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Nonlinear phonology: An overview

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0. Introduction

The last five or six years have seen a substantial change in the nature of research into phonological theory. This change has been marked by the development of several new theoretical frameworks, for which we can use the somewhat awkward and misleading term "nonlinear phonology". In this short essay, I hope to give an introduction to the various ideas underlying nonlinear phonology, as well as to provide an outline of the mechanics of formal analy-sis under this rubric. Because of rigid constraints of space, I cannot do justice to every viewpoint, nor can I present full-fledged arguments. But I do try to provide something of a retro-spective on what has already been achieved and the reasons behind it, and I offer a lengthy bibliography to those whose interest is stimulated by this survey.

  The structure of this presentation is as follows. In the first section I describe the basic notions of the theory in Chomsky and Halle (1968), particularly those less well-known features that are essential to understanding the subsequent development of non-linear phonology. In the following sections I characterize the two most important and extensive such nonlinear theories, the metrical and the autosegmental, including the topic of syllable structure in the former. The concluding section deals with a recent area of research, the unification of the autosegmental and metrical theories.

1. Linear Phonology

Since 1968 (and even earlier), generative phonology has been largely dominated by the basic assumptions made in Chomsky and Halle's monumental The Sound Pattern of English. (SPE). Although relatively minor adjustments of the SPE theory were proposed from time to time in the first half of the 1970's, no interesting and comprehensive alternative to it ever received broad acceptance. This is in clear contradistinction to what in retrospect appear to be truly massive changes in syntactic theory during the same period.

  A fundamental property of the SPE theory, as well as of subsequent research in the same mold, is the assumption that the deepest and most interesting principles of universal grammar will be found in the form and function of phonological rules. An example of this in SPE is the claim that disjunctive ordering relations between two adjacent rules — like the subparts of the Latin stress rule, where the penultimate subrule applies only if the antepenultimate one fails — are limited to cases where the structural description of the first rule properly contains that of the second. This condition is expressed formally by the requirement that the subrules be collapsible by the parenthesis notation. In later discussion of SPE, much attention was focused on the problem of multiple application sites of a single rule, as in alternating stress phenomena.

  Against this very rich and innovative conception of rule form and function, the SPE model did not present significant changes in conceptions of phonological representation.

Chomsky and Halle adopted, with interesting but relatively minor changes, the theory of distinctive features in Jakobson, Fant, and Halle (1951). The claim in SPE — a claim whose significance will become clear shortly — is that an utterance and the representations underlying that utterance are made up of a matrix of distinctive features, with each column corresponding to a single segment. Segments, then, are bundles of unordered features, and utterances are strictly ordered lists of segments. All propertjes of an utterance, including such obviously prosodic ones as tone, stress, and syllabification, must inhere in its segments, mediated by the distinctive features and rules for interpreting them phonetically. With the addition of a simple theory of boundaries or junctures, this essentially exhausts the SPE conception of phonological representation. The only major comment on representational issues to be found in subsequent discussion of SPE is the abstractness question, an issue involving the whole grammar as much as this area alone.

The SPE model remains the most comprehensive theory of phonology devised to date. One can, however, identify the development of a significant alternative in what might be called nonlinear phonology. The common element of the diverse trends falling under this single term is a rejection of the SPE model of phonological representation I have just outlined. Properly speaking, the features still have a place, but the segments do not. Utterances are made up of several kinds of simultaneous levels, with each level related to but ordered independently of (whence the designation nonlinear) any other level. In no level can segments of the SPE sort be identified. Methodologically, the focus on phonological structure in nonlinear phonology has reduced the attention paid to and the formal role of phonological rules and their interaction.

Within this somewhat ill-defined realm of nonlinear phonology, we can identify two major theoretical movements, metrical and autosegmental. Except in very recent work which I will discuss in the concluding section of this essay, metrical and autosegmental phonology have been concerned with largely complementary phenomena to which they bring to bear conceptually and formally quite different sorts of mechanisms. Metrical phonology, applied to phenomena of stress and syllabification, exploits the notion of relations of constituency and relative strength or prominence between contiguous prosodic units (like syllables, stress groups, and so on). Relations are notated by a complex, binary-branching tree with labeled nonroot nodes. Autosegmental phonology, which figures most often in the analysis of tone, accent, and vowel harmony, is characterized by abstracting out shared propertjes (indicated by distinctive features) of possibly noncontiguous elements in an utterance. This abstraction is mediated by a notation of simplex, n-ary branching trees, with the prosodic features of harmony or tone appearing on separate levels called tiers.

I will now turn to a more rigorous characterization of these two theoretical viewpoints, including extensive exemplification. Considerations of the boundaries of autosegmental and metrical theory, as well as conflation of the two, await the concluding section.

2. Metrical Phonology

The origins of metrical phonology lie chiefly in Liberman (1974) and Liberman and Prince (1977). Consider first one of metrical theory's simplest yet most striking results: the English compound stress rule. Representative data appear in (1):

(1)   a.

	1	2
	[[labor]$_N$	[union]$_N$]$_N$

b.

	1	3	2
	[[[labor]$_N$	[union]$_N$]$_N$	[committee]$_N$]$_N$

c.

	2	1	3
	[[union]$_N$	[[finance]$_N$	[committee]$_N$]$_N$]$_N$

d.

	2	3	1	3
	[[[labor]$_N$	[[union]$_N$]$_N$	[[finance]$_N$	[committee]$_N$]$_N$]$_N$

As is clear from (1), compounds may have main stress on the left member (1a, b) or on the left member of a complex (that is, branching) right member. If we consider stress to be a relational notion, then a straightforward account of (1) is possible: in any given level of a compound, the right member is the more prominent if it is complex, and otherwise the left member is more prominent.

       Liberman (1974) and Liberman and Prince (1977) implement this relative prominence relation by means of complementary strong (s) and week (w) labels on the sister nodes of a binary-branching tree. Under this account, the stressing of English compounds is accomplished by (2):

(2)   Lexical Category Prominence Rule (LCPR) of two sister nodes [N1 N2], N2 is strong if and only if it branches. Since labels on sister nodes take complementary values, the biconditional (2) is sufficient to label anybinary-branching tree unambiguously.

Rule (2), applied to a compound like <u>labor union</u> <u>finance</u> <u>committee</u>, yields the result in (3):

(3)

labor   union   finance committee
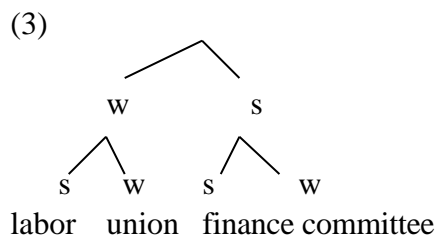
The most prominent element in the tree, called the designated terminal, is that node dominated only by <u>s</u> labels and the root. It corresponds to primary stress. Degrees of secondary stress are also indicated by the labeling, since any <u>s</u> node is relatively more prominent than its sister.

    The result encoded in (2) is typical of metrical phonology. It represents a considerable theoretical improvement over the cumbersome SPE apparatus for compound stress, and it has some subtle empirical advantages as well. The analysis generalizes easily to English nuclear stress, the unmarked (neutral or nonemphatic) stress in phrasal categories, Nuclear stress is always right prominent — that is, the right node is labeled <u>s</u>. A number of other analyses have applied this model to phrasal or compound stress in other languages: Afghani Persian (Bing 1980), Italian (Nespor and Vogel 1979), and Biblical Hebrew (Dresher 1980-1981, 1981; McCarthy 1979a).

    Formally, the inherent properties of metrical theory are as follows: Complementary labels <u>s</u> and <u>w</u> on sister nodes define a relation of relative prominence, where prominence can be instantiated as one or more of a number of phonetic correlates (characteristic duration,

amplitude, or fundamental frequency, or full versus reduced vowel or consonant systems). The labeling relation demands binary-branching tree structures (properly, rooted, directed graphs with binary-branching nonterminal nodes) to achieve a coherent representation. The terminal nodes of the trees are contiguous elements — a string of words or compounds in the case of the compound and nuclear stress rules.

For English word stress, the terminal nodes are also a string of contiguous elements, the syllables (about which more later). But, unlike compounds and phrases, in which tree structure is already provided by rules of morphology or syntax, within words trees must first be built by some procedure. In Liberman and Prince (1977), one version of this procedure is given in considerable detail. A right-to-left iterative rule assigns [+stress] to some vowels, and concomitantly a left-branching tree, called a foot, is erected with a [+stress] vowel as head. Since trees must be inherently nonoverlapping structures, in words with several stresses a foot extends rightward only as far as the next foot. Finally, all feet and stray or unfooted syllables are gathered up as the terminal nodes of a rightbranching word-level structure. The entire result is labeled by rule (2), which therefore suffices for all lexical category members, both simplex words and compounds.

The formulation of the rule assigning [+stress] need not concern us here; it is sufficient to note that the Liberman and Prince analysis retains considerable segmental character, with a segmental stress rule assigning a stress feature to vowels. In Liberman and Prince (1977), the metrical structure serves only to determine degrees of stress, not its presence or absence. A fortiori, formal constraints on metrical theory can have no role in governing the distribution of word stress, although they can determine the relative strength of several stresses in a word. This result places a severe limit on the extent to which metrical structure can illuminate typological considerations of stress placement.

Fortunately, this limitation has been circumvented. The first work to propose a fully nonsegmental metrical theory of stress is Prince (1976). (See also Vergnaud (1977).) Prince proposed that stressing is essentially reducible to rules directly assigning metrical foot structure to words. In his conception, the terminal nodes of feet may be syllables or moras, a unit of prosodic weight. Rules of stress assignment will, in general, stipulate particular foot structures, including conditions on their terminal nodes, and the directionality of foot assignment. A general condition provides that forms receive the maximal compatible foot structure, a property corresponding roughly in its effect to the principle of disjunctive interpretation of parentheses in SPE rule schemata.

Two illustrations present paradigm cases of this theory in operation. Classical Latin stress is assigned by the foot in (4), mapped onto a word from right to left:

(4)   Latin Stress Rule
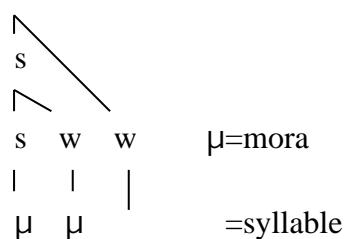
Some representative forms will be footed as in (5):

(5) a.　　　　b.　　　　c.　　　　d.

| | | | |
| temporis | cineris | honooris | feroo |
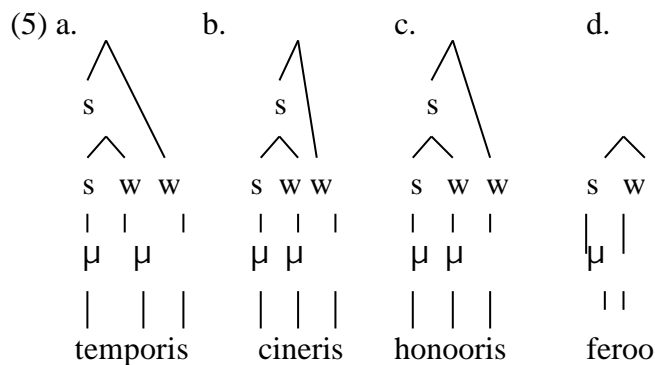
In (5a, b, c) the maximal foot assigns stress to the antepenultimate syllable or to a bimoraic penult. A nonmaximal foot is applicable to the disyllable in (5d). A quite different stress pattern arises in a language like Warao (Hayes 1980) with alternating stress. In this case, stress falls on every even-numbered syllable, counting from the right. The Warao foot under this theory appears in (6):

(6) Warao Stress Rule
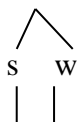
This foot is assigned from right to left, as in (7)

(7) a.　　　　　　　　　b.

yiwa ra na e　　　na ho ro　a ha ku ta i
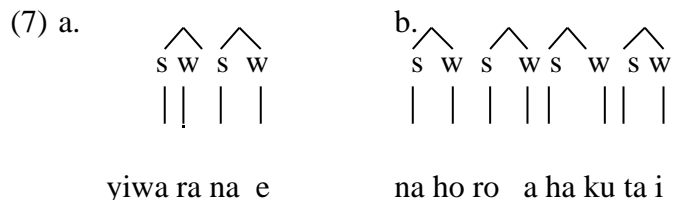
The last stress is the most prominent, a fact that can be captured by a right-branching word-level tree labeled according to (2).

　　The theory in Prince (1976) offers a number of important insights that have been further refined in later work. First, much of the need for stipulated disjunctive ordering is vitiated by the requirement of foot maximality. The maximal foot is inherently disjunctive with respect to any smaller feet because tree structures cannot overlap on the same string of syllables. (If they overlapped, they would not be trees.) Since disjunction by parentheses in SPE figured only in stress-like rules, probably all cases of disjunction can be explained in this way. Moreover, foot maximality allows for the case of stress located a possibly unbounded distance from word-edge, as in the cases of Eastern Cheremis and Komi (Kiparsky 1973) and Classical Arabic (McCarthy 1979b). These rules require an elaborate variable mechanism in SPE-derived work.

　　Second, the prevalence of alternating patterns of stress also follows as a direct consequence of the formal system. A binary alternating pattern is generated by the least complex, and therefore most highly valued, metrical foot structure. Moreover, the formalism captures an intuition, due originally to Halle, that there is a deep connection between

disjunctive ordering and alternating patterns in stress rules (see Vergnaud (1977) for an interpretation leading to this result).

Third, the most fundamental insight about word stress in this work, as well as in Liberman and Prince (1977), is the realization that the foot plays a fundamental role in determining properties of prosodic systems. Constraints on foot form and the association of feet with syllabic strings, augmented by labeling rules, should largely determine the universal characteristics of word stress.
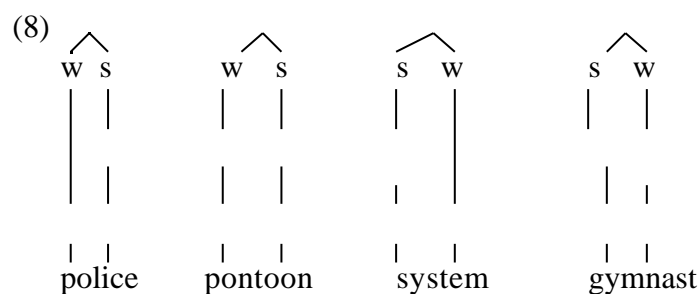
Finally, Prince's use of syllables and moras as the terminal nodes of feet constitutes a preliminary theory of the role of syllabic quantity in stress assignment, a problem treated unsatisfactorily in SPE (cf. pg. 241, n. 3).

These last three issues in particular have occupied substantial attention in more recent work. I will outline the chief results of this discussion and then turn to a related topic, the theory of syllable structure.

Alternating patterns of considerably greater complexity than that in Warao have been studied in some detail. Hale and White Eagle (1980) have argued on the basis of stress shift phenomena induced by vowel epenthesis that Winnebago alternating stress must be represented by metrical feet. Mora-counting alternating stress systems in Tübatulabal (Vergnaud 1977), Capanahua (Safir 1979), and Creek and Cairene Arabic (McCarthy 1979b) have also been analyzed metrically. Stowell (1979) describes cases in Seneca and Passamaquoddy in which the alternating stress feet function as a kind of intermediate stage in the computation, subject to a further rule of superfoot assignment.

A number of stress patterns are analyzed metrically in Halle and Vergnaud (1978), but the most comprehensive metrical survey of alternating stress appears in Hayes (1980), including particularly detailed analyses of Aklan and Yidin^y (on the latter, see also Nash 1980-81).

On the next point, Kiparsky (1979) and Selkirk (1980) have proposed that the foot be recognized as a separate, labeled prosodic category, like the syllable, rather than as simply a derivative of some foot assignment rule. Arguments for this move are numerous. First, English stress can be brought into conformity with other systems by eliminating the feature [stress]. Since English contrasts w-labeled syllables that are stressed with those that are unstressed, foot structure distinctions are needed to determine vowel reduction. This is illustrated by the contrasting disyllables in (8) (Selkirk 1980):

(8)

```
    ∧            ∧            ∧            ∧
   w  s         w  s         s  w         s  w
   |  |         |  |         |            |  |
   |  |         |  |         |            |  |
   |  |         |  |         |  |         |  |
  police      pontoon      system       gymnast
```

Only syllables that do not head a foot are unstressed and therefore reduced.

Second, some phonological rules take the foot as their domain. Prince (1980) has argued compellingly that the complexities of Estonian quantity are readily explicable under a foot-based account. Kiparsky (1979) and Selkirk (1980) have argued, referring to earlier work by Kahn (1976), that t-flapping in English is a foot-internal process. Other rules of English have the same property or, like expletive infixation (McCarthy in press), take the foot as their

antidomain. In the complex accentual system of Tiberian Hebrew, several stress shift rules (McCarthy 1979a, Hayes 1980) and the melodic determination of word length (Dresher 1980-81, 1981) must also refer to feet.

Third, cross-linguistic considerations show that a rigidly circumscribed typology of foot types is possible. This typology is developed most carefully in Hayes (1980). He argues that only two primitive foot types are needed, binary (like Warao) and unbounded (like Eastern Cheremis and Komi). Cases of apparently ternary feet, Latin, are treated by Hayes with extrametricality, the stipulation of the final syllable as exempt from the erection of metrical structure. Extrametricality plays a virtually indispensible role in the analysis of many prosodic systems. Two detailed analyses heavily exploiting extrametricality are those of English in Hayes (1980) and of Spanish in Harris (1980b).

A final point on which recent research has concentrated is the phenomenon of quantity sensitivity, the property in many rules of counting moras. In Halle and Vergnaud (1978) and McCarthy (1979b) quantity sensitivity is given a geometric interpretation. In the internal structure of syllables (to be discussed immediately below, a constituent called the rhyme is recognized, including the nucleus and postvocalic consonantism. A syllable containing only a short nucleus vowel will have a nonbranching rhyme, whereas a heavy syllable — one with a long vowel or closed by a final consonant — will have a branching rhyme. The mechanism of projection (Vergnaud 1977) abstracts out of a word a simultaneous representation containing only the rhyme constituents. The basic intuition captured in the theory is that the branching of feet and of rhymes is homogeneous, as illustrated in (9):

(9)

foot level

CVCVCCVCVCV VCVCVCV
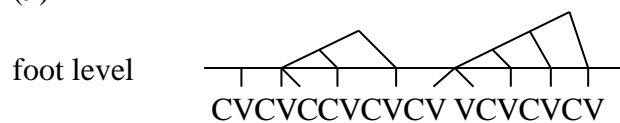
The attraction of stress to heavy syllables follows from having branching rhymes participate in the uniformly left (or right) branching foot structure. In Hayes (1980), this notion is developed as a parameter of universal grammar, left (or right) dominance in feet. Quantity sensitive stress rules are not the only area where syllable structure has been studied. Metrical analyses of syllable structure do not necessarily invoke the notion of prominence labeling (though some do, like Kiparsky 1979, McCarthy 1979b, and Ingria 1980). But, unlike autosegmental theory, they share with the metrical theory of stress a concern with the constituency relations of contiguous elements, either at the level of the syllable or that of one of its subconstituents. Kahn's (1976) original proposal for an internally simplex syllable constituent has been mostly supplanted by claims for a number of subconstituents of the syllable, as illustrated in (10):

(10)
$$\text{Syllable}$$

```
(10)            Syllable
              /        \
          Onset        Rhyme
            |          /    \
          C_0      Nucleus   Coda
                     |         |
                    V_0       C_0
```

Onset — C_0

Rhyme — Nucleus (V_0), Coda (C_0)
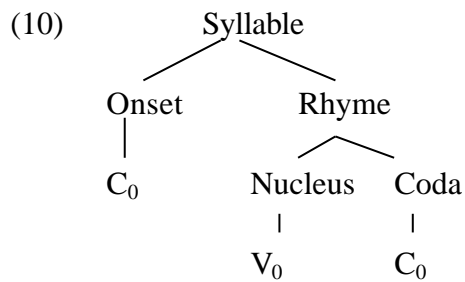
One sort of argument that has been proposed for this constituency has already been outlined: reference to, say, the rhyme in phonological rules. A similar argument from Indo-European reduplication for onset constituency has been made by Kiparsky (1979). Other arguments, like those for English syllable structure in Selkirk (forthcoming) and Halle and Vergnaud (1978), are distributional in character. Coöccurrence restrictions within the syllable are often local in a strict sense: they are limited in scope to a particular constituent. So, for example, many languages limit coda position to sonorant consonants, a property that can be expressed by labeling the coda node with [+son]. A final, important source of evidence about syllable structure are phenomena of epenthesis, elision, compensatory lengthening, and sonorant syllabification and desyllabification. Although there are many different views in the literature, the common insight seems to be that, with independently necessary rules assigning syllable structure, no rules at all are needed to account for such phenomena. Rather, they emerge as automatic consequences of the principles governing syllable well-formedness. Languages that have been treated in this way include Yiddish (Lowenstamm 1979, 1981), French (Anderson 1981), Spanish (Harris 1981, Kaye 1981), and Klamath (Feinstein and Lapointe 1981, Clements and Keyser 1980), as well as others.

3. Autosegmental Phonology
No tonal data are discussed anywhere in SPE, and the theory of tone suggested there (the complex features of Wang (1967)) is entirely inadequate. Subsequent research set out to remedy that inadequacy, and the result ultimately was autosegmental phonology, a theory with quite unexpected consequences extending far beyond tonal analysis.

Woo (1969) originally rejected the complex tonal features of Wang (1967) in favor of level-tone segmental features. Under this theory, contour tones like rising and falling are to be analyzed as sequences of high and low level tones on adjacent vowels. It was noted, however, that this analysis incorrectly excludes contour tones on syllables containing only a short vowel, an observation that led to the melody-mapping theories of Williams ((1971)=(1976)) and Leben (1973). In this case, distinct segmental and tonal representations are recognized at the beginning of the derivation, and then later a universal mapping procedure — a kind of segmentalization — inserts the tonal features into the segments. The mapping algorithm provides that tonal features may "pile up" in linear order at the right edge of a word, permitting contour tones in that position. The output of the mapping rule is a conventional segmental representation.

Problems with this theory centered on a complex technical issue: the lack of a well-defined stage in the derivation when mapping takes place. The alternative, adopted in Goldsmith (1976a, b) and Haraguchi (1976), is to say that there is no mapping procedure, that tonal and nontonal levers always remain distinct, and that therefore there are no segments in the strict sense. The theory is autosegmental, then, in that it recognizes that different classes of features

can appear on different levels, called tiers, with each level unspecified with respect to the features on other levers. Since the tones must be coordinated with other articulatory gestures, a mechanism of association between different autosegmental tiers isprovided, quite distinct from the earlier mapping algorithm.

We can now formalize these notions. Consider the hypothetical tonal representation in (11):

(11)   segmental tier   babababababa
                                       | | ⋁⋰
          tonal tier   H   L   H
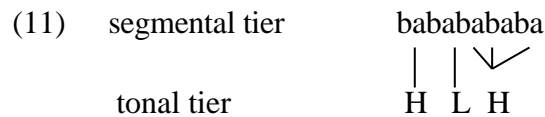
Units on the segmental tier (not segments in the SPE sense) are archisegments unspecified for tone, units on the tonal tier are unspecified for all nonprosodic features. Tonal or melodic elements are associated with stipulated tone-bearing elements (here, the vowels) by lines. These association lines orchestrate the gestures, rendering the first syllable high-toned, the second low, and so on. In Goldsmith (1976a, b) the association between segmental and tonal tiers is governed by the following constraint:

(12)   Well-formedness Condition (WFC)
         a.   Every tonal element is associated with at least one tone-bearing element; and
                 every tone-bearing element is associated with at least one tonal element.
         b.   Association lines do not cross.

Clause a of the WFC provides that a tonal element will spread out association lines to take in tone-bearing elements when the number of the latter exceeds that of the former, as in (11). When the opposite condition holde, several tonal elements will be associated with a single tone-bearing element, as in (13), yielding a surface rising contour tone:

(13)   ba ba
          | ⋀
         H L H
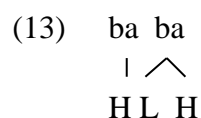
One area of research in autosegmental theory concerns revisions in the WFC. In particular, it has been proposed that the second consequence of clause a be eliminated, so that contour tones do not arise automatically, but rather appear by the operation of languageparticular rules (Clemente and Ford 1979).

By far the bulk of autosegmental research concentrates on extending the empirical coverage of this theory. In Goldsmith (1976a) it is applied chiefly to Igbo, a tonal system, but with discussion of other languages as well. In Haraguchi (1976), pitch accent systems in a number of Japanese dialects are treated autosegmentally. The analysis of pitch accent requires a small enrichment of the theory, the provision of a diacritic element star (*) that appears on a lexically-specified tone-bearing element and melodically-specified tonal element. Principles of association then provide that tonal and segmental starred elements must be matched in association, giving the starred syllable or mora a distinctive pitch. Typologically quite distinct tonal systems in Kikuyu (Clemente and Ford 1979) and Chinese languages (Yip 1980) and the

accentual systems of Indo-European (Halle and Kiparsky 1981 and Tonga (Goldsmith 1981) have all been analyzed autosegmentally.

Another extension of autosegmental theory is the area of melodic analysis of nontonal features (partly anticipated in work on complex segments like Anderson 1976). In Goldsmith (1976a, b) there is an autosegmental treatment of Guarani nasal harmony. Clements (1976, 1977, 1981) and, in a somewhat different mode, Vergnaud (1977, 1980) have developed excellent results in the autosegmental analysis of vowel harmony systems. The basic insight behind this work is that the harmonizing feature appears on a separate melodic tier from the segmental string. Vowels are then unspecified for the harmonizing feature, as illustrated in (14) with the Turkish form k⋊z⋉m⋊z 'our girl':

(14)   kIzImIz
          ＼／
        [+back]
        [-round]
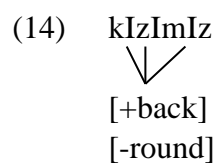
Arguments for this approach are numerous. The obligatory nature of vowel harmony follows from the well-formedness condition, since the vowel archisegments must be spelled out. The apparent action-at-a-distance in vowel harmony — its nonlocal effect — becomes strictly local when viewed as an autosegmental phenomenon. The existence of neutral and opaque segments, vowels that are exempt from harmony or that trigger it but do not undergo it, can also be derived from this theory. There exist cases of grammatically-controlled harmony, in which the melodic level functions as a kind of morpheme.

The most extreme version of autosegmental theory is that espoused in McCarthy (1979a, 1981) and in work by Halle and Vergnaud (1980), Harris (1980a), Marantz (1981), and Clements and Keyser (1980, 1981). This view holds that the segmental tier contains only information about the canonical pattern of a form, encoded as a string of C's and V's. All features for point and manner of articulation appear on a separate tier or tiers, as in the representation of Arabic kattab 'caused to write' in (15):

(15)   a
            ⌒
        [CVCCVC]
          ＼｜／
          k t b
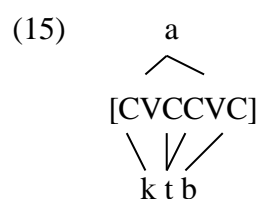
In particular, the representation of geminates in this system (such as t in (15)) is not unlike that proposed by Ingria (1979) and Leben (1980).

4. The Fusion of Metrical and Autosegmental Phonology
A somewhat controversial but interesting area of recent research is the delimitation of the boundaries between autosegmental and metrical analysis. In Halle and Vergnaud (1981, forthcoming) and many other works the position is taken that some version of the metrical formalism is appropriate for many phenomena that have been treated autosegmentally.

In the case of harmony processes, where the discussion has been most extensive, several sorts of arguments for metrical structure have emerged. Zubizarreta (1979) has argued that the

dependance of Andalusian Spanish vowel harmony on stress requires that the harmony domain be indentified with the metrical stress foot; thus, harmony takes place within a binary-branching structure. Hayes (1980) makes a similar claim for Eastern Cheremis. Sportiche (1977) argues from a cline effect, a reduction in degree of nasality with greater distance from a nasal harmony trigger, that Guaraní nasal harmony is represented by a metrical structure incorporating relative degrees of strength. In McCarthy (1979a) it is claimed that quantity-sensitive harmony in Tigre and Maltese requires metrical structure in parallelism to quantity-sensitive stress rules. And Steriade (1979) argues from a particular type of harmony-blocking segment in Khalkha Mongolian for a kind of amalgam of autosegmental and metrical theory.

Halle and Vergnaud (1981, forthcoming) develop these notions in considerable detail, reserving binary-branching metrical structure for directional harmony processes while retaining autosegmental n-ary trees for nondirectional or dominance systems. In a directional system like Turkish, the trigger is the most deeply-embedded peripheral element. Its value for the harmonizing features percolates through the tree, as illustrated in (16): (cf. (14)):

(16)   [+back]
        [-round]

   k⤝zImIz   k⤝zImIz   k⤝z⤝m⤝z

               percolation
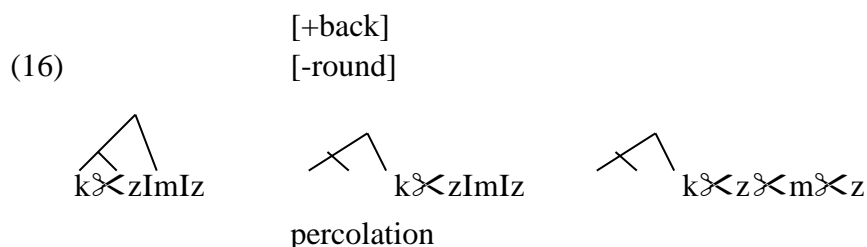
This theory, thee, establishes a major role for the directional/ dominant typological distinction.

Much has obviously been left unsaid here; in particular, the treatment of theories of syllabification and of tone is grossly incomplete. I have also neglected the interesting results obtained by Paul Kiparsky in unpublished work on lexical phonology, and I have scarcely touched on the issue of segmental quantity. Nonlinear phonology is already too large and changing too quickly for a fully adequate survey of this sort.

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