Note on a Phonological Hierarchy in English

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1. Introduction

A major point of contact between theoretical work in generative grammar and more traditional activities in historical linguistics is the search for conditions on the form and content of grammars. Such conditions function indirectly as predictions of the possibility of certain kinds of linguistic change; as a result, known changes can be used as a source of fruitful hypotheses about conditions in grammatical theory, and such changes can be inspected as sources of evidence for, or counterevidence to, particular systems of hypotheses. Much is concealed in my facile use of the phrases "conditions on the form and content of grammar" and "known changes," the latter in particular, for the pursuit of specific hypotheses normally entails a careful examination of accepted presentations of linguistic changes. But I shall not explore these issues here. Rather, I shall provide a few preliminary examples and then move to a consideration of some aspects of English phonology which supply evidence about the content of grammatical theory and thus, derivatively, about linguistic change.

1.1. PHONOLOGICAL HIERARCHIES

The following are some of the hypotheses which have been put forth about phonological theory:
(1) If a language has a rule dropping [b] between vowels, that rule also drops [d] and [g]; and if a language has a rule dropping [d] between vowels, that rule also drops [g]. But the converse is not true in either case (see Foley's contribution to this volume). Put another way: a rule deleting intervocalic [b], or intervocalic [d], or both, is not a possible phonological rule.

(2) If a language has a rule lowering [i] to [æ], that rule must also lower [e] to [æ] (David Stampe, personal communication). Put another way: a rule lowering [e] to [æ] is not a possible phonological rule.

The form of such hypotheses is familiar from Jakobson's investigations of implicational universals:

(3) "If, in the languages of the world, or in child language, the fricative consonants are limited to a single phoneme, this phoneme is as a rule represented by s" (Jakobson 1968: 55).

(4) "The existence of back consonants in the languages of the world presupposes accordingly the existence of front consonants" (Jakobson 1968: 53).

All four hypotheses lead to specific predictions about possible historical changes, given the assumption (as in Halle 1962) that among the mechanisms of linguistic change are (a) moderate changes in existing rules and (b) the addition of new rules. We can conclude from hypothesis (3), for example, that an unconditioned replacement of [s] by [f] is an impossible phonological change, because it would yield a system in violation of (3). From hypothesis (1) we can conclude that a language with a rule deleting intervocalic [g] cannot change so as to generalize that rule to drop both [g] and [b] (but not [d]), and that the deletion of intervocalic [d] (without [g] also) or [b] (without [d] and [g] also) is an impossible phonological change, because all these changes would result in a system in violation of (1). Similar principles can be adduced in morphology—there is some predictability in case syncretisms, for example—and in syntax—some principles of word order imply others, for instance (cf. Greenberg 1963 and Ross 1967). Still more predictions can be made on the basis of additional specific assumptions about linguistic change itself, such as Kiparsky's (1968) hypotheses concerning the reordering of rules.

Hypotheses (1) through (4) all refer to hierarchical arrangements among the sounds of a language. Hypotheses (1) and (2), in par-
ticular, establish hierarchies with respect to individual rules (inter-
vocalic deletion of voiced stops and lowering of vowels, respective-
ly). It happens that both these hierarchies apply to the class of
segments affected by the rules in question. There is, however, no
reason to suppose that such orderings are limited in this way; simi-
lar hierarchies might appear in the environments of rules. Sections
2 through 7 of this paper will, in fact, describe hierarchies applica-
table to rule environments.

A discussion of hierarchies is significant only insofar as the same
or similar orderings (or their inverses) reappear at many points in
the grammars of many languages. That is, an argument that a par-
ticular hierarchy requires representation in phonological theory
will resemble arguments supporting particular choices of feature
systems or other notational conventions (see Chapters 7 and 8 of
Chomsky and Halle 1968, also Bach 1968). A ramified theory
would require an account of the relationships and interactions
among the various hierarchies, and to be completely satisfying,
the tenets of such a theory should have some external justification,
for example, in terms of phonetics. In the following sections, which
largely constitute a report on work still in progress, I pursue the
hypothesis that the hierarchy

\[(5) \text{ Vowels Glides [r] [l] [n] [m] [ŋ] Fricatives Stops}\]

must be represented in phonological theory. I assume the rather
modest burden of illustrating the reappearance of this sequence
in English, without attempting to locate it within a ramified theory,
without attempting to produce external explanations for the mem-
bership and arrangement of this class, and without attempting
seriously to relate my remarks to current discussions of feature rep-
resentations and markedness.

I use the features and notational conventions of Chomsky and
Halle (1968), except that to refer to subsets of (5) I occasionally
employ the ad hoc notations in (6).

\[(6) [\pi \rightarrow \rho] \text{ to refer to the set of all elements in (5) beginning with } \pi \text{ and}
\text{ ending with } \rho \text{ (regardless of whether } \pi \text{ precedes or follows } \rho \text{ in (5));}
\text{ [\pi]^{+} to refer to } [\pi \rightarrow \text{Stops}]; [\pi]^{-} \text{ to refer to } [\pi \rightarrow \text{Vowels}]\]
Thus, \([1 \rightarrow \text{Fricatives}]\) denotes the class comprising \([1]\), the nasals, and the fricatives, while \([1 \rightarrow \text{Glides}]\) denotes the class of liquids and glides; \([1]^+\) refers to \([1]\) together with all elements of \((5)\) to the right of \([1]\) (that is, to \([1]\) and all true consonants), and \([1]^−\) refers to \([1]\) together with all elements of \((5)\) to the left of \([1]\) (that is, to liquids, glides, and vowels).

1.2. ALLEGRO VARIANTS

The rules under discussion are for the most part processes triggered in some fashion by speed of speech, style, fatigue, and the like. I have been obliged to make rather fine judgments about what is acceptable in "normal," "fast," and "very fast" speech. The difficulties of such an undertaking are obvious; in addition to having to judge the acceptability of many different versions of the same utterance at varying speeds and in varying styles, the investigator is required to judge whether unrelated processes are operative at the same speed and in the same style. Nevertheless, seeing no alternative to sensitive introspection and listening, I have attempted to make such judgments. I do not suppose that my decisions are entirely consistent. Certainly they will differ in many details from the decisions of other speakers.

The phenomena of fast speech merit much closer examination than they have received in the literature. The very richness of the data seems to have convinced many investigators that allegro variants are merely automatic consequences of faster speech, except for certain words that have idiosyncratic variants. However, the view that fast-speech forms have a direct explanation in phonetic terms presumes a coherent and detailed theory of linguistic phonetics, which cannot be said to be available yet, despite the work of Ladefoged 1967 and of Jakobson and Halle (notably Jakobson, Fant, and Halle 1961 and Chomsky and Halle 1968, Chapter 7). The view is nevertheless encouraged by a number of fast-speech processes, for example, the rule Pre-Stress Contraction discussed briefly in Section 2, and the transitional stop variation that is the subject of Section 5.

1.3. RULE EXTENSION

One notable characteristic of many allegro variants is that they involve extensions of (usually obligatory) rules of slow-speech
phonology. Consider the rule Gliding, which shifts [i] to [y] obligatorily in such words as pavilion, Pennsylvania, and invasion. The process is extended in fast speech to Lithuania, colonial, lithium, accordion, criterion (to which Gliding does not apply in slow speech because no + boundary precedes the [i]), spontaneous, permeate (to which Gliding does not apply in slow speech because the vowel in question is [e], not [i]), marsupial, oblivion, Kentuckian (to which Gliding does not apply in slow speech because the consonant preceding the [i] is noncoronal), and familiarity and peculiarity (to which Gliding does not apply in slow speech because the vowel following the [i] has primary stress). The slow-speech restrictions on Gliding are discussed in Chomsky and Halle (1968: 225-27).

More than simple generalization is taking place here, however. Chomsky and Halle (1968: 228) argue that the failure of Gliding to apply in the word emaciate (similarly, propitiate, appreciate, initiate, and many others) should be explained by the assumption that Gliding precedes the rule Alternating Stress, at least in those dialects (among them mine) in which Gliding is obligatory in words like beneficiary and auxiliary; if emaciate has final stress at the stage in its derivation when Gliding might apply, then Gliding will be blocked (as in familiarity), and a following application of Alternating Stress will shift the stress from the ultima to the antepenult. But in fast speech the extended Gliding rule must apply to emaciate after Alternating Stress applies, for otherwise the allegro form *[əməʃeɪt] (instead of the correct [əməʃeɪt] or [əməʃeɪt]) would be predicted.

It is tempting to suppose, in light of this example and the numerous situations in which allegro rules must be assumed to apply quite late in the sequence of rules, that all specifically fast-speech rules are ordered after all obligatory rules. S. Jay Keyser has suggested the following counterexample to me. There are English dialects in which the Flapping rule is obligatory in words like writer and rider. In these dialects, as in mine, words like winter do not have a flap in slow speech. But in faster speech the (specifically fast-speech) rule of Nasal Dropping (ordered after Nasalization of vowels) works to place the [t] of winter in the proper environment for Flapping, which then applies to yield [wɪDr]. Flapping is also called into play by the operation of the fast-speech rule Glide Deletion, which drops
initial [h] (generally) and initial [w] (in a few words only) before unstressed vowels; phrases like might have [máyDə(v)] and what would [wâDəd] thus have flaps in fast speech. Another example is the rule Auxiliary Contraction, which (in conjunction with Glide Deletion) is responsible for the reduction of is and has to [z], would and had to [d], have to [v], will to [l], am to [m], and are to [r]. Is and has reduce to [z] after consonants as well as vowels, and if the preceding consonant is voiceless, the obligatory rule of Progressive Voicing Assimilation, familiar from its application to various formatives realized as [s, z, izz] or [t, d, id], yields [s], as in Chuck’s not here and Pat’s been sick.

C.-J. Bailey has pointed out to me that a number of fast-speech phenomena can be explained as the result of a rule deleting boundaries in a variety of contexts. Although few of the phenomena discussed in this paper can be so explained (the applicability of Glide Deletion, Auxiliary Contraction, and Flapping in phrases containing unstressed auxiliaries or pronouns being the principal class of exceptions), it should be noted that this deletion must apply before a considerable number of obligatory slow-speech rules—among them, the Flapping rule already mentioned and the rules of Palatalization and Y Dropping, which apply in slow speech in the derivation of actual, gradual, sensual, and visual (Chomsky and Halle 1968: 230–32), and in fast speech to yield [dïjə] for did you, [wôwčə] for won’t you, and the like.

Also due to Bailey is the hypothesis that if the order of two rules with respect to each other changes in fast speech, it changes from the marked to the unmarked order (in the sense of Kiparsky 1968), never in the opposite direction. Let us examine the ordering of Gliding and Alternating Stress within this framework. In slow speech the order Gliding–Alternating Stress is marked, because if Alternating Stress were to apply first the domain of applicability of Gliding would be increased by the emaciate class, whereas the slow-speech form of Gliding neither decreases nor increases the domain of Alternating Stress. In fast speech this order remains marked, because the extended version of Gliding removes cases, the emaciate class again, from the domain of Alternating Stress, whereas Alternating Stress neither decreases nor increases the domain of the fast-speech version of Gliding. On Bailey’s hypothe-
sis, the reordering of Alternating Stress before Gliding is to be expected.

Bailey’s hypothesis should be extended in some fashion to incorporate the observation that when specifically fast-speech rules are added, markedness in rule ordering tends to be minimized. This imprecise formulation of the principle is intended to cover such cases as the ordering of Nasalization before Nasal Dropping, Glide Deletion before Auxiliary Contraction, Nasal Dropping and Glide Deletion before Flapping, and Auxiliary Contraction before Progressive Voicing Assimilation.

Before turning to other matters, here is another example of rule extension in fast speech. Further instances are noted in the following sections.

The rule Nasal Assimilation, which assimilates the final [n] of the prefixes con-, in-, syn-, and en- to the position of any following obstruent except [f] (conflation), [v] (convection), [k] (concussion), or [g] (congratulation), is extended in fast speech to apply (a) before [f v k g], (b) to final [n] of the prefixes un- and non- and of the first elements of compounds, which do not assimilate at all in slow speech, and (c) progressively, to nasals following obstruents, as in eleven, bacon, and hypnotize. I have specified that Nasal Assimilation applies generally before obstruents, and not merely before [p b], because I take this to be the same rule as the one specifying the nasal before [k g] within morphemes, as [n] (rink, ring), and the nasal before [p b f] within morphemes, as [m] (camp, amber, camphor). That is, the obligatory (slow-speech) rule applies generally within morphemes and across the + boundary (the boundary in comfoil and congress, which show assimilation in show speech—cf. convent, concourse, infant), but only before [p b] across the = boundary.4

It is natural to suppose that rather than the fast-speech rules being extensions or generalizations of normal (slow-speech) rules, the normal rules are restricted versions of the more general processes. I am indebted to David Stampe for the idea. The associated view of language acquisition is that the child embarks upon the task of language learning with innate knowledge of a set of quite general rules, and that what he must learn is (a) the way in which these rules are restricted in his language, plus (b) their order, insofar as it must be
marked. The associated view of linguistic change is that the primary mechanism of change, aside from reordering, is the removal of restrictions on rules. What corresponds to "addition of a rule" within this framework is the removal of an absolute prohibition against the rule, so that it is to be expected that the earliest evidences of a rule will appear in considerably restricted environments (restricted in the class of segments affected, in the contexts in which the rule applies, and in the lexical items to which the rule applies). Some discussion of rule spread, in time and space, within similar conceptual frameworks, can be found in Bach (1968: 135-37) and in Labov's paper in the present volume. Foley's contribution to this volume puts forth a theory of linguistic change along similar lines.

Although this promising direction of investigation will not be pursued further here, it should be noted that not all phonological processes "extend" in the same fashion as Gliding and Nasal Assimilation. Thus, for example, the rule N+Resonant, which assimilates the final [n] of the prefixes con-, in-, syn-, and en- completely to a following [r l m n], does not apply to a number of forms (e.g., enrage, enlist, enmesh, inlay). In fast speech the unassimilated clusters remain, and moreover the rule does not extend to [n] in un- and non-, nor to [n] at the end of first elements of compounds (tin wrap, as opposed to the Nasal Assimilation example pinball), nor to [n] before resonants in such names as Conroy and Conlon. Instead, in definitely fast speech Nasalization and Nasal Dropping apply to yield [ɜɹɛj] for enrage, [nɑˈliɪɡ] for nonlegal, [kɑˈroy] for Conroy, etc.

2. The Rule Slur

Let us begin with the following syncope rule:

\[
\varepsilon \rightarrow \emptyset / C - \begin{cases} r \\ l \\ n \end{cases} \begin{bmatrix} - \text{ cons} \\ + \text{ voc} \\ - \text{ stress} \end{bmatrix}
\]

This rule applies in moderately fast or casual speech to delete the reduced unstressed vowels in examples like the following:
Note on a Phonological Hierarchy in English

(8)(a) Before [r]: hindering, blunderer, puckering, elaborate (adj.), mackerel, amorous, doggerel, cadaverous, camera, every, laboratory, ephemeral, operative, separate, treasurer, reference, federal, impoverish, inaugural, lateral, directorate, dangerous, et cetera, temperature, Everest, Barbara
(b) Before [l]: pedaling, twinkling, suppler, awfully, respectfully, erratically, reciprocally, javelin, Emily, especially, excellent, equivalent, acidophilus, chocolate, easily, ambulatory, benevolent, desolate (adj.), leveling, channeling, Lancelot, Evelyn, chancellor
(c) Before [n]: happening, stiffening, opener, pardoning, seasonal, reasoning, reckoning, resonant, coordinate, personal, definite, infinite, arsenal, reasonably, gelatinous, effeminate, rational, larceny, traditional

Slur applies obligatorily in business, and in my speech to a number of other words, e.g., camera, every, celery, general, mystery, chocolate, and family; most of these are instances of syncope before [r], although there are a few cases before [l].

I wish to emphasize that this rule is a general process, in contrast to many other English contraction rules, for example Auxiliary Contraction (see section 1.3), which is restricted to a small set of words and is restricted in a rather complex way by the phonological and syntactic environment of those words (see Zwicky 1969).

On the other hand, the deletion in Slur is not governed by any simple or obvious conditions on the "pronounceability" of the result, in contrast to the contraction rule Pre-stress Contraction

\[
\varepsilon \rightarrow \emptyset / \# C \quad \left[ ^{- \text{cons}} \right. \\
\quad + \text{voc} \\
\quad + \text{stress}
\]

which seems to have no relationship to the hierarchy in (5). Pre-stress Contraction manifests itself in quite fast speech in the dropping of the unstressed vowel in the first syllable of such words as

(10) derivative, united, development, galoshes, demonstrative, subordinate, senility, vicinity, ferocious, coordinate
The rule does not apply in such words as Decameron, revised, pedestrian, and deflation, presumably for phonetic reasons. Slur, in contrast, fails to apply in a great many cases in which the result would be easily pronounceable:

(11) Before syllables bearing stress: degenerate (vb.), compensatory, imaginary, polarize, scandalize, hyphenate, Eucharist, vocalism, intellect, parallel

(12) Before clusters: development, honestly, graciously, earnestly

(13) Before obstruents: historical, relevant (cf. referent), divisible, voracity, Arabic, imperative, analogy

(14) Before [m]: element, minimum, monogamy, astronomer, consummate (adj.), ultimate

(15) Across strong (i.e., compound or word) boundaries: counter-attraction, counterintelligence, inter-American, underexposed, castle adventure, button across

Note also that the correct operation of Slur depends on the prior application of a number of other rules—vowel-reduction rules, because the rule applies only to unstressed vowels that have been reduced to [ə], and also an extended (fast-speech) version of Y Dropping (see sections 1.3 and 7), which eliminates the glide of [yə] (from careful speech [yuw]) in examples like ambulatory and inaugural and of [yə] in examples like auxiliary, because there is no trace of the [y] in the contracted forms of these words. Presumably, for speakers who do not obligatorily palatalize [ty dy] to [ɛ J] before unstressed vowels, an extension of Palatalization (and Y Dropping) precedes Slur in the derivation of such words as

(16) lecturer, cultural, congratulate, spatula, credulous, modular, fraudulent, fortunate

all of which show palatals—e.g. [fɔrdni] for fortunate.

In the notation of (6), Slur has the formulation

(17) - cons
- stress
+ voc

which appears to be merely an unmotivated variant of
(18) 
\[ \varepsilon \rightarrow \emptyset / C \rightarrowland [+ cons \rightarrowland [- cons ] [+ obs \rightarrowland [- vul ] [+ cor \rightarrowland [- stress ] ] ] ] \\

However, I shall argue that the exclusion of [m] from the environment of Slur is a relative rather than an absolute exclusion and that the acceptability of the output of Slur varies, being highest in position before [r], lowest before [n]. In fact, I shall argue that the hierarchy in (5) corresponds to a differential in the acceptability of the outputs of Slur, ranging from normally entirely acceptable before [r], to less acceptable before [n], to normally unacceptable before [m] and [ŋ], to entirely unacceptable before obstruents (as in (13)).

First, the contraction before [m] and [ŋ]. The Slurred versions of the examples in (14) strike me as unacceptable at the same rate of speech at which the examples in (8) are normal. But in faster speech they are not quite so bad, certainly much better than the Slurred versions of the obstructed examples in (13). A few words—*Quadrigesima, handsomer, perhaps unanimous*—are good even in only moderately fast speech. Examples of [ə] in the Slur environment before [ŋ] are not easy to find, but one such occurs in the proper name *Durringer* (when pronounced with simple [ŋ] rather than with [ŋg] or [ŋj]); Slur is inapplicable in this case.

Next, the exceptions to Slur. They are somewhat more numerous before [l] than before [r], and somewhat more numerous before [ŋ] than before [l]. The exceptions before [r] are, so far as I have been able to determine, all of a single type: They are all cases of a failure of deletion before [riŋj]. My judgments on some words ending in [əriŋj] with respect to Slur in moderately fast speech are given in (19):

(19) (a) Slur applies: *discovery, menagerie, factory, summary, hosiery, misery, machinery, mastery, scenery, illusory, dispensary, shrubbery, bindery, every, nursery, cursory, robbery, slippery, hickory, memory, Bowery*
(b) ? Slur applies: *haberdashery, quackery, battery, chicory, napery, creamery, usury, surgery, perjury, feathery, periphery, sorcery, mockery, refinery, thievery, Calvary*
(c) Slur does not apply: *infirmary, nunnery, summery,
lechery, perfumery, buttery, buggery, granary, cannery, gunnery, crockery, Hungary, plenary, greenery, notary, popery, snobbery, rotary, primary, rosary, rookery, deanery

Note especially the robbery-snobbery and summary-summery contrasts. The classification of words in [əriy] according to the applicability of Slur seems to be largely arbitrary, although some generalizations can be made (e.g., adjectives in -y, "like," do not contract in moderately fast speech: silvery, blustery, blistery, splintery, cindery, thundery, powdery, gingery, leathery, gossamery, summery, watery, papery, peppery, coppery, buttery). It is clear that Slur is being extended to new vocabulary items, just as it is extended in very fast speech.

The exceptions to Slur before [l] are of two types. First, [ə] before the suffix -ly does not drop after a stressed syllable, with few exceptions (easily, especially, finally):

(20) (a) -al-ly: mentally, eternally, morally, vocally, orally, totally, monumentally
    (b) -i-ly: readily, happily, prettily, jerkily, wheezily, chubbily, cloudily, stuffily, sunnily, drowsily

(Cf. the words in -ically, which is always reducible to [ikliy]). The second class of exceptions contains most occurrences of [ə] derived from [yuw], except in ambulatory, perhaps in particular, and in the words in which the [y] of [yuw] has been absorbed by Palatalization and Y Dropping (e.g., spatula):

(21) binocular, jocular, populous, popular, amulet, fistula, cumulus, truculence, circular, muscular, tabular

Y Dropping, but not Slur, applies to these words in fast speech, so that popular, for example, has the variants [pápyuwl], [pápyɔl], [pápɔl] in increasingly rapid speech.

The exceptions to Slur before [n] are diverse. The principal restrictions are against [mn] and [tn] clusters that would result from the operation of Slur. These restrictions must refer specifically to the rule Slur, for the clusters are not, in general, unacceptable in English (cf. the proper names Hamnet, Simnall, Putney, Courtney, and also amnesia, insomnia); moreover, the restrictions are not ab-
solute, because there are some forms (e.g., effeminate, scrutiny, gelatinous, fattening) that reduce comfortably in fast speech, and because the domain of the rule is extended as the rate of speech increases. The following are some examples:

(22) (a) [mn]: feminine, geminate (adj.), Gethsemane, stamina, phenomenal, nominal, abdominal, dominant, hominy, aluminum, voluminous, Germany, prominent
    (b) [tn]: intestinal, Latinist, monotony, botany

The reduction in functional, inflectional, and similar forms is relatively unacceptable, probably because of the complex [kšn] cluster created. I find the reduction of traditional, emotional, and the like quite natural, as opposed to the reduction of confessional, professional, and the like. And I find the contraction of progeny, nitrogenous, misogyny, etc. (to [jn]) less acceptable than the contraction of fortunate (to [čn]).

A final source of evidence for the ranking of the resonants in the environment of Slur consists of cases in which the rule could apply to either of two different resonants within the same word:

(23) (a) [ərəl]: federally, generally, literally, laterally, cursorily, naturally, minerally, electorally
    (b) [ənəl]: personally, subliminally, seasonally, conventionally, terminally, marginally, criminally

In (23a) the contraction before [r] is clearly preferable to the contraction before [l]; [jɛnraliy], for example, is much better than [jɛnrliy], although both forms can occur in fast or casual speech (for the latter form, see the next section). In (23b) the matter is not so clear; for some words (e.g., personally) I prefer the reduction before [l], in others (e.g., criminally) the reduction before [n]. The former cases provide some evidence for the dominance of [r] over [l], while the latter cases are neutral with respect to the question of the ordering of [l] and [n]—but this ordering is the one that is supported most strongly by the argument from exceptionality.

3. The Rules Ruh-reduction and Ruh-lessness

A number of words (e.g., separable, preferable, cooperative, corroborative, tolerably) have, in addition to the variants generated by
Slur, fast-speech forms that appear to show Slur in operation before obstruents: [sɛpɾbɬ], [préfɾbɬ], etc. But in fact, this reduction is dependent not on a resonant following the [ə], but rather on a resonant (more precisely, an [ɹ]) preceding the [ə], as can be seen from the examples in (24), which exhibit a variation between normal speech [ɹə] and fast speech [ɬ] in diverse positions.

(24) reciprocal, segregate, instrument, intricacy, introduction, hydroplane, profusion, pretend, professor, demonstrative, corporal, natural, pirate, hieroglyph, chiropractor, moral

Clearly a rule distinct from Slur, moreover one that can apply to the output of Slur, is required. This rule, Ruh-reduction, is not conditioned by the stress on (or even the existence of) a neighboring syllable:

(25) ə → ɹ / [- word boundary] — [- word boundary]

The context in (25) prohibits the rule from applying in initial position (Ramona, reduction, risotto, romantic; cf. brassiere and professor, which reduce) or in final position (hydra, pellagra, Capra, Barbara; cf. apron and corporal, which reduce). The formulation of the change itself requires some discussion. It does not seem possible to frame the rule as a straightforward [ə]-deletion rule (contracting the sequence CrəC to CrC, upon which the independently required rule Syllabication would operate to yield CrC), because the reduction takes place after vowels (even lax vowels, as in caraway) as well as after nonsyllabics. Some speakers, as reported to me by David Stampe, have a clear intermediate stage [ɹɹ] between [ɹə] and [ɹ], so that two rules are involved, the first an assimilation, the second a simplification of [ɹɹ] that is required in any event to account for the common pronunciation of mirror as [mɨɹ] (similarly, horror, purer, pairer):

(26) (a) ə → [+cor]/[- word boundary] ɹ — [- word boundary]  
(b) ɹ → φ / — ɹ

Because there is some independent evidence for (26b) and because the rules in (26) have a sort of internal motivation lacking in (25), I shall suppose that (26) is closer to the correct formulation of Ruh-reduction than (25), even though the intermediate stage [ɹɹ] is not prominent in mv speech.
Ruh-reduction is applicable in definitely fast or casual speech (also in the speech of many children). Hence, forms like [préfrɪbl] are less acceptable than forms like [préfrəbl]. In still faster speech some speakers eliminate the retroflex coloring of [ɾ], when unstressed and flanked by consonants, in many words. This rule, Ruh-lessness, is common in my speech in only a few forms (surprise, governor, paraphernalia, thermometer, and particular), for which dissimilatory influences are usually cited as the cause, as in Kenyon and Knott 1953: xlv. Although the best examples of Ruh-lessness are in words with two [ɾ]’s, the explanation in terms of dissimilation is not entirely convincing, because (a) some of the best examples would involve anticipatory dissimilation over long distances, e.g., three syllables in particular and thermometer, and (b) many speakers of otherwise [ɾ]-ful dialects have [ə] for unstressed [ɾ] in allegro pronunciations of words lacking a second [ɾ] (instrument, profession, introduction, permission). Nevertheless, Ruh-lessness is favored in dissimilatory environments, so that the reduction in governor is more acceptable than the reduction in governess.16

Ruh-reduction does not simplify [ɾə] only. It applies also, in a very restricted fashion, to [lə], [nə], and [mə]. These reductions are characteristic of quite fast or careless (for example, alcoholic) speech. I find the reduced [nə] and [mə] forms somewhat less acceptable than the reduced [lə] forms.

The generalized version of (26a) will assimilate some unstressed syllabics to some preceding resonants in the features coronal, lateral, and nasal. The details of the assimilations are not entirely clear to me. The generalized version of (26b) will then drop [ɾ] before coronal vowels, [l] before lateral syllabics, and nasals before nasal syllabics. Without giving a concrete form to these revisions, I list here a few examples (many of which show, in addition to Ruh-reduction, assimilation rules not discussed here):

(27) (a) [lə] from Slur: chocolate [ˈchɒklət], ambulatory [ˈæmbəˌtɔri], equivalent [əˈkwɪvələnt]
(b) Other [lə]: ablative [ˈæblətɪv], complicate [ˈkɒplɪkeɪt], Raglan [ˈræɡlən], restless [ˈrɛsləs]
(c) [nə] from Slur: coordinate [ˈkɔrdərət], definite [ˈdefɪnət]
(d) Other [nə]: abnegation [ˈæbnɛˈgeɪʃən], ignominious [ɪɡnəˈmɪniəs], sadness [ˈsædŋəs]
(e) (26b) applying to [n]: *kennel* [kɛnɬ], *denim* [dɛm], *linen* [lɪn], *canner* [kænər]

(f) [mə]: *admonition* [ædɔmiʃn], *admiration* [ædɔ'mrəyʃn]

(g) (26b) applying to [m]: *maximum* [mæksɔm], *camel* [kæm], *summon* [sən]

Note that my judgment is that [rə] is most likely to contract, then [lə], then [nə] and [mə].

Ruh-lessness applies generally only to [r]. In extremely fast or careless speech it may affect a few occurrences of [l] ([čákəŋ] for *chocolate*, [kəpəkɛy?] for *complicate*), but not the syllabic nasals.

4. The Rule VVR

Still another deletion of [ə] occurs, as in the case of Slur, before resonants, but otherwise in an environment quite different from the Slur contexts:

\[
\begin{array}{c}
\varepsilon \rightarrow \emptyset \\
\left[ + \text{voc} \right] \\
\left[ \begin{array}{c}
- \text{cons} \\
\end{array} \right] \\
\left[ \begin{array}{c}
- \text{voc} \\
\end{array} \right] \\
\left[ + \text{cons} \right] \\
\end{array}
\]

VVR applies to the words in (29) to reduce a sequence VGəR to VGR:

(29) (a) [r]: *dire, flower, diary, prior, theory, payer, fiery*

(b) [l]: *jewel(ər), dial, duel(ist), fuel(ing), royal(ly), con-strual, denial, real*

(c) [n]: *Brian, Rowan, lion(ize), Zion(ist), Cohen*

(d) [m]: *Noam, jeroboam, Hyams*

(e) [ŋ]: *doing, sowing, saying, pawing, seeing*

The reduction before liquids is usual in fairly fast speech for me. The reduction before the nasals is less normal; some reductions are impossible for me except in very fast speech:

(30) (a) [ŋ]: *Malayan, Siouan, Korean, Samoan*

(b) [m]: *museum, atheneum*

Also, I find the reductions before [ŋ] definitely less natural than the other reductions, with the acceptability of the results correlated to some extent with the degree of stress on the preceding syllable
Note on a Phonological Hierarchy in English 291

(highest for the examples in (29), lower for vetoing and tangoing, and very low for hulaing and subpoenaing) and to some extent with the quality of the preceding vowel (highest for front vowels, especially [iy], as in seeing and carrying).

In summary, my judgment is that the contraction is most likely to take place before [r] and [l], then in the cases before [n] and [m] given in (29), then before [ŋ] and in the cases before [n] and [m] given in (30).

5. Transitional Stops

A variety of CCC clusters have CC variants in fast speech, with the middle C dropped. Conversely, a variety of CC clusters have variants with a transitional stop intervening between the two consonants. Thus, although some speakers of English have a distinction between [ns] in prince and [nts] in prints (in slow speech), in faster speech the two forms vary freely with each other. Some speakers do not appear to have the distinction at all. In general, the greater the number of feature distinctions between the first and last consonants, the more likely the variation. Without exploring in detail the principles of this variation, I provide first some examples with nasals (in conjunction with fricatives in (31) and (32), with stops in (33) and (34):

(31) tenth, thousandth; prince, prints, answer, pencil, landscape; friendship, French, trench; warmth; Damson, damps; Canfield, panful, handful, grandfather; length; rinks; compunction, juncture; drumful, lumpful; Hampshire; ringful, tankful; gowns, grounds, lens, lends; strange, fringe; dams, damsel; rings, stirrings; Convair

(32) fishnet, rashness, rationing; casement, Westminster; Kastner, Flessner; Fishman, trashman; Hefner, roughness; business, Gesner

(33) dreamt, jumped; ranked; dreamed; ringed

(34) happening, raptness; weakening, weakness; Hickman

Now observe that [l] is involved in a similar variation. However, in contrast to the variation for the nasals, which is normal in fast speech for all speakers, and regular at all speeds for some, the variation for [l] is common only in definitely fast speech, and it is not
general (so far as I know) for any speakers. The following examples correspond to (31)-(34):

(35) health, pulse, cults; Welsh, filch; shelf; balls, balds; valve
(36) Kessler, beastly, base line, mist line; Ashley, freshly; snuffling, softly; dazzling, fuzzless; javelin, unraveling
(37) milepost, cold pan; welkin; callbox, coldbox; call girl, Colgate; Colney, coldness
(38) rippling, capless; pickling, thickly, perfectly, exactly; ribless, stubbly; rugless, Raglan; landlady, inland, fondling

The variant forms of the examples in (31)-(34), and of those in (35)-(38), are by no means of a uniform degree of acceptability. On the whole, however, the nasal cases are better than the [l] cases.

[r] does not participate in this variation at all. I do not believe that the variation is possible in such words as those in (39)-(42):

(39) course, courts; turf, carful; harsh, lurch; cars, cards; curve
(40) mystery, mess room; mushroom; calf-rope, riff-raff, raft race; misery; livery
(41) tarpon, cart pole; clerk, Perkins; carbon, card box; Cargill
(42) apron; Akron, Bactrian; rib roast, scabrous; vagrant

6. The Rule Dentdel

The discussion of transitional stops in the previous section is complicated by the existence of a separate rule deleting [t] and [d] preceding # (#C in moderately fast speech, but extended to apply before vowels and in phrase-final position in faster speech) and following [f s n l]. Thus, many examples of reduction of CCC to CC, where the middle C is [t] or [d], can be taken either as examples of transitional stop variation or as examples of Dentdel: Westminster, grandfather, lifts, handful, coldness. However, the transitional stop variation (but not Dentdel) “expands” clusters as well as reducing them, and it (but not Dentdel) eliminates labials (damped, damps) and velars (junked, junks)\textsuperscript{20} as well as alveolars, while Dentdel (but not transitional stop variation) deletes [t] and [d] in fast speech, even before words beginning with a vowel (e.g.,
past in he went past a store and old in she gave me the same old answer.

Dentdel applies after the continuant obstruents [f] and [s], but not [v z ź ť]. This restriction follows from the fact that in most dialects the rule, even in fast speech, does not apply to [t] or [d] representing the past tense ending (thus, coughed, sniffed, and tossed cannot reduce, although lift, past, and Christ can\textsuperscript{21}), in combination with the fact that the excluded continuants do not occur before [t] and [d] in morpheme-final position. An approximate statement of the rule is given in (43):

\[
(43) \begin{cases} t \\ d \end{cases} \rightarrow \emptyset / [+ \text{cons}] - [+ \text{cont}] - #
\]

In addition to the examples already given, some words subject to Dentdel are\textsuperscript{22}

(44) soft, excellent, test, must, shan't, won't, can't, don't, wouldn't; and, around, beyond, grant, land, friend; build, cold, hold

Now notice that Dentdel does not apply to [t d] preceded by [r]. I find the reduction unacceptable in forms like hard, heart, shirt, court, cord.\textsuperscript{23} This restriction can be incorporated into (43) by adding the condition that the segment preceding the deleted stop be either nonvocalic or anterior. Or, in the suggestive notation of (6):

\[
(45) \begin{cases} t \\ d \end{cases} \rightarrow \emptyset / [1 \rightarrow \text{Fricatives}] - #
\]

7. Weak Cluster Conditions

According to Chomsky and Halle 1968: 241n., a distinction must be made in at least three obligatory rules of English phonology between a strong cluster (a [+ cons] segment followed by any [+ cons] segment except [r], or a cluster of three or more [+ cons] segments) and a weak cluster (a single [+ cons] segment, or one followed by [r] or [w]). The formula for a weak cluster—

\[
(46) [+ \text{cons}] \left( \begin{array}{c} \text{α voc} \\ \text{α cons} \\ - \text{ant} \end{array} \right)
\]
must appear in the environment of these rules, the most notable of which is the part of the Main Stress rule that incorporates essentially the Classical Latin stress rule, by which *vertebra* is stressed on the antepenult but *umbrella* on the penult. In the nonce notation of (6) a weak cluster is represented as

\[(47) \ [r]^+ ([r]^-)\]

Note that in this instance, as in the case of Dentdel and transitional stops, the problem to be solved is the exclusion of [r] (together with the glides) from a larger class to which [r] naturally belongs. Another example of this type may be the following restriction on the occurrence of [s] and [ʃ] in initial position: Before [r], [ʃ] but not [s] occurs; while before [lmn], [s] but not [ʃ] occurs. Dialect variation in the treatment of [yuv] (when it bears some stress and follows a coronal nonsyllabic) might provide still another example. There are two extreme dialects with respect to Y Dropping (see section 1.3), one preserving the [y] in words like *tune*, *duty*, *assume*, *nuisance*, *lute*, and *ruin*, the other (mine) without a [y] in any of these words. I am aware of two intermediate dialects of interest in an examination of the hierarchy in (5). The first preserves the [y] in all cases except after [rl], the second in all cases except after [r] (*lute*, *Lucifer*, *illuminate*, and *lubricate* maintaining the [y], *ruin*, *ruby*, and *rule* lacking it).²⁴

The processes in which [r] is excluded contrast with Slur, Ruh-reduction, Ruh-lessness, and VVR (perhaps also Syllabic Resonants—see note 9), in which the problem (aside from gradation in acceptability) is the exclusion of one or more of the nasals from a larger class to which they naturally belong.

8. Prospectus

Let us suppose, on the basis of the English rules discussed in sections 2 through 7, that the hierarchy in (5) requires representation in phonological theory. I shall not consider the question of how this representation is to be accomplished, but rather shall offer a few remarks on the relationship of the hierarchy to feature composition and to markedness, and then I shall approach (in a most
tentative way) the question of the extent to which it can be predicted when the hierarchy is relevant to a given rule.

The hierarchy in (5)—vowels, then glides, then liquids, then nasals, then fricatives, then stops—corresponds to a gradation of sonority, from greatest to least. The sequence of the major classes is governed by the principles in (48), with (48a) applied before (48b):

\[(48) \quad \begin{array}{l}
(a) \ (i) [- \ cons] \ precedes [+ \ cons] \\
\quad (ii) [- \ obst] \ precedes [+ \ obst] \\
(b) \ (i) [+ \ voc] \ precedes [- \ voc] \\
\quad (ii) [+ \ cont] \ precedes [- \ cont]
\end{array} \]

By the principles in (48a) all vowels and glides precede all liquids, nasals, fricatives, and stops (i), and all vowels, glides, liquids, and nasals precede all fricatives and stops (ii). The result is a three-way division, with all vowels and glides preceding all liquids and nasals, which in turn precede all fricatives and stops. Principle (48bi) orders vowels before glides within their class, and liquids before nasals within their class (but does not affect fricatives and stops), while principle (48bii) orders liquids before nasals within their class, and fricatives before stops within their class (but does not affect vowels and glides).

Within the portion of the hierarchy of immediate interest to us, namely the liquids and nasals, the sequence is governed by the principles in (49):

\[(49) \quad \begin{array}{l}
(a) \ (i) [- \ back] \ precedes [+ \ back] \\
\quad (ii) [+ \ cor] \ precedes [- \ cor] \\
(b) [- \ ant] \ precedes [+ \ ant]
\end{array} \]

Principle (49a) orders \([n \ m]\) before \([\eta]\) (i) and \([n]\) before \([m \ \eta]\) (ii), without affecting the liquids. Principle (49b) orders \([r]\) before \([l]\) (and must be ordered after (49a) so as not to affect the nasals).

Note that the principles in (49) are applicable to oral consonants as well as to resonants; Jakobson’s observations quoted earlier in (3) and (4) follow from (49a). In other words, the ordering of the nasals in (5) corresponds to the ordering with respect to markedness, from least to greatest, and not to the ordering with respect
to sonority, which is \([\eta \ n \ m]\).\(^{25}\) On the other hand, the ordering of [\(r\)] before [\(l\)] in (5) accords with the ordering by decreasing sonority, not with the ordering by increasing markedness, [\(r\)] being marked in contrast to [\(l\)]. That is, the hierarchy in (5) is complex with respect to the natural dimensions of sonority and markedness.

English contraction rules supply some evidence about other sub-hierarchies of (5). For example, the rule Glide Deletion (recall section 1.3) drops initial [\(h\)] quite extensively, initial [\(w\)] in very restricted environments (only in the words will, would), and initial [\(y\)] not at all. The rule is sensitive to factors of stress, speed, and syntax in a complex way, but the sequence is not difficult to discern.\(^{26}\)

Although it is impossible at present to predict when a hierarchy will apply to a rule, or to predict which hierarchy (or hierarchies) will apply and in which order (recall the contrast between transitional stop variation, Dentdel, and the weak cluster condition, on the one hand, and Slur, Ruh-reduction, Ruh-lessness, and VVR, on the other), some suggestive observations can be made.

Note first that all the rules discussed so far in which the hierarchy in (5) is applicable are rules in which the resonants appear in the environment. In contrast, rules that change the major class features of resonants are governed by principles cutting across considerations of sonority and markedness. The relationships between [\(r\)] and [\(s\)], [\(z\)], [\(n\)], [\(l\)], [\(d\)], and [\(w\)], and similar relationships between [\(l\)] and various stops and glides, and between nasals and sounds of other classes all appear to be quite independent of the hierarchy in (5). Other processes that affect the resonants directly, in particular the superimposition of secondary features on the resonants, invoke the hierarchical principles. For example, in Kolokuma ljo (Williamson 1965: 16) vowels and [\(w\) y \(r\)], but not [\(l\)], are nasalized in the vicinity of nasals.

Although the characterization of the circumstances in which [\(r\)] is favored, as opposed to those in which the nasals are favored, is impossible on the basis of the tiny sample of rules considered here, a rough conceptualization of the distinction is not out of the question: [\(r\)] is favored when the strength of a syllabic nucleus is reduced (by elimination of an initial resonant, as in (26b), or by
elimination of secondary articulations, as in Ruh-lessness, or by de-
le-tion, as in Slur and VVR) and when assimilations characteristic
of vowels are operative (as in the first part of Ruh-reduction and
the Ijo nasalization rule). In contrast, the nasals are favored when
the "strength" of a consonant cluster is involved. Put very su-
cinctly, the distinction is one between "vowel" rules and "conso-
nant" rules. These excessively vague notions await much further
investigation.

Finally, notice that other hierarchies interact with the one in
(5). Thus, Dentdel is most likely when a consonant (especially an
obstruent) follows the [t] or [d] to be deleted. Slur is normally
inapplicable before stressed syllables, but in quite fast speech (and
in some dialects) it extends to this position as well. The appli-
cability of VVR is in part conditioned by the stress on and quality
of the preceding syllable. The result is in each instance a complex
pattern of acceptability, made still more elaborate when idiosyn-
cratic lexical markings, rather than storable phonological or syn-
tactic environments, contribute to the determination of accept-
ability, as in the case of Slur applying to [ə] before [riy].

A considerable amount of work will be required to sort out these
processes and the restrictions on them—among other things, a sur-
vey of synchronic processes involving liquids and nasals, of histori-
cal changes involving these sounds, of principles of borrowing in-
volving them, and of their treatment in language acquisition, all of
these in a wide variety of language.27 To this survey I offer the
above observations as prolegomenon.

NOTES

1. I am indebted to Ann D. Zwicky for her many suggestions about the
form and content of this paper. I have incorporated into the text a number of
observations made by other participants in this conference. This is the ver-

tion of February 16, 1969.

2. Throughout this paper I use italics to cite forms in conventional orthog-

graphies, surrounding brackets to cite transcriptions, which are to be taken as
phonetic except where the context makes it clear that a more abstract repre-
sentation is intended. My phonetic transcriptions are not uniform, being rather
narrow for features under discussion, broad in other respects. In particular,
I do not mark many distinctions of quality and quantity in vowels.
3. Auxiliary Contraction is related to the rule VVR discussed in Section 4 below, although the nature of the association is still unclear to me.

4. For discussion of the = boundary see Chomsky and Halle 1968. Names like Canby (with assimilation only in fast speech) must be treated as containing a # boundary associated with the formative -by (appearing also in Whitby, with failure of voicing assimilation, and in Rugby, with its unusual cluster of voiced obstruents.

5. I propose to demonstrate, on another occasion, that both this rule and the "assimilation" rule operative in words like affect, support, and attest are not rules of complete assimilation, but rather deletion rules, at least in my dialect.

6. In hidering and many similar examples the [ə] is first inserted by rule, then deleted optionally by another rule, in this case Slur. The underlying form of hinder does not have a vowel preceding the [r] because hindrance has two, not three, syllables in all dialects (compare dangerous). Schwa Insertion is required because in many dialects (mine among them) hinder and hidering have [ər], rather than [r], in slow speech.

7. The resultant [yn] cluster in united is pronounced [p].

8. But note that there is no obvious phonetic explanation for the condition that the rule does not apply to initial [ə], as in alembic, aroma, anemic, and amusing, or to [ə] in syllables after the first, as in Canaletto, paronymic, homiletic, and analytic. However, some of the examples cited in note 13 below can be interpreted as undergoing medial applications of Pre-stress Contraction.

9. The exclusion of the environment before [m] (and [ɲ]) makes it unlikely that Slur is the same rule as Syllabic Resonants, which applies to the sequences [ər al en am ən] to yield [r l n m ɲ] in such words as pallor, pedal, bacon, ransom, and baking. There does appear to be some gradation in the operation of Syllabic Resonants, at least to the extent that [ɲ] appears in faster speech than the other syllabic resonants, and perhaps that [m] appears in faster speech than [r l n]. I have not yet made a systematic investigation of these matters.

10. Kenyon and Knott (1953) give palatals for all of these words, but many speakers have clusters in fairly slow speech.

11. I know of but one exception, wintry.

12. In many British dialects Slur applies to the words in (19b) and (19c) as well as to those in (19a). These dialects also reduce (and subsequently delete) the penultimate vowel in words like legendary, imaginary, and secondary, which cannot have reduced vowels in my dialect, and in many of the words in (20) and (22) below.

13. The words probably, mathematics, and vaudeville are subject to an exceptional deletion of [ə], in the case of probably and vaudeville before an obstruent and in the case of mathematics before [m] followed by a stressed vowel. Note that the corresponding reduction of probable is unacceptable. C.-J. Bailey has pointed out to me that various dialects syncopate [ə] following [r l], in words like America, orange, Carolina, guarantee, caramel, Phila-
Note on a Phonological Hierarchy in English

*delphia, skeleton, Europe* (the relevant examples differ from dialect to dialect), none of which are reducible in my speech except at high speeds.

14. The word *iron* has no form with nonsyllabic [r] in my speech. Thus, in slow speech I have a contrast between *irony*, “like iron,” [áyɾni:] and the figure of speech *irony* [áyɾni:] (although the contrast is eliminated in fast speech by the application of Ruh-reduction to the latter form). *Iron* then requires either the obligatory application of Ruh-reduction or else the unusual underlying representation */IVrn/.

15. For the appearance of the feature *coronal* in (26a), see Chomsky and Halle 1968: 304. The reduction of *mirror* and similar forms indicates that (26b) is not restricted by occurrences of # in the way that (26a) is. Note that the rule Syllabic Resonants mentioned in note 9 might be treated essentially as the mirror image of (26).

16. In a few cases the second [r] is deleted instead of the first, as in *interpret* [ɪntɹˈpɪt], where the first [r] is stressed and the second unstressed.

17. In examples like *burial, Albanian, criterion, geranium, and linoleum*, VVR does not apply, because the extension of Gliding applies first, changing [ɪɾə] to [yə].

18. Except in a few words like *diamond* and *diaper*, where VVR is obligatory for me.

19. Words like *tentful* and *Pitman* (also *salt peter*, with [I], and *cartful*, with [r]) do not have acceptable variants without a medial stop, in my speech. What happens is that a Glottalization rule replaces [t] by [ʔ] in these words, yielding [tɛʔfl] and [piʔmən]. Glottalization (which also applies to [t] in *mountain* and *mutton* and to [p] in *bottle*) must therefore precede the processes of variation with transitional stops, if the latter are to be blocked. Glottalization is much more extensive in some dialects, Scots English for one, than it is in mine.

20. An extension of Glottalization applies to *damp* and *junk* in very fast speech, even before vowels and in phrase-final position, to yield [dæʔ] and [jʌʔ], which cannot be further reduced. Glottalization applies to [t] as well as [p k]: note [kæʔ] for *can’t* in fast speech. The reduced versions of words like *went* [wɛnt] cannot be considered as resulting from Glottalization followed by a [ʔ]-deletion rule, for two reasons: (a) [d] drops in the same environments as [t], but has no intermediate form [ʔ], and (b) after the operation of Glottalization, original [p t k] have fallen together as [ʔ] and cannot be distinguished in the operation of a putative [ʔ]-deletion rule, which nevertheless would have to drop [ʔ] from original [t] but not from [k p].

21. William Labov has pointed out that in some Black English dialects the rule is extended to the past tense ending as well.

22. Dentel, or a rule having a similar effect, is obligatory in words like *fasten, soften, hasten, and moisten*.

23. Final [d] remains, and final [t] is replaced by [ʔ] in very fast speech (see notes 19 and 20 above).

24. In my wife’s dialect the [y] is preserved except after [s r l]. This treatment of the [y] involves a principle separate from the hierarchy in (5),
namely the functioning of [s] with [r] as continuants, in opposition to the stops, both oral and nasal.

25. Also [g d b]. Foley's hierarchy in (1) is ordered by sonority, presumably on the basis that the most sonorous stops, the voiced velars, are most likely to drop when surrounded by the maximally sonorous segments, vowels (especially stressed vowels). Note Fletcher's values for "phonetic power" cited by Jakobson, Fant, and Halle 1961: 28).

26. A complicating factor is the treatment of initial [ð], which is affected by Glide Deletion in approximately the same way as [w].

27. Hans Hock has called my attention to a number of difficult cases in the development of various Indo-European languages. The common feature of Hock's examples is the exclusion of one nasal from a larger class containing the other nasal and the liquids. Presumably, principles other than the one discussed in this paper are to be invoked, although these matters are by no means clear. An apparent, rather than real, difficulty is the Latin rule assimilating the [n] of con- to a following resonant, a rule sometimes said (as in Hale and Buck 1966: 25) to apply before nasals and [r] but not before [l]; as Eric Hamp and C.-J. Bailey have pointed out to me, what appears to be the case is that new formations with con-, with no assimilation only at first (regardless of whether [r] or [l] followed), were made at different periods in the history of Latin.

REFERENCES


