,* etc.). Except for the cases treated in Section 23 below, neither these facts nor the unacceptability of phrases like **the queens of England's* (which have Pl and Gen associated with different words) seem to have any bearing on the choice of underlying forms for Gen and Pl.[25]

At least two analysts, Anderson (1974b) and Mansell (1974), have argued that the identity of Gen, Pl, and GenPl in regular nouns does bear on the choice of underlying forms. Anderson (1974b, p. 59) writes:

> As is well known, when both regular plural and possessive endings are attached to the same form, the latter has no phonetic realization: *the boys' books*. This cannot be due to a morphological rule which says "*poss* → ∅ / *plural* ___," since the possessive occurs perfectly regularly with those irregular plural forms which do not have the sibilant ending: *the children's books*. Thus, it seems reasonable enough to posit a rule which deletes the regular possessive ending when it follows the regular plural ending. Now notice that if we assume the nonsyllabic shapes for both endings, the grammar of English already contains a rule which will accomplish this: the rule of geminate reduction (see Chomsky & Halle, 1968), which deletes one of a pair of identical consonants. This rule does not apply between a word final sibilant and one of the endings (that is, we have *kisses*, not **kiss'*), because of the intervening word boundary (#). The

[25] It is not clear what the correct account of the sonorancy condition on irregular GenPls is. Zwicky (1969, pp. 421–422) opts for a lexical redundancy rule (Chomsky and Halle, 1968, pp. 380–389) that marks irregular nouns ending in obstruents as exceptions to a rule segmentalizing the Gen morpheme (recall the discussion in fn. 8). But this can't be correct, since all such a rule would do is bar the segmentalization of Gen; this analysis predicts that the GenPl of *tooth* is *teeth*, not that the GenPl fails to exist. It is also true that this lexical redundancy rule is not of the sort discussed by Chomsky and Halle, who see lexical redundancy rules as part of the "readjustment component," hence applying between the syntactic and phonological components of a grammar; Zwicky (1969), however, treats as lexical redundancy rules any principles stating dependencies between the features (phonological, morphological, syntactic, semantic, stylistic) of lexical items, and this more general conception now seems to be the current one.

A more satisfactory analysis of the sonorancy condition would be to treat it as a surface structure constraint (Perlmutter, 1970) that marks as ungrammatical certain combinations of morphological and phonological features. The same treatment is available for explaining the ungrammaticality of **the queens of England's*: a surface structure constraint requires that genitive plural NPs must have Gen and Pl associated with the same word (or, equivalently, that genitive plural NPs must end in their head nouns).

> conventions suggested above [p. 55fn.], however, would suggest that the plural and the possessive are separated by simple morpheme boundary (+), rather than word boundary, since the word including the plural and the possessive does not dominate any lexical element that is not dominated by the word including just the plural. That is, the natural underlying structure of *boys'* is /##boy#z+z#/. It is argued in Chomsky and Halle (1968), and accepted here, that + does not impede the operation of rules, and accordingly the independently needed rule of geminate simplification will account for the reduction of possessive after the regular plural if we assume both have the shape /-z/ (or /-s/). A parallel use of geminate reduction cannot be made if we assume the syllabic variants, for obvious reasons. The choice, then, would seem to be between /-z/ and /-s/; and this choice I resolve in favor of /-z/ because . . . the choice of /-s/ would require us to formulate [the epenthesis rule] so as to add the epenthetic vowel to the stem (that is, before the boundary) rather than to the ending if [the rule] is to work correctly. This conclusion I find counterintuitive, but without real evidence beyond that. I assume throughout, of course, that whatever choice is made for the sibilant endings, the analogous choice should also be made for the dental preterite.

I quote Anderson at such length because this passage exposes the form of the argument quite clearly, as well as making explicit reference to some principles discussed in earlier Sections of this paper. Two new elements appear here: an appeal to the geminate simplification rule posited in *The Sound Pattern of English,* and a dependence on the *Sound Pattern* conventions for placing occurrences of the word boundary # in the underlying representations for multimorphemic units. A further bit of argumentation is merely implicit in the passage: Anderson rejects, and rightly so, a rule deleting Gen when it occurs immediately after Pl, but in doing so he assumes that there is no way to refer to the S subset of the allomorphs of Pl and Gen (and perhaps also that even if there were, his analysis would be superior because his deletion rule is purely phonologically conditioned, while a rule deleting S after S is morphologically conditioned; that is, there might be an appeal to principle (XI) in Anderson's argumentation). The rejected analysis would posit a deletion rule of the form

$$(19)\ \begin{bmatrix}\text{Gen}\\ +\text{regular}\end{bmatrix} \rightarrow \emptyset \,/\, \begin{bmatrix}\text{Pl}\\ +\text{regular}\end{bmatrix} \text{ —}$$

The analysis in (19) is of the sort that is commonly stigmatized as "missing the point," since its rather obvious

phonological motivation (avoidance of sibilant clusters) is in no way visible in the rule itself. Nevertheless, as I argued in Section 8 above and in Zwicky (1969, sec. 8), it may be too much to suppose that the correct formulation of a rule will "wear its motivation on its sleeve," to suppose that if a rule is correctly formulated it will be possible to read off the function or functions of the rule from the statement of the rule alone, without consideration of other aspects of the grammar of which the rule is a part. An extended attack on such a principle of transparent motivation has been mounted by Kiparsky (1972), who directs his criticisms against what he calls "the paradigm of formal explanation" (the devising of notational conventions and a simplicity metric, and the use of these to select grammars for particular languages), although they are applicable even to theories that do not rely on formal simplicity.

In the following sections I take up, in order, the question of geminate simplification and the boundary placement problem. I then turn to Mansell's article.

## 22. GEMINATE SIMPLIFICATION

Although Chomsky and Halle (1968) do not give this evidence, the clearest arguments for a geminate simplification come from words that have underlying forms in which identical consonants happen to occur on both sides of a boundary. When this happens, only one consonant appears phonetically: thus, with the # boundary, *unnatural* (compare *unpleasant*) and *totally* (compare *completely*); and with the special = boundary posited by Chomsky and Halle (1968, pp. 94-95, 118), *dissemble* (compare *disappoint* and *resemble*) and *expire* (compare *exacerbate* and *inspire*). The degemination is optional, in careful speech, when the morphemes involved both bear stress, as in *embalmment, ruleless, subbasement, pen-knife*, and *black cat* (see the discussion of Kruisinga, 1925, pp. 113-114). Chomsky and Halle (1968, pp. 222, 238) also assume that an assimilation rule feeds degemination in some examples with the prefixes //æb=// and //sub=//, for instance, *assist* and *suggest;* Zwicky (1970d) argues instead for a single rule of deletion in these cases.

Chomsky and Halle (1968, pp. 148-151) also argue for morpheme-internal occurrences of underlying double consonants (hence for morpheme-internal applications of degemination), on

three grounds: stress placement, the quality of certain stressed vowels ([ʌ] in *Russell* versus [yu] in *Pusey*), and concomitant variation in the voicing of sibilants ([s] in *Russell* versus [z] in *Pusey*). It is these latter instances of degemination that would support Anderson's arguments for the nonsyllabic analysis, since it is only in these forms that the identical consonants would be separated not by a strong boundary (# or =), but rather merely by +, which is the boundary Anderson assumes between Pl and Gen. But there are two lines of objection: (a) that degemination *other* than across strong boundaries is not very well supported; and (b) that degemination *across* strong boundaries is undoubted, so that failure of degemination in *kisses* is exceptional and unexplained. The first difficulty arises from the fact that geminate consonants other than across strong boundaries have been assumed primarily to regularize the placement of stress (to get stress on the penult of *Kentucky* rather than on the antepenult, for instance), and the extent of this regularity has been questioned by numerous reviewers and critics of Chomsky and Halle (1968); the geminates specifically are discussed by McCawley (1974). The second difficulty strikes at the very heart of Anderson's proposal, since it makes exceptions out of some of the very forms for which the analysis was devised.

One might suppose that the rule responsible for the identity of GenPl, Pl, Prs, and Gen was not a degemination but rather a cluster simplification, a rule both more general than degemination (since it would simplify even nongeminate clusters) and less general than it (since it would apply only word-finally). Chomsky and Halle (1968, p. 85) posit a rule that deletes word-final //g// after nasals (as in *sing* and *singer*, versus the comparative *longer*), there is a casual speech simplification of final clusters ending in /t d/ (giving [bol], [fayn], and [fɪs] for *bold, find*, and *fist*; see Labov (1972c, pp. 216–226), Black English speakers frequently lack the Prs suffix (as in *He work* for *He works*; also discussed by Labov), and adjectives of nationality ending in /s z š č/ show no Pl suffix when they are used as collective nouns (thus, *the Chinese/Dutch/Irish/Swiss*, as opposed to *the Indians/Israelis/Greeks/Yugoslavs*; see Pullum, 1975). But there is really no way to treat all these simplificatory phenomena (and some others that could be adduced) as part of a single process: the deletion of final //g// in *sing* and the nonappearance of the Pl in the nationality adjectives are obligatory, while the other simplifications are variable; the phonological conditions are quite different in the four cases; and, in

fact, the last two cases have been argued not to be phonological deletions at all. Labov argues that the *morpheme* Prs sometimes simply fails to appear in phonological underlying representations, and Pullum maintains that the nonexistence of **the Irishes* is to be explained as a (probably phonological) constraint on a syntactic rule (*Chinese* and *Swiss* are somewhat special, since they have zero Pls as individual nouns: *two Chinese/Swiss*).

It thus appears that the deletion of Gen after Pl in regular nouns must be treated as a morphological, or at least morphologically conditioned, rule.

## 23. BOUNDARY PLACEMENT

Chomsky and Halle (1968, pp. 366-372) propose to predict the occurrences of #, as opposed to + and =, from the interaction of two sorts of principles—a universal convention for the insertion of # on the basis of surface syntactic structure, plus various language-particular rules for replacing certain instances of # by weaker boundaries. For instance, their underlying form for *kept* is $_{V}[_{V}[k\bar{e}p]d]$, which by their universal convention has # inserted at each end of a constituent that belongs to a major category, thus: $_{V}[\#_{V}[\#k\bar{e}p\#]d\#]$. Then because *keep* belongs to a special class of verbs, namely those with internal Psts, there is a rule peculiar to English that reduces the boundary between *keep* and Pst to +, giving the string to which phonological rules will apply: $_{V}[\#_{V}[\#k\bar{e}p+]d\#]$. In the case of GenPls, how the universal convention applies will be determined by the syntactic surface structure: if the structure of *boys'* is $_{N}[_{N}[_{N}[boy]\text{Pl}]\text{Gen}]$, then the convention gives $_{N}[\#_{N}[\#_{N}[\#boy\#]\text{Pl}\#]\text{Gen}\#]$, but if the structure is $_{N}[_{N}[boy]\text{Pl Gen}]$, the convention gives $_{N}[\#_{N}[\#boy\#]\text{Pl+Gen}\#]$. Anderson assumes the latter, on the grounds quoted above, that "the word including the plural and the possessive does not dominate any lexical element that is not dominated by the word including the plural" (1974b, p. 59). I can see two interpretations of this, neither of them really satisfactory.

First, we might take Anderson to be referring to the fact that there are only two *surface* elements in *boys'*. But the Chomsky-Halle convention operates on *underlying* strings, and cannot be sensitive to the surface form. Then since the underlying string is *boy* Pl Gen, and *boy* is a noun, and *boy* Pl is a noun, and *boy*

Pl Gen is a noun, the convention assigns the structure Anderson does not want.

Alternatively, we might take him to mean that affixes like Pl and Gen are not "lexical elements." But then *boy* Pl would not dominate any lexical element that is not dominated by *boy* alone, which by parity of reasoning would lead to the conclusion that the correct structure of *boys'* is $_{N}[$*boy* Pl Gen]. But we know this structure to be incorrect, since it predicts a + rather than a # boundary between *boy* and Pl.

Suppose we said instead that sequences of affixes have no internal structure; this would give the structure Anderson wants. But this proposal, too, fails, since it says that *kindnesses* has the underlying structure $_{N}[_{A}[$*kind*$]$*ness* Pl], which incorrectly predicts a + rather than a # boundary between *ness* and Pl, hence that the plural of *kindness* ought to be *kindness'*, given the rest of Anderson's analysis.

Suppose, finally, that instead we enunciated the principle that sequences of *inflectional* affixes have no internal structure; this, too, would give the structure Anderson wants, since Pl and Gen are both inflectional, but would permit internal structure for *kindnesses*, which has a derivational affix *ness* followed by the inflectional affix Pl. Moreover, this proposal for distinguishing the properties of inflectional and derivational affixes is not new; Lounsbury (1966, p. 384), speaking of Iroquoian, says that

> we may distinguish between purely linear constructions on a single level, and constructions in depth, involving successive levels, one within the other. . . . For lack of a more suitable term [for the linear type] we may extend the application of an older term and call it *inflection*. The second type, involving constructions within constructions, . . . may properly be called *derivation*.

This is the best basis I know of for saving Anderson's proposed structure, but it also has a flaw. The problem is that Gen is only marginally an inflection in English; as I pointed out in Section 5 above, Gen has many of the properties of a clitic. However, if Gen is a clitic, then the combination of a noun with Gen should exhibit internal structure, in the same way as *oxen'll* (from *ox* Pl *will*, i.e., [[*ox* Pl]*will*]) and *hasn't* (from *have* Prs *not*, i.e., [[*have* Prs] *not*]). Although sequences of clitics do not show internal structure, clitics regularly stand outside inflections, so that if Gen is a clitic, we should expect the structure $_{X}[_{N}[_{N}[$*boy*$]$*Pl*]$Gen] for *boys'*, hence a # boundary between Pl

and Gen. Therefore, it seems difficult to maintain that this boundary is a +, as Anderson does.[26]

## 24. MARKOVIAN APPLICATION AND DERIVATIONAL CONSTRAINTS

Mansell (1974) examines Halle's 1973 proposal for a morphological component distinct from the phonological component. He has two sorts of objections, the first a general problem for models with separate morphological components—"if the morphology is cut off from the phonology . . . how will it be possible to employ single rule formalisms having both morphophonemic and phonological effects?" (pp. 127-128), citing the "rules with dual effects" in Schane (1971, p. 519)—the second a problem for Halle's initial proposal, which uses an "exception filter" to distinguish possible words from actually occurring words and to mark specific words as exceptions to phonological rules but otherwise permits no interactions between morphology and phonology (so that the grammar is "Markovian," in the sense that "a rule applies to a form if and only if the form fits the structural analysis of the rule at the point in the derivation at which the rule is applicable" (Kiparsky, 1973a, p. 57)).[27] The Markovian character of grammar is to be preserved, in Halle's initial proposal, by appeal to those parts of the exception filter that function as "readjustment rules," namely, the marking of specific words as exceptions to certain phonological rules by means of implicational rules of the form: [+/– Rule X] → [+/– Rule Y]. Mansell argues that derivational constraints (in the sense of Lakoff, 1969, 1970a) are to be preferred to such implicational rules in at least two cases: the English genitive plural and the formation of the plural in a Bavarian dialect.

Halle (1973, pp. 13-16) himself revises his model to permit rules of word formation to "look ahead" to the output of phonological rules (citing English deadjectival verbs in *-en* and present adverbial participles in Russian). Thus, he advocates a restricted theory of derivational constraints: "I would like to

[26] The discussion in this Section accepts the *Sound Pattern* proposals for boundary placement and deals with Anderson's analysis in his own terms. As I pointed out in Section 9 above, manipulations of boundaries have not been universally accepted.

[27] This sense of *Markovian* is to be distinguished from the sense "applying (as a group) to segments in order from left to right"—a mode of rule application advocated by Cearly (1974) for phonological, as opposed to morphological, rules.

propose that the added power of having access to different stages in a derivation be available only to word formation rules, whereas rules of phonology be restricted . . . to information overtly present in the string at the point in the derivation at which the phonological rule applies" (p. 15). Rules of word formation can peek, but phonological rules cannot reminisce; and rules that peek can all be ordered together "ahead of the bulk of the phonological rules" (p. 15). Mansell, however, denies that Halle's restricted theory of derivational constraints is adequate.

Mansell begins (p. 132) by assuming an English analysis much like the Southworth-Daswani proposal in Section 9 above. Due to Wang (1971), the analysis has underlying //s// for Pl, an epenthesis rule comparable to (9), and a voicing rule comparable to (10). The difficulty created by the Gen is the difference between *missus* /mɪsɨz/, which has the Gen /mɪsɨzɨz/, and the Pl *misses* /mɪsɨz/, which has the Gen /mɪsɨz/. Mansell observes that to have //s// for the Gen as well as the Pl, the selection of a phonological underlying form for Gen must follow the selection of a phonological underlying form for Pl and must be sensitive to phonological features of the word; the analysis thus has the following two ordered realization rules (themselves ordered before epenthesis and voicing):

(20) Pl ⟶ s

(21) Gen ⟶ s / [$\alpha$strident] [$\beta$strident] ___
Condition: if $\beta$ is +, $\alpha$ is −

Mansell then observes (p. 133) that this Markovian analysis is possible only if the underlying form for Pl is nonsyllabic; but since he accepts Miner's arguments for a syllabic analysis, he concludes that this Markovian analysis is not possible. It is, of course, possible to see Mansell's observations as a further argument against the syllabic analysis.

Mansell next discards various revisions of (21) that refer to the existence of morpheme boundaries and considers an implicational rule solution: if the realization rule for Pl is rule M (we do not need to decide on the underlying form) and the realization rule for Gen is rule N, then suppose that there is an implicational rule

(22) [+Rule M] ⟶ [−Rule N]

This solution is Markovian (and also does not use extrinsic ordering crucially), but as Mansell points out (p. 135) it has no visible motivation—in particular, there is no reference to the class /s z/. I discussed objections of this sort above in Section 20; my feeling is that they are weighty but not decisive.

Mansell, however, proposes to show that a *second*, equally unmotivated-looking implicational rule would be required for English. Such a rule would cover the irregular plurals *indices* /mdisiz/, *crises* /kraysiz/, and the like, which Mansell says have the GenPl identical to the Pl, just like regular nouns. According to the generalization in Section 20 above about the correlation between sonorancy and irregular GenPls, *index* should *lack* an irregular GenPl; but Mansell's example *the indices' main purpose* (p. 135) does not sound bad to me. Perhaps the sonorancy generalization applies only to the Anglo-Saxon stratum of the vocabulary (in which case it covers only a handful of forms). In any event, if the nonanglicized plural of *index* is selected by some rule other than rule M, say rule P, then we need another implicational rule:

(23) [+Rule P] ⟶ [−Rule N]

But then the analysis misses the generalization that covers both (22) and (23) and refers to the class /s z/. Mansell concludes that the implicational rule approach is not satisfactory, and that derivational constraints (also admitted in a limited way by Halle) are needed, although he does not formulate a constraint for the English GenPl data. Presumably what we want is something like the following: Gen is realized as //s// (or whatever) unless it is preceded by /s z/ realizing Pl. The phrase "realizing Pl" represents the derivational constraint, since it requires that some instances of /s z/ be distinguished from others (the /z/ in *missus* from the one in *misses*, for instance) on the basis of their derivational history.

A possible countermove, along the lines of Baker and Brame's 1972 response to Lakoff (1970a), would be to "carry along" morphological features after morphemes are spelled out phonologically and to refer to these features in later rules. In the case at hand, the rule realizing Gen would have a negative environment in addition to referring to the "arbitrary" (Lakoff, 1972) feature [+plural]:

$$(24)\quad \text{Gen} \longrightarrow \text{s EXCEPT} / \begin{bmatrix} +\text{obst} \\ +\text{cont} \\ +\text{cor} \\ +\text{plural} \end{bmatrix} \_\_$$

Mansell rejects negative environments out of hand, as an "unmotivated theoretical innovation" (p. 134), so that a rule like (24) is simply not possible for him. Instead, he proposes a derivational constraint of the sort Halle rejects.

In the next Section I discuss briefly a metatheoretical issue raised in the arguments by Halle, Mansell, Lakoff, and Baker and Brame, and also in many of the arguments cited in earlier Sections: the question of expressive power.

## 25. EXPRESSIVE POWER

The development of the theory of generative grammar illustrates a constant tension between two opposite tendencies: a drive toward more powerful, less restricted theories (motivated by the inability of existing theories to give a satisfactory account—or even *any* account—for certain data) versus a drive towards less powerful, more restricted theories (motivated by the desire to make linguistic theory as interesting and as falsifiable, in Popper's 1960 sense, as we can, so that the theory predicts the range of possible human languages as closely as possible). Both tendencies are abundantly exemplified in the earlier Sections of this paper, though the most striking instances are those of the second, or theory-restricting, variety. Repeatedly some linguist objects to a piece of theoretical apparatus on the grounds that it greatly increases "expressive power"—the range of possible languages encompassed by the theory. On this basis, Baker and Brame object to derivational constraints, Mansell to negative environments, Lakoff to features referring to previous rule applications, Pyle to boundary manipulations, Koutsoudas, Sanders, and Noll to extrinsic ordering constraints, Shibatani to nonautomatic alternations, various writers to the intermingling of morphophonemic and allophonic rules, and so on.

The difficulty with these (entirely laudable) objections is that they lead in different—sometimes contradictory—directions, as the Lakoff and Baker-Brame exchange shows. That is, moving

from arguments within a given theory to arguments about choosing alternative theories does not necessarily resolve our original puzzles about underlying forms. Indeed, the puzzles multiply.

## 26. SUMMING UP

We have seen that the attempt to answer some very simple questions about the analysis of one language can lead to a remarkably complex series of new questions, on several levels: (a) other, possibly related analytic questions; (b) issues of methodological preference; (c) points of theory; (d) possible "external" lines of evidence; and (e) metatheoretical considerations. I now give a few examples of each sort from the material above on the English inflectional endings.

First, other analytic questions. We have seen reference to Auxiliary Reduction (Section 6), the internal Pls and Psts (Section 9 and elsewhere), AdjEd forms (Section 6), various assimilations in voicing (Sections 6 and 20), intervocalic voicing (Sections 9 and 10), other voicing alternations (Section 11), forms in *-edly* and *-edness* (Section 15), syncope rules (Section 19), degemination and cluster simplifications (Section 22), and the identity of the regular GenPl and Pl (Sections 21-24). Other analytic questions in English may bear on the selection of underlying forms for S and T in two ways: it may be that some of the rules involved are the same in the two cases (this has been suggested for Auxiliary Reduction, voicing assimilations, intervocalic voicing, other voicing alternations, syncope rules, and degemination, with varying degrees of plausibility), or it may happen that choosing a particular analysis in one case simplifies the statement of the rule(s) involved in the other (as Miner suggests for the AdjEd forms, and various writers maintain for the internal Psts and Pls and for the regular GenPl).

Second, issues of methodological preference. Here I refer to principles like (IV) through (XII), or a preference for analyses not using extrinsic ordering crucially, when these are understood as expressing analytic desiderata rather than as absolute conditions on analyses. Obviously, different linguists differ in which of these methodological principles they accept, and also in the weights they assign to the principles; as I pointed earlier, Wells specifically rejects principle (VI), while most of the analysts I have mentioned rely heavily on principle (XI). For those who are metrically inclined, the methodological principles can be seen

as assigning greater "cost" to analyses violating the principles than to those conforming to them, greater cost to more extreme violations than to lesser ones, and greater cost to violations of the more important principles than to violations of the less weighty ones. In any event, these principles can serve as warrants for particular analytic claims, as I have illustrated many times in the exposition above. The backing for the principles *themselves*, however, has been little investigated—though such an analysis is clearly essential, since different linguists have different theoretical intuitions in these matters. In my own work on methodological principles (summarized in Zwicky, 1974b), I have emphasized that they are justified insofar as they value analyses that are independently supported. It is also possible to support methodological principles on the basis that they serve to restrict the expressive power of theories (though not absolutely).

Third, points of theory. Here I refer to proposed *absolute* restrictions on analyses. We have seen many examples of theoretical points brought to bear on the selection of underlying forms for S and T: for instance, Shibatani's use of surface phonetic constraints (Section 8), constraints on boundary manipulations (Section 9), Shapiro's reference to principles of markedness (Section 13), the Unordered Rules Hypothesis (Section 16), the rejection of curly brackets (Section 18), the rejection of negative environments (Section 18), conventions on the placement of boundaries (Section 23), and the question of implicational readjustment rules versus derivational constraints (Section 24). When the "matrix" theory within which an analysis is to be located is well established, stable, and not seriously questioned, then absolute theoretical restrictions can play a decisive role in choosing between alternatives. Insofar as the matrix theory is itself in doubt, the analyses it requires are not decisively selected, since if there is a problem we could always blame the theory rather than the analysis and thereby throw the argument one level up. Although particular linguistic analyses are often defended by reference to points of theory—accusations of "unwarranted theoretical innovation" typically mark such arguments—it strikes me that the matrix theories are rarely strong enough to maintain these defenses; in the terms of Kuhn (1962), linguistic theory seems to be in a constant state of revolution, with no elaborated "paradigm" and very little chance for "normal science."[28] As a result, arguments from points of

[28] Though, some of Kuhn's critics have declared that this sort of ferment is the usual situation in all science; see the exchanges in Lakatos and Musgrave (1974).

theory are usually a good deal less final than they might seem; today's unwarranted theoretical innovation is tomorrow's theoretical breakthrough, and vice versa.

Fourth, external lines of evidence. "External" evidence comes from data outside of the linguistic system being described—from historical developments, acquisition, related dialects, speech errors, and so on, as well as from parallels in other languages and from cross-linguistic generalizations not elevated to points of theory. In Section 7 above, I considered some observations on nonstandard dialects that might be pertinent to the selection of underlying forms for S and T in standard English (and touched on historical matters); Section 12 reviewed some relevant acquisitional data; parallel phenomena in other languages were cited for deletion and insertion rules with related effects (in Section 6), for clitics with different phonological behavior (in the same Section), for general conditions on epenthesis and syncope (in Section 14), for voicing assimilation conditioned by sonorants (in Section 17), and for independent behavior of the subrules of morphologically conditioned rules (in the same Section), and many other observations are cited in articles I referred to in passing. The applicability of external data to the problem at hand is not always clear: I argued in Sections 7 and 12 that certain sorts of external data need not be evidential, and that existing arguments from such data seem to appeal to methodological principles of dubious utility (which is not to say that data of these types might not reveal something about the issues involved); cross-linguistic evidence for rule plausibility, on the other hand, looks very strong.

Fifth, metatheoretical considerations or (roughly), what should count as a theory, and why. The principal metatheoretical appeals we have seen are references to designing an evaluation metric (as in the discussions of rule collapsing, ordering, curly brackets, and negative environments); attempts to explain rules or constraints on phonetic grounds (as in references to phonetic naturalness) or on other functional grounds (as in references to iconicity or to preservation of morphological distinctions); and proposed restrictions of expressive power (as outlined in Section 25).

We see, then, that the testing of a very low-level linguistic hypothesis—in this case an hypothesis about the nature of *the* standard example of phonologically conditioned alternation in English (taught in virtually every introductory linguistics class)—results in appeals to all sorts of facts, hypotheses, analyses,

methodological preferences, theoretical points, and meta-theoretical assumptions. Theory and analysis, hypothesis and test, explanation and description are intimately entwined.[29]

[29]I should add that Sections 1 through 25 are quite abbreviated and give nothing like a complete analysis of the arguments they treat.

## REFERENCES


Anderson, Stephen R. (1974a) "On the typology of phonological rules," in Bruck, Fox, and LaGaly (1974): 1-12.

_____ (1974b) *The Organization of Phonology*. New York: Academic Press.

_____ (1974 Ms.) "On the interaction of phonological rules of various types." To appear in *JL*. Revision of Anderson (1974a).

_____ and Paul Kiparsky (eds.) (1973) *A Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston.

Anisfeld, Moses and G. Richard Tucker (1968) "English pluralization rules of six-year-old children." *Child Development* 38: 1201-1217. Reprinted in Ferguson and Slobin (1973): 211-240.

Bach, Emmon and Robert T. Harms (eds.) (1968) *Universals in Linguistic Theory*. New York: Holt, Rinehart and Winston.

Bailey, Charles-James N. (1974) "Motivating an alternative analysis of the English inflections." *IJAL* 40 (no. 2): 138-140.

Baker, C. LeRoy (1971) "Stress level and auxiliary behavior in English." *LingI* 2 (no. 2): 167-182.

_____ and Michael K. Brame (1972) "'Global rules': a rejoinder," *Lg.* 48 (no. 1): 51-75.

Bar-Adon, Aaron and Werner F. Leopold (eds.) (1971) *Child Language: A Book of Readings*. Englewood Cliffs, N.J.: Prentice-Hall.

Berko [Gleason], Jean (1958) "The child's learning of English morphology." *Word* 14: 150-177. Reprinted in Saporta (1961): 359-375; Bar-Adon and Leopold (1971): 153-167.

Bierwisch, Manfred (1967) "Syntactic features in morphology: general problems of so-called pronominal inflection in German," *To Honor Roman Jakobson*, pp. 240-270. The Hague: Mouton.

_____ and Karl Erich Heidolph (eds.) (1970) *Progress in Linguistics*. The Hague: Mouton.

Bloch, Bernard (1947) "English verb inflection." *Lg.* 23: 399-418. Reprinted in Joos (1966): 243-254.

Bloomfield, Leonard (1933) *Language*. New York: Holt, Rinehart and Winston.

Bombaugh, Charles C. (1961) *Oddities and Curiosities of Words and Literature*, Martin Gardner (ed. and annot.). New York: Dover. Reprinting of sections of *Gleanings for the Curious from the Harvest-fields of Literature*, 3rd ed. (1890). New York: Lippincott.

Botha, Rudolf P. (1970) *The Methodological Status of Grammatical Argumentation*. The Hague: Mouton.

_____ (1971) *Methodological Aspects of Transformational Generative Phonology*. The Hague: Mouton.

Bresnan, Joan W. (1971 Ms.) "Contraction and the transformational cycle in English."

Bruck, Anthony, Robert A. Fox, and Michael W. LaGaly (eds.) (1974) *Papers from the Parasession on Natural Phonology.* Chicago: Chicago Linguistic Society.

Cearly, Alvin (1974) "The only phonological rule ordering principle," in Bruck, Fox, and LaGaly (1974): 30-42.

Chambers, J. K. (1971) "A phonological argument for the derivation of the $\phi$-subclass." *PiL* 4 (no. 3): 433-445.

Chomsky, Noam (1973) "Conditions on transformations," in Anderson and Kiparsky (1973): 232-286.

_____ and Morris Halle (1968) *The Sound Pattern of English.* New York: Harper and Row.

Cohen, David and Anne Utschig (1973) "On epenthesis, syllabification, and syncope in English." Paper read at LSA summer meeting, Ann Arbor.

Delack, John B. (1971) "English morphology and linguistic universals." *Glossa* 5 (no. 2): 202-221.

Dressler, Wolfgang U. and F. V. Mareš (eds.) (1974) *Phonologica 1972*: Akten den 2, internationalen Phonologie-Tagung in Wien. München: Wilhelm Fink.

Eliasson, Stig (1972) "Unstable vowels in Swedish: syncope, epenthesis, or both?" in Firchow et al. (1972): 174-188.

Fasold, Ralph B. (1971) "Minding your Z's and D's: Distinguishing syntactic and phonological variable rules." *CLS* 7: 360-367.

Ferguson, Charles A. and Dan I. Slobin (eds.) (1973) *Studies of Child Language Development.* New York: Holt, Rinehart and Winston.

Firchow, Evelyn Scherabon, Kaaren Grimstad, Nils Hasselmo, and Wayne O'Neil (eds.) (1972) *Studies for Einar Haugen Presented by Friends and Colleagues.* The Hague: Mouton.

Fischer, J. L. (1958) "Social influences on the choice of a linguistic variant." *Word* 14 (no. 1): 47-56.

Fishman, Joshua A. (ed.) (1971) *Advances in the Sociology of Language,* I. The Hague: Mouton.

Fujimura, Osamu (ed.) (1973) *Three Dimensions of Linguistic Theory.* Tokyo: TEC Co.

Giglioli, Pier Paolo (ed.) (1972) *Language and Social Context.* Baltimore: Penguin.

Gimson, A. C. (1970) *An Introduction to the Pronunciation of English,* 2nd ed. (1st ed., 1962). London: Edward Arnold.

Gleason, Henry A. (1961) *An Introduction to Descriptive Linguistics,* 2nd ed. New York: Holt, Rinehart and Winston.

Guile, Timothy (1972) "A generalization about epenthesis and syncope." *CLS* 8: 463-469.

Halle, Morris (1973) "Prolegomena to a theory of word formation. *"Lingl* 4 (no. 1): 3-16.

Harms, Robert T. (1973) "Some nonrules of English." Distributed by IULC.

Harris, Zellig S. (1942) "Morpheme alternants in linguistic analysis." *Lg.* 18: 169-180. Reprinted in Joos (1966): 109-115.

Hausmann, Robert B. (1974) "Underlying representations in dialectology." *Lingua* 35 (no. 1): 61-71.

Hill, Archibald A. (1958) *Introduction to Linguistic Structures.* New York: Harcourt Brace Jovanovich.

Hoard, James E. and Clarence Sloat (1973a) "English irregular verbs." *Lg.* 49 (no. 1): 107-120.

_____ (1973b) "Subregularities in morphology." Paper read at annual LSA meeting, San Diego.

Hockett, Charles F. (1947) "Problems of morphemic analysis." *Lg.* 23 (no. 3): 321-343. Reprinted in Joos (1966): 229-242.

_____ (1958) *A Course in Modern Linguistics.* New York: Macmillan.

Householder, Fred W. (1971) *Linguistic Speculations.* Cambridge: At the University Press.

Hudson, Grover (1974) "The role of SPCs in natural generative phonology," in Bruck, Fox, and LaGaly (1974): 171-183.

Humberstone, I. Lloyd (1972) "Rewiring transformations." *York PiL* 2: 71-92.

Jacobs, Roderick A. and Peter S. Rosenbaum (eds.) (1970) *Readings in English Transformational Grammar.* Waltham, Mass.: GinnBlaisdell.

Jakobson, Roman (1971a) "The phonemic and grammatical aspects of language in their interrelations." In Jakobson (1971b): 103-114. Reprinted from *PICL* 6.

_____ (1971b) *Selected Writings* II: *Word and Language.* The Hague: Mouton.

Jespersen, Otto (1942) *A Modern English Grammar: On Historical Principles,* VI: *Morphology.* London: Allen and Unwin.

Jones, Daniel (1964) *An Outline of English Phonetics,* 9th ed. (1st ed., 1918) Cambridge: Heffer.

Joos, Martin (ed.) (1966) *Readings in Linguistics* I, 4th ed. (1st ed., 1957, ACLS). Chicago: University of Chicago Press.

Juilland, Alphonse and James Macris (1962) *The English Verb System.* The Hague: Mouton.

Kenstowicz, Michael J. and Charles W. Kisseberth (1970) "Rule ordering and the asymmetry hypothesis." *CLS* 6: 504-519.

King, Harold V. (1970) "On blocking the rule for contraction in English." *Lingl* 1 (no. 1): 134-136.

King, Robert D. (1973) "Rule insertion." *Lg.* 49 (no. 3): 551-578.

Kiparsky, Paul (1968) "Linguistic universals and language change," in Bach and Harms (1968): 170-202.

_____ (1972) "Explanation in phonology," in Peters (1972): 189-227.

_____ (1973a) "Abstractness, opacity and global rules." in Fujimura (1973): 57-86. Revised version of paper presented at Indiana University Conference on Rule Ordering and distributed in 1973 by IULC.

_____ (1973b) "How abstract is phonology?" in Fujimura (1973): 5-56. Revised version of paper distributed in 1968 by IULC.

_____ and Carol Kiparsky (1970) "Fact." in Bierwisch and Heidolph (1970): 143-173. Reprinted in Steinberg and Jakobovits (1971): 345-369.

Kisseberth, Charles W. (1970) "On the functional unity of phonological rules." *Lingl.* 1 (no. 3): 291-306.

Koutsoudas, Andreas, Gerald Sanders, and Craig Noll (1971) "On the application of phonological rules." Distributed by IULC.

Kruisinga, Etsko (1925) *A Handbook of Present-day English,* Part I: *English Sounds,* 4th ed. Groningen: P. Noordhoff.

Kruisinga, Etsko (1932) *A Handbook of Present-day English*, Part II: *English Accidence and Syntax*, sec. 2, 5th ed. Groningen: P. Noordhoff.

Kuhn, Thomas S. (1962) *The Structure of Scientific Revolutions.* Chicago: University of Chicago Press.

Labov, William (1969) "Contraction, deletion, and inherent variability of the English copula." *Lg.* 45 (no. 4): 715–762. Revised version in Labov (1972a): 65–129.

_____ (1972a) *Language in the Inner City: Studies in the Black English Vernacular.* Philadelphia: University of Pennsylvania Press.

_____ (1972b) *Sociolinguistic Patterns.* Philadelphia: University of Pennsylvania Press.

_____ (1972c) "The study of language in its social context," in Labov (1972b): 183–259. Originally in *Studium Generale* 23: 30–87. Reprinted in Fishman (1971): 152–216, Giglioli (1972): 283–307, Pride and Holmes (1972): 180–202.

Lakatos, Imre and Alan Musgrave (eds.) (1974) *Criticism and the Growth of Knowledge*, 3rd ed. Cambridge: At the University Press.

Lakoff, George P. (1965) *On the Nature of Syntactic Irregularity.* Report NSF-16: Mathematical linguistics and automatic translation, Computation Laboratory, Harvard University. Reproduction of Ph.D. dissertation, Indiana University, 1965.

_____ (1969) "On derivational constraints." *CLS* 5: 117–139.

_____ (1970a) "Global rules." *Lg.* 46 (no. 3): 627–639. Reprinted in Seuren (1974): 143–156.

_____ (1970b) *Irregularity in Syntax.* New York: Holt, Rinehart and Winston. Republication of Lakoff (1965).

_____ (1972) "The arbitrary basis of transformational grammar." *Lg.* 48 (no. 1): 76–87.

Lightner, Theodore M. (1968) Review of Joos (1966). *GenLing.* 8 (no. 1): 44–61.

_____ (1970) "On regular inflectional endings in English." *PiL* 3 (no. 3): 503–519.

Lounsbury, Floyd (1953) *Oneida Verb Morphology.* Yale University Publications in Anthropology 48.

_____ (1966) "The method of descriptive morphology," in Joos (1966): 379–385. Reprint of section of Lounsbury (1953).

Luelsdorff, Philip (1969) "On the phonology of English inflections." *Glossa* 3 (no. 1): 39–48.

Malone, Joseph L. (1970) "In defense of non-uniqueness of phonological representations." *Lg.* 46 (no. 2): 328–335.

Mansell, P. (1974) "Implicational rules and the statement of (morpho-) phonological exceptions." *IPSK Univ. München Forschungsberichte* 3: 125–143.

Matthews, Peter H. (1972) *Inflectional Morphology: A Theoretical Study Based on Aspects of Latin Verb Conjugation.* Cambridge: At the University Press.

_____ (1974) *Morphology: An Introduction to the Theory of Word-Structure.* Cambridge: At the University Press.

McCawley, James D. (1971) "On the role of notation in generative phonology." Distributed by IULC.

_____ (1974) Review of Chomsky and Halle (1968). *IJAL* 40 (no. 1): 50–88.

Miner, Kenneth L. (1975) "English inflectional endings and unordered rules." *FLang* 12 (no. 3): 339-365. Distributed in 1972 by IULC.
Morin, Jean-Yves (1974) "En avant, en arrière." *CLS* 10: 472-481.
Mulder, J. W. F. (1968) *Sets and Relations in Phonology: An Axiomatic Approach to the Description of Speech.* Oxford: At the University Press.
Nida, Eugene A. (1948) "The identification of morphemes." *Lg.* 24 (no. 4): 414-441. Reprinted in Joos (1966): 255-271.
_____ (1949) *Morphology: The Descriptive Analysis of Words,* 2nd ed. Ann Arbor: University of Michigan Press.
Ohso, Mieko (1973) "A phonological study of some English loan words in Japanese." *OSU WPL* 14: 1-26. Revision of 1971 M.A. thesis, OSU.
Perlmutter, David M. (1970) "Surface structure constraints in syntax." *Lingl* 1 (no. 2): 187-256.
Peters, P. Stanley (ed.) (1972) *Goals of Linguistic Theory.* Englewood Cliffs, N.J.: Prentice-Hall.
Popper, Karl R. (1960) *The Logic of Scientific Discovery,* 2nd ed. (1st ed., 1958). New York: Basic Books. Translation of *Logik der Forschung* (1934).
Postal, Paul M. (1966) "On so-called 'pronouns' in English." *Georgetown MSLL* 19: 177-206. Reprinted in Jacobs and Rosenbaum (1970): 56-82; Reibel and Schane (1969): 201-224.
_____ (1974) *On Raising.* Cambridge, Mass.: M.I.T. Press.
Pride, J. B. and Janet Holmes (eds.) (1972) *Sociolinguistics.* Baltimore: Penguin.
Pulgram, Ernst (1970) *Syllable, Word, Nexus, Cursus.* The Hague: Mouton.
Pullum, G. K. (1975) "PEOPLE DELETION in English." *OSU WPL* 18.
Pyle, Charles (1972) "On eliminating BM's." *CLS* 8: 516-532.
Reibel, David A. and Sanford A. Schane (eds.) (1969) *Modern Studies in English.* Englewood Cliffs, N.J.: Prentice-Hall.
Ringen, Catherine (1972) "On arguments for rule ordering." *FLang.* 8 (no. 2): 266-273.
Robinson, Orrin W. (1974 Ms.) "Abstract phonology and the history of umlaut."
Roldán, Mercedes (1972) "In defense of raising." *PiL* 5 (no. 4): 514-529.
St. Clair, Robert (1973) "The independency principle in dialectology." *LangSci.* 27: 23-26.
Sampson, Geoffrey (1973) "Duration in Hebrew consonants." *Lingl* 4 (no. 1): 101-104.
Saporta, Sol (ed.) (1961) *Sociolinguistics: A Book of Readings.* New York: Holt, Rinehart and Winston.
Schane, Sanford A. (1968) "On the non-uniqueness of phonological representations." *Lg.* 44 (no. 4): 709-716.
_____ (1971) "The phoneme revisited." *Lg.* 47 (no. 3): 503-521.
Selkirk, Elisabeth O. (1972) "The phrase phonology of English and French," Ph.D. dissertation, M.I.T.
Semiloff-Zelasko, Holly (1973) "Syncope and pseudo-syncope." *CLS* 9: 603-614.
Seuren, Pieter A. M. (ed.) (1974) *Semantic Syntax.* London: Oxford University Press. German edition: *Generative Semantik: Semantische Synax* (Düsseldorf: Pädagogischer Verlag Schwann, 1973).

Shapiro, Michael (1972) "Explorations into markedness." *Lg.* 48 (no. 2): 343-364.
Shibatani, Masayoshi (1972) "The phonological representations of English inflectional endings." *Glossa* 6 (no. 1): 117-127.
Shibatani, Masayoshi (1973) "The role of surface phonetic constraints in generative phonology." *Lg.* 49 (no. 1): 87-106.
Silva, Clare M. and Arnold M. Zwicky (1973) "Discord." *OSU WPL* 16: 62-75.
Sloat, Clarence and James E. Hoard (1971) "The inflectional morphology of English." *Glossa* 5 (no. 1): 47-56.
_____ (1973) "The asymmetry of English inflectional endings." Paper read at annual LSA meeting, San Diego.
Sommerstein, Alan (1974) "On phonotactically motivated rules." *JL* 10 (no. 1): 71-94.
Southworth, Franklin C. and Chander J. Daswani (1974) *Foundations of Linguistics.* New York: Free Press.
Stampe, David L. (1973) "Dissertation on natural phonology." Ph.D. dissertation. University of Chicago. Distributed in 1972 as "How I spent my summer vacation."
Stanley, Richard (1973) "Boundaries in phonology," in Anderson and Kiparsky (1973): 185-206.
Steinberg, Danny D. and Leon A. Jakobovits (eds.) (1971) *Semantics: An Interdisciplinary Reader in Philosophy, Linguistics, and Psychology.* Cambridge: At the University Press.
Stockwell, Robert P. and Ronald K. S. Macaulay (eds.) (1972) *Linguistic Change and Generative Theory.* Bloomington: Indiana University Press.
Stockwell, Robert P., Paul Schachter, and Barbara H. Partee (1973) *The Major Syntactic Structures of English.* New York: Holt, Rinehart and Winston.
Swadesh, Morris and C. F. Voegelin (1939) "A problem in phonological alternation." *Lg.* 15 (no. 1): 1-10. Reprinted in Joos (1966): 88-92.
Toulmin, Stephen (1958) *The Uses of Argument.* Cambridge: At the University Press.
Vennemann, Theo. (1972a) "Phonological uniqueness in natural generative grammar." *Glossa* 6 (no. 1): 105-116.
_____ (1972b) "Rule inversion." *Lingua* 29: 209-242.
Wang, William S-Y. (1971) "Approaches to English phonology." Berkeley *POLA* 13: WW1-WW41.
Wells, Rulon (1949) "Automatic alternation." *Lg.* 25 (no. 1): 99-116.
Whitney, William D. (1960) *Sanskrit Grammar,* 9th issue of 2nd ed. (1889). Cambridge, Mass.: Harvard University Press.
Wolfram, Walter A. (1970) "Underlying representations in Black English phonology." *LangSci.* 10: 7-12.
Wright, Joseph (1905) *The English Dialect Grammar.* Oxford: Clarendon Press.
Wurzel, Wolfgang U. (1970) *Studien zur deutschen Lautstruktur,* StGr 8. Berlin: Akademie-Verlag.
Zwicky, Arnold M. (1969) "Phonological constraints in syntactic descriptions." *PiL* 1 (no. 3): 411-463.
_____ (1970a) "Auxiliary Reduction in English." *LingI* 1 (no. 3): 323-336.

_____ (1970b) "Class complements in phonology." *LingI* 1 (no. 2): 262-264.

_____ (1970c) "A double regularity in the acquisition of English verb morphology." *PiL* 3 (no. 3): 411-418.

Zwicky, Arnold M. (1970d) "The free-ride principle and two rules of complete assimilation in English." *CLS* 6: 579-588.

_____ (1970e) "Greek-letter variables and the Sanskrit *ruki* class." *LingI* 1 (no. 4): 549-555.

_____ (1972) "Note on a phonological hierarchy in English," in Stockwell and Macaulay (1972): 275-301.

_____ (1973) "Bibliography II: Cyclical segmental rules." *OSU WPL* 16: 107-111.

_____ (1974a) "Bibliography V: The English inflectional endings." *OSU WPL* 17: 206-221.

_____ (1974b) "The strategy of generative phonology," in Dressler and Mareš (1974): 151-168.