

Harry van der Hulst / Norval Smith (eds.)
THE STRUCTURE OF
PHONOLOGICAL REPRESENTATIONS
(Part I)

This volume contains ten original contributions dealing with non-segmental phonology.

Current research within the paradigm of generative phonology has revealed that the theory of phonological representations advocated in Noam Chomsky and Morris Halle's *Sound Pattern of English* is unsuited to deal with phenomena like tone, accent or syllable structure. Two complementary theories known as *Autosegmental* and *Metrical* phonology have been put forward.

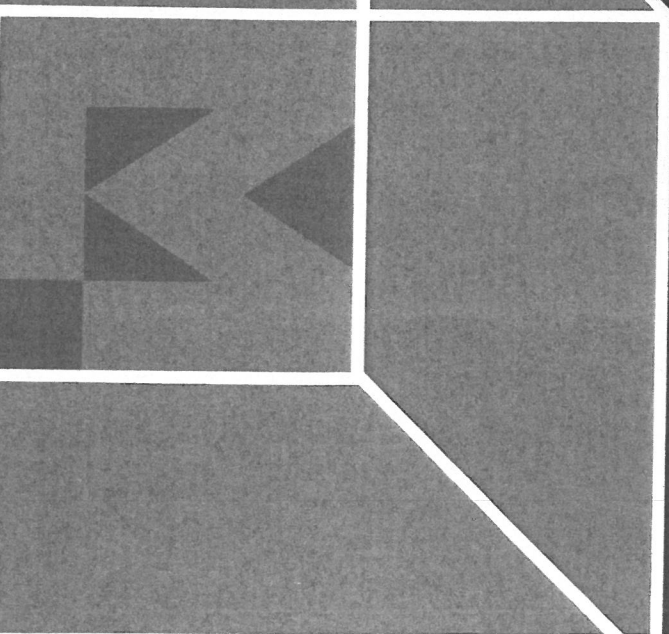
In this volume leading phonologists in both areas report on their work in progress: John Goldsmith, Morris Halle, Jean-Roger Vergnaud, Shosuke Haraguchi, Bruce Hayes, Larry Hyman, Paul Kiparsky, William Leben, John McCarthy, Marina Nespør and Irene Vogel. The editors have added an extensive overview of the field that will provide the necessary background.

Among the topics discussed are tone, accent, juncture, syllable structure, prosodic domains, vowel harmony, nonconcatenative morphology, nasality, etc.

Part II contains articles of equal quality by Stephen Anderson, Colin Ewen, Harry van der Hulst, Norval Smith, Steven Lapointe, Mark Feinstein, Roland Noske, Elisabeth Selkirk and Maria Luisa Zubizarreta. This second volume appears as *Linguistic Models 3*.

The structure of
phonological
representations
(Part I)

Harry van der Hulst
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On the Framework of Autosegmental Phonology *

Morris Halle and Jean Roger Vergnaud

M.I.T. and C.N.R.S., ERA 247

One of the most productive developments in phonology of the last decade has been the emergence of autosegmental phonology. The major insight lying at the base of autosegmental phonology is that the phonological representation is composed not of a single sequence of entities roughly resembling a line of type, but rather that the phonological representation is made up of several parallel sequences of entities, resembling thus more a score for a musical ensemble than a single line of type. This type of representation was, of course, not invented during the last decade. Multi-line phonological representations have standardly been used in notating the tonal characteristics of utterances, and in such representations the tones of an utterance have frequently been written on a separate line above the speech sounds that compose the utterance. However, it has usually been thought that much like the neumes used in the notation of the Gregorian chant or of the Massoretic text of the Hebrew bible the tones are diacritic features of the syllables or vowels. What has been novel in autosegmental phonology is that the tones of an utterance are not viewed as diacritics of vowels or syllables; rather the tones are viewed as constituting an autonomous sequence of entities, separate from and equal to the sequence of consonants and vowels that make up what we shall call here the phonemic core of the utterance.

Once the phonological representation is viewed as consisting of several independent sequences (or tiers) of entities — one sequence composed of tones, another of phonemes — there immediately arises the question as to how the entities on different tiers are synchronized, since ultimately the various tiers are actualized in a single acoustic signal emanating from the speaker's vocal tract. The precise statement of how entities on one tier are linked to those on another tier has, therefore, been an important topic in autosegmental phonology, and the fact of having focussed atten-

* The material in this study is to be included in a longer study *Three Dimensional Phonology* now in preparation. The authors are grateful to J. Goldsmith and P. Kiparsky for help and advice. This work was supported in part by the National Institutes of Mental Health Grant #5 PO1 MH13990-15.

tion on this issue is perhaps one of the most significant contributions to be credited to autosegmental phonology, for it is only when tones and phonemes are viewed as constituting autonomous sequences that the question of their synchronization can arise.

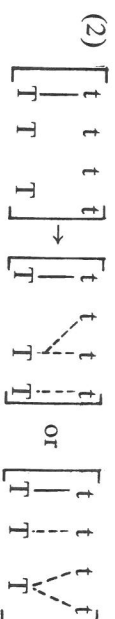
As one examines the different autosegmental studies that have appeared during the last decade there appear two rather different conceptions as to how autosegments on different tiers are to be linked. For reasons that are not altogether clear to us these quite fundamental differences have not previously been brought out in the open and debated, and we believe that this has affected negatively the progress that has been made in this area. We shall, therefore, state what we perceive to be the salient differences between the two approaches and then contrast the two approaches in order to bring out some of their respective advantages and drawbacks.

The most important difference between the two approaches concerns we believe the way in which the links between entities on different tiers are established. In one of the two approaches a critical role in establishing the links is played by the so-called Well Formedness Condition. As is well known, the Well Formedness Condition has been central in the studies of John Goldsmith. We have reproduced in (1) the Well Formedness Condition in the form it is given in Goldsmith's recent paper (February 1981) on Tonga:

- (1)
 - i. All tones must be associated with (at least) one syllabic element.
 - ii. All syllabic elements must be associated with (at least) one tone.
 - iii. Association lines do not cross.

Goldsmith explains that "the Well Formedness Condition functions not to rule out, or eliminate derivations which violate any of its conditions, but rather to add or delete association lines in order to maximally meet its specifications." In addition Goldsmith postulates the existence of a diacritic mark — the accent — which serves to synchronize the different autosegmental tiers. Specifically, in their lexical representations morphemes may have any number — including zero — of accented tone bearing phonemes (which, unless noted otherwise, will be taken to be vowels). Accented vowels are linked to specific (accented) tones on the tonal tier. Once the accented autosegments are linked, the Well Formedness Condition comes into play adding "association lines in order to maximally meet its specification."

It was pointed out by Clements and Ford (1979) that in certain cases the Well Formedness Condition can be satisfied in several ways as shown in (2).



Not all of these alternatives are made equal use of in the languages of the world. As remarked by Clements and Ford, it appears rather that in the languages that have been studied to this point the second alternative given in (2) is preferred. To deal with this fact Goldsmith supplements the Well Formedness Condition with a special tone linking rule that has the effect of associating tones and vowels one to one and from left to right.

In the approach that we want to contrast with that of Goldsmith, tone linking is accomplished by a similar left-to-right rule. But here the left-to-right rule produces the correct output without requiring recourse to the Well Formedness Condition or its equivalent. We find this approach in Williams' (1971) paper, in Haraguchi's (1977) book on Japanese, and in a number of other studies. Williams describes his Tone Mapping Rule, as follows (p. 469):

- (3)
 - i. It maps from left to right a sequence of tones onto a sequence of syllables.
 - ii. It assigns one tone per syllable, until it runs out of tones,
 - iii. then, it assigns the last tone that was specified to the remaining untoned syllables on the right, ...
 - iv. until it encounters the next syllable to the right belonging to a morpheme with specified tone.

It is obvious that the type of linkings established by this rule are rather different from those envisaged by the Well Formedness Condition. In particular, there is no requirement that each tone be linked to at least one vowel. While the last tone is normally linked to several vowels when the number of vowels exceeds the number of tones, the converse is not normally the case when the number of tones exceeds the number of vowels. Williams is quite specific on the fact that the linking of more than one tone to a given syllable is a marked phenomenon for which special provision must be made in the grammar of the language. He writes: "An idiosyncratic fact about the rule in Margi is that if there are two tones and only one syllable then both tones may be assigned to that syllable." To make this explicit we add to the Mapping Rule (3), the provision (3v)

- (3)
 - v. If the procedure above runs out of vowels (syllabic elements or syllables), more than one tone may be assigned to the last vowel only if the grammar of the language includes a stipulation to that effect.

Having established some differences between the two approaches we now attempt to find evidence which might decide between the two approaches. Consider first the facts in Etung in (4a), which are taken from Goldsmith's dissertation (1976; we reproduce here the 1979 version published by Garland Publishing, Inc.).

- (4) a.
- | | | | | | | | |
|------|----------|-------|-----------|--------|------------|--------|---------|
| kpá | 'first' | kpè | 'even' | nā | 'it is' | nò | 'how' |
| ńsé | 'father' | ègù | 'evening' | ódà | 'platform' | èkát | 'leg' |
| ékúé | 'forest' | èyùrì | 'dress' | ákpùgà | 'money' | bìsóné | 'spoon' |

As shown by the monosyllabic words in the first row, Etung is one of those languages which, like Margi, are subject to the special stipulation allowing two tones to be linked to a single vowel. The absence of contour tones in polysyllabic words is then accounted for by the fact that we are running out of vowels only in the case of monosyllabic words. Thus, it would seem that Etung has melodies consisting of at most two tones; consequently we run out of vowels to assign tones to only in monosyllables. This, however, cannot be the entire story, as shown by the examples in (4b)

- (4) b.
- | | | | | | | | |
|-------|---------|-------|--------|--------|--------|--------|--------|
| éròp | 'spear' | èbìn | 'farn' | ábò | 'they' | òbò | 'arm' |
| ésèbè | 'sand' | òròbé | 'beam' | édìmbá | 'pot' | ìnbùtá | 'rain' |

The trisyllabic forms in (4b) show that there are three-tone melodies in Etung; specifically HHL, LLH, HLH and LHL and since with melodies we run out of vowels in the case of bisyllabic words, we find — as predicted by (3iv) — contour tones on the second syllable, and we do not find the tone contours in (4c).

- (4) c. ábò òbò

There is still more to this story. We recall that unlike the Well Formedness Condition the Mapping Rule (3) does not require that each tone be linked to a vowel. The question may then be asked what happens to such tones that remain unlinked at the end of the derivation. The simplest assumption is that in (5).

- (5) Only tones linked to segments in the phonemic core are phonetically actualized.

Hence tones remaining unlinked cannot surface and forever remain in a phonetic limbo condemned never to see the bright daylight of phonetic reality. Condition (5) allows us to propose a very simple analysis of the Etung facts presented above. Note that we have encountered eight tone patterns on polysyllabic words; i.e., 2³ or precisely the number of all possible sequences of the two tones, High and Low, taken three at a time. Given the stipulation that Etung allows at most two tones to be linked to a single vowel the Mapping Rules (3) and Condition (5) directly account for the tonal contours of the monosyllabic words in (4a).

The situation is less straightforward if the Well Formedness Condition were to be applied here. In that case, the Well Formedness Condition would have to be supplemented by a special rule deleting all but the two leftmost tones linked to a single vowel; i.e., a rule of the form (6)



Since rule (6) is far from intuitive a solution without such a rule is to be preferred over one requiring this rule. Thus, the facts of Etung provide some evidence favoring the Mapping Rule over the Well Formedness Condition.

The intricate tonology of Tonga, a Bantu language spoken in Zambia has long attracted the attention of scholars, and much fascinating data on Tonga has been published by H. Carter (1962) (1971) (1972), Meussen (1963) McCawley (1973), and M. Cohen (1974). Goldsmith early recognized the importance of the Tonga facts. He discussed some of them in his dissertation and has recently devoted to them two articles, of which the second, published by the Indiana University Linguistics Club, is to be recommended especially because of the large body of data covered and the clarity of its exposition. Our remarks below are heavily influenced by Goldsmith's study.

Tonga has both accented and unaccented morphemes. There are several kinds of accented morphemes in the language. The simplest kind of accented morpheme illustrated in (6a) has a single accented vowel. The accented vowel always has a Low tone and all preceding vowels have High tones. We follow Goldsmith in postulating that each accented vowel is supplied with the melody High-Low of which the Low tone is linked to the accented vowel whereas the High tone is unassociated as shown in (7a)

- (7)a. í — bú — s í * "smoke" í — mú — s ìnè * "ox"
- | | | | | | | | |
|---|---|--|--|--|--|---|---|
| H | L | | | | | H | L |
| | | | | | | | |

As illustrated in (7a) unaccented morphemes — as expected — have no inherent tone. As a result the H tone of the accented morpheme spreads on to these morphemes.

Tonga also has morphemes with several accented syllables. As illustrated in (7b) these are readily dealt with in the same way as morphemes with a single accented vowel.

- (7) b.
- | | | | | | |
|-----------------------|---------------|---------------------|----------------|----------------------|--------------|
| *
tòmbéià
HL HL | *
‘lizard’ | *
škùbè
HL HL | *
‘vulture’ | *
àcísyà
HL HL | *
‘uncle’ |
|-----------------------|---------------|---------------------|----------------|----------------------|--------------|

If we adopt the Mapping Rule (3) nothing further needs to be said since Tonga is one of the many tone languages that does not admit contour tones. Formally this means that in the grammar of Tonga there is no special stipulation allowing us to link more than one tone to a given vowel. In view of this the word initial H tone in (7b) cannot be linked to any vowel and, pursuant to (5) above, does not surface. The solution is not quite as simple if the Well Formedness Condition is employed. We have reproduced in (7c) the passage from Goldsmith’s paper (1981, p.7) dealing with the multiple accent words above.

- (7) c. (15)
-

By the Well-Formedness Condition (2), the initial H will be associated with the first vowel of the word, even in a case like (15), thus producing in effect a falling tone. The surface L tone is the effect of the tone-simplification rule (16), which simplifies HL to L (compare with (11b)).

- (16)
-

We note that because of the way the Well Formedness Condition operates, a special tone-simplification rule (rule (16) in the passage quoted in (7c)) is required. No such rule is required if the Tone Mapping Rule (3) is employed.

This brings us to words consisting exclusively of unaccented morphemes which are illustrated in (7d)

- (7)d. i – bù – sù ‘flour’ i – mù – ntù ‘person’
i – bà – sànkwà ‘men’

The obvious way to deal with such words is to assign to them no tone whatever — for as we have already seen in (7a), this gives the correct results in the case of unaccented prefixes. The problem with this solution is that we would then have no way of accounting for the fact that accentless words are composed exclusively of Low tones. Since no tones are linked to the vowels in these words it would seem that our theory predicts that such words should be toneless.

Faced with this dilemma we have two options. Our first option is to add some rules to the description of Tonga so as to insure that a Low tone will be linked to all vowels in unaccented words. This is the procedure followed by Goldsmith in the passage reproduced in (7e) which directly follows the material quoted in (7c):

- (7) e. Rule (16), independently needed, suggests an analysis for Class C, the unaccented class of stems, as Bill Poser has pointed out to me. As has been noted both in Slavic and Japanese accentual systems, a rule of recessive accent placement may place an accent on the initial vowel of an otherwise unaccented word, as in (17).

- (17)
- $$V \rightarrow V^* / \# \# C \text{ — } X \# \# \quad \text{Cond: } X \neq \dots V \dots$$

This rule will apply to (Class C) unaccented forms, then, as in (18).

- (18) a. i + bù + sù → b. i + bù + sù
H L

- c. i + bù + sù → d. i + bù + sù
H L

- ∅ (16)

We conclude this survey of the basic nominal types by noting that the basic tone melody is HL, but that all words are accented, either by the accent or accents contributed by their component morphemes (stems, in the cases considered so far), or by the recessive accent rule (17).

While this solution produces the correct output, it is not altogether unproblematic, for it leads to the rather strange conclusion that "all words are accented", even though we know that some words are not accented. There is thus reason to explore another alternative.

The alternative solution starts out by questioning the implication of the theory as developed to this point that vowels — or tone bearing phonemes — which are not linked to an autosegmental tone should surface as toneless. This implication presupposes that if a feature is specified on an autosegmental tier, it may not also be specified in the phonemic core. This proposition is surely the one to be adopted in view of Occam's razor, which enjoins us not to multiply entities without necessity. We note, however, that Occam's razor does not prevent us from multiplying entities when this is made necessary by the facts. In the present instance we believe that we can indeed justify such a multiplication of entities. We, therefore, postulate condition (8)

- (8) The fact that a feature is specified on a separate autosegmental tier does not preclude it from also being specified in the phonemic core. Whenever a given phoneme is linked to an autosegment, the autosegmental feature specification supersedes the specification in the core.

We shall assume that in Tonga all vowels are redundantly specified in the phonemic core as being [+Low tone]. At the present time we do not know whether this can be made a universal principle; i.e., whether all vowels in all languages must be redundantly specified as [+Low tone]. If so, then nothing further needs to be said about accentless words in Tonga. If the redundant assignment of Low tone to vowels is not universal, a redundancy rule to this effect will have to be added to the grammar of Tonga.

The preceding has an interesting consequence for the treatment of Tonga words with nonfinal accents. As shown in (9a) in such words the vowels following the last accented vowel have Low tone.

- (9) a. $\acute{a} - \acute{c}i - \grave{t}o\grave{n}g\grave{a}$ "the Tonga language"
- $\acute{b}\acute{a} - \acute{s}i\grave{l}u\grave{w}\acute{e}$ "leopards"

We now have two ways of achieving this result. We can either allow the linked Low tone to spread to the right. Alternatively, we can assume that the Low tone on postaccentual vowels is the redundantly specified tone that was discussed above.

We would like to propose that the latter rather than the former is the correct resolution, and to implement this proposal formally we suggest that the Tone Mapping Rules (3) are subject to the restriction:

- (9) b. The Tone Mapping Rules (3) apply only to floating (= unlinked) tones.

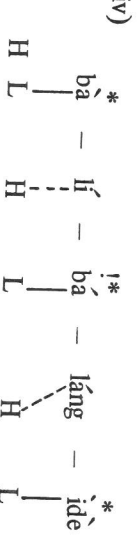
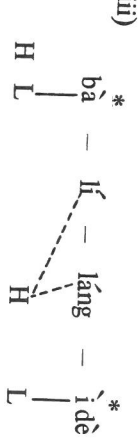
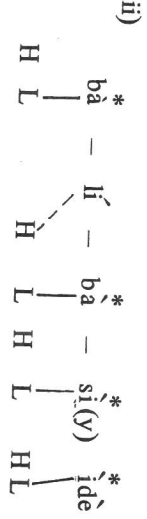
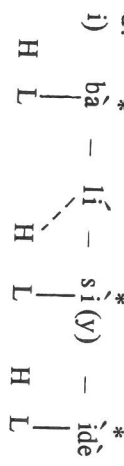
Given condition (9b) the Low tones on the postaccentual vowels in (9a) can only be redundantly specified since the linked Low tone cannot spread to these vowels.

We must now justify this restriction, and Tonga provides crucial evidence. It was observed by Meussen that all morphemes of the language can be divided into two classes "according to whether . . . they are constantly low (or lowered high [i.e. downstepped H]) or not." He next proposes to mark the former class of elements and leave the latter class unmarked. He then observes that

- (9) c. "unmarked" elements are high between "marked" elements (Meussen 1963, p. 73)

It is important to observe that (9c) is not a rule in our sense; it is rather an observationally correct statement about tonal contours of Tonga words, which falls out as a consequence of the rules and principles that we have developed to this point. To see this consider the forms illustrated in (9d)

- (9) d.



(from Meussen p. 73).

These forms consist of the verbal stems /siy/ "leave" and /lang/ "look for", the word initial prefix /ba/ "they", the word medial prefixes /ba/ "them" and /h/, which has affirmative meaning, and the suffix /ide/ which signals the perfective aspect. We observe that (with the exception of the last form) once the melodies are assigned to the accented morphemes the tonal contours of the words are derived by the Tone Mapping Rule (3).

Given the rules developed to this point the last form in (9d) should surface with the tone contour LHLHL, whereas its actual contour is LH:HL. It has been observed by Goldsmith (p. 5) that when a prefix is attached to the stems in (7b) their tone contours are modified as shown in (9e)

(9) e.



As Goldsmith notes in Tonga, as in many other tone languages, the downstepped High tone is the standard implementation of a High tone immediately preceded by a floating Low tone. There is no difficulty in the present instance to account for the presence of a Low tone in the required position, for the underlying representations of the forms in (9e) are

(9) f.



All that we need, as Goldsmith has already shown, is a rule that links the (9) High tone to the left vowel if preceded by two vowels, linked respectively to a High and Low tone as given in (9g)



In view of the fact that in Tonga multiple associations of tones with a single vowel are not admitted, we shall assume that an automatic side effect of the rule is to float the Low tone, thereby triggering downstep in the High tone on the right. (We provide further justification for this assumption in the discussion of condition (12d) below). It is obvious that the Downstep Rule (9g) accounts for the deviant tone contour of the last

example in (9d). As noted above, all other facts in (9d) directly follow from the underlying representation, the Mapping Rule (3) and other conventions developed here.

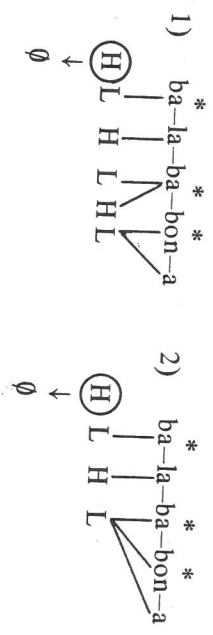
This straightforward and therefore desirable result cannot be obtained by the Well Formedness Condition as simply. To produce it the Condition must be supplemented by additional rules. In discussing forms with conservative accented morphemes such as the present indicative

(9) h.



which correspond tonally to the example (9d-ii) Goldsmith remarks (p. 14) that the string in (9h) would produce the tone contour in (9i-1) with a rising tone on the second /ba/ and that the correct tone contour with Low tone on the /ba/ would require the string in (9i-2):

(9) i.



In order to obtain the required string Goldsmith postulates that a special rule applies which deletes all but the first of several accents appearing on consecutive vowels. This rule, which is referred to as Meussen's rule, is reproduced in (9j)

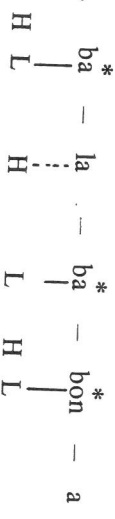
(9) j.



Since Meussen's Rule "must apply before the insertion of the basic tone melodies," the required string (9i-2) is derived from (9h). [It will have been observed that in (9i) the word initial H-tone is deleted. We discuss this deletion directly below, see rule (11c).]

We note that if instead of the Well Formedness Condition the Tone Mapping Rule (3) is applied to the underlying string (9h) the correct tone contour is produced without recourse to any additional rules or principles.

(9) k.



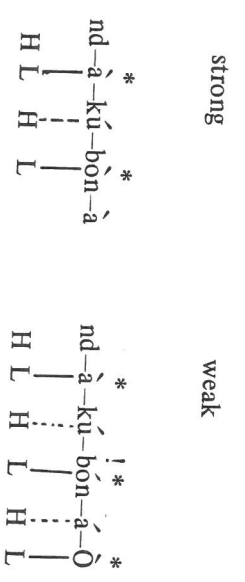
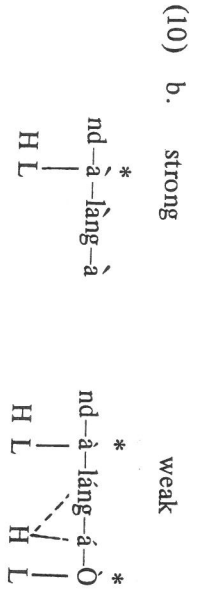
We conclude, therefore, that the application of Meussen's Rule in the derivation of this form is yet another example where the Well Formedness Condition generates incorrect outputs which must be fixed up by other rules.

The present instance, however, differs somewhat from the examples of misgeneration discussed above. Whereas in the above example the grammar had to be complicated by the addition of an otherwise unnecessary rule (cf. (6) (7c) and (7e)), Meussen's Rule (9j) is a fully motivated rule of Tonga phonology. It functions, however, not in all words but only in weak forms of the verb about which a few words need to be said here. Each Tonga verb can appear either in a "strong" form or in a "weak" form. The weak form induces an accent on the first (or only) syllable of an immediately following nominal or particle, with which it stands in a close syntactic relation. Thus, a verb like *tola* "take" can appear in either of the two forms (10a):

- (10a. i) ndà-ká-tòlá nyàmà "I TOOK meat" (strong)
- ii) ndà-ká-tólá nyàmà "I took MEAT" (weak)

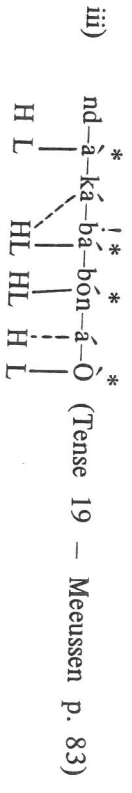
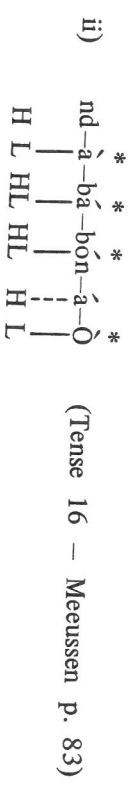
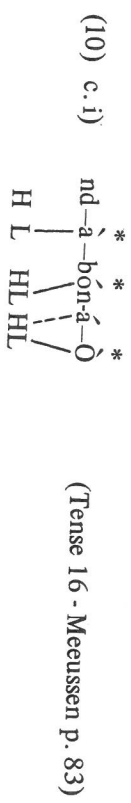
As the translations indicate, the two forms have different interpretations. In (10ai), the focus is on the verb, whereas in (10aii) the focus is on the complement of the verb. Carter notes that "the strong series require no support and may stand at the end of an utterance; the weak series require the support of a following item, usually nominal or particle." The fact that the weak form cannot be final is implicit in the phonological characterization given above, which places an accent on the following syllable. The formation of a weak form might be viewed as a sort of cliticization.

As shown in (10b) the effect of this process is as predicted by the rules developed to this point. Since each accented vowel is linked to the melody High-Low the High tone, which is floating, is spread to the unlinked vowels at the end of the verbal form, which in the strong forms surface with Low tone. We illustrate this in (10b) where the letter O represents the accented syllable of the following word; the word initial prefix represents the 1sg.subject "I". [The prefix which has the underlying form /ndi/ loses its vowel if followed by a vowel; see (12a) below.]

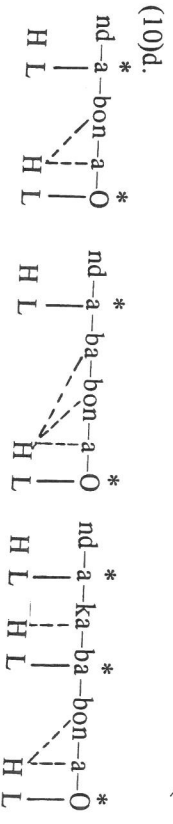


(Examples from Meussen p. 82, 83 - Tenses 15, 16)

It will be noted that in the last form of (10b) a downstepped H tone appears on the stem vowel *bon* in place of the L tone which is linked to it by the Mapping Rule. This is, of course, to be expected since the string produced by the Tone Mapping Rule undergoes the Downstep Rule (9g). Not all weak forms of the Tonga verb are derived as straight-forwardly. We illustrate some problematical forms in (10c)



As shown above, the Mapping Rule produces incorrect outputs in all these examples. In particular it assigns a Low tone to the stem *bon* in (10c-i) instead of the attested High tone; and in (10c-ii,iii) it makes incorrect tone assignments both to the stem *bon* and to the object prefix *ba*. These incorrect tone assignments will not arise if Meussen's Rule (9j) is applied to these forms, for then the stem *bon* will lose its accent in all forms, as will the object prefix *ba* in (10cii), yielding the representations in (10d)



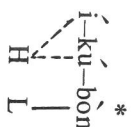
In the first two examples nothing further needs to be said; in the third example the Downstep rule (9g) will apply yielding the tone contour shown in (10c-iii).

The application of Meussen's Rule in the weak forms is natural, since accent loss commonly accompanies cliticization of one form onto another. Accordingly, it is to be expected that Meussen's Rule would not apply to the strong forms. And indeed, as we have seen above, Meussen's Rule was not needed in the generation of the correct contour of any strong form of the verb.

We now shall attempt to show that when applied to strong forms in the way in which phonological rules are normally applied, Meussen's Rule produces incorrect results whenever there are more than two consecutive accented vowels. Examples of this kind have led Goldsmith to propose conditions on rule application of a very unorthodox kind. As the facts involved are of some complexity, they require a brief digression into certain other aspects of Tonga tonology.

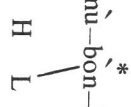
As we have seen above in (9d), like nominal stems, verbal stems may be accented or unaccented, and this leads to surface contrasts such as those in the infinitive forms in (11a)

- (11) a. \dot{i} -kù-làng-à "to look for" \dot{i} -kù-bòn-à "to see"



In finite forms of the verb, however, the tonal contrast is neutralized as shown in (11b)

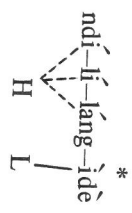
- (11) b. tù-mù-làng-à "we look for" tù-mù-bòn-à "we see"



To obtain the correct output in such cases we follow Goldsmith in postulating a rule which deletes the first H tonal autosegment in finite verbal forms

(11) c. H → ∅ / Vb _____

It might be noted here parenthetically that H-Tone Deletion (11c) applies also in the derivations of the forms in (9d), but this has no effect on the output. Moreover, in finite verbal forms with accented suffix, rule (11c) does not apply; e.g., it fails to apply in the 1.sg. pres. perf. ind. aff. forms



which otherwise would have surfaced with a uniformly Low tone contour. Neither of these facts, however, affects anything that is at issue here. Consider now the strong forms of the recent past of which a few are given in (12a) with the surface representation on the left and the underlying representation on the right.

(12) a.

- nd-à-bá-bòn-à ndi-à-ba-bon-a "I saw them"

- nd-à-bá-làng-à ndi-à-ba-lang-a "I looked for them"

- w-á-bà-bòn-à u-à-ba-bon-a "he/she saw them"

- w-á-bà-làng-à u-à-ba-lang-a "he/she looked for them"

It is immediately obvious that the subject prefixes /ndi/ "I" and /u/ "he/she" undergo phonetic changes in position before the vowel: /ndi/ loses its vowel and /u/ becomes a glide prevocally. We shall assume that this is the result of two separate rules: Vowel Deletion and Glide Formation. If we now make the plausible assumption that these two rules and H-Tone Deletion (11c) apply to the forms in (11a) we get the representations in (12b)

however, can be achieved only if the Well Formedness Condition is replaced by the Tone Mapping Rules (3) and other conventions presented here.

References

- Allen, M.R. (1978), *Morphological Investigations*. Doctoral Dissertation. University of Connecticut.
- Al-Mozainy, H. (1981), *Vowel Alternations in a Bedouin Hijazi Arabic Dialect: Abstractness and Stress*. Doctoral Dissertation. University of Texas, Austin.
- Anderson, S.R. (1976), Nasal consonants and the internal structure of segments. *Language* 52, 326–344.
- Anderson, S.R. (1978), Syllables, Segments and the Northwest Caucasian Languages. In: *Bell & Hooper (eds.)*, 47–59.
- Anderson, S.R. (1979), On the Subsequent Development of the 'Standard Theory'. In: *Dimssen (ed.)*, 2–31.
- Anderson, S.R. (1980), Problems and perspectives in the description of vowel harmony. In: *R. Vago (ed.)*, 1–49.
- Arekambe, D. (1972), Aspects of the phonology of Gokana. Long Essay. University of Ibadan, Nigeria.
- Aronoff, M. (1976), *Word Formation in Generative Grammar*. Linguistic Inquiry Monograph, 1. Cambridge, Mass., M.I.T. Press.
- Asinyirimba, J.O. (1972), The phonology of Gokana. Long Essay. University of Ibadan, Nigeria.
- Barratt, L. (1981), Prenasalized Stops in Guarani. Where the Autosegment Falls. *Linguistic Analysis* 7, 187–202.
- Battistella, E. (1979), Igbo Vowel Harmony. *Cunyform papers in Linguistics* 5–6, 108–124.
- Becker, L. and D. Massamba (1980), Ci-Ruri Tonology (A Preliminary View). *Studies in the Linguistic Sciences*. Urbana, Illinois.
- Bell, A. and J.B. Hooper (eds.) (1978), *Syllables and Segments*. Amsterdam.
- Bendor-Samuel, J.T. (1960), Some problems of segmentation in the phonological analysis of Terena. *Word* 16, 348–355.
- Benjamin, G. (1976), An Outline of Temar Grammar. In: *P. Jenner et al. (eds.)*, Part I.
- Bennis, A. and A. Groos (1980), The government-binding theory: an overview. *GLOW Newsletter*. Foris Publications, Dordrecht.
- Bing, J.M. (1979), *Aspects of English Intonation*. Doctoral dissertation Amherst: University of Massachusetts.
- Bing, J.M. (1980), Linguistic rhythm and grammatical structure in Afghan Persian. *Linguistic Inquiry* 11:3, 437–63.
- Booij, G. (1981), Rule Ordering, Rule Application, and the Organization of Grammars. In: W. Dressler (ed.), *Phonologica 1980* (Proceedings of the 4th International Phonology Meeting).
- Brame, M. (1974), The Cycle in Phonology: Stress in Palestinian, Maltese, and Spanish. *Linguistic Inquiry* 5, 39–60.
- Broselow, E. (1979), Cairene Syllable Structure. *Linguistic Analysis* 5, 345–82.
- Brosnahan, L.F. (1960), A word list of the Gokana dialect of Ogoni. *Journal of West African Languages* 1, 43–52.
- Brosnahan, L.F. (1964), Outlines of the phonology of the Gokana dialect of Ogoni. *Journal of West African Languages* 4, 43–48.
- Camilli, A. (1941), I rafforzamenti iniziali. *Lingua Nostra* 3, 170–174.
- Carlson, G. and T. Roeper (1980), Morphology and subcategorization: Case and the unmarked complex verb. In: *Hoeksra, Van der Hulst and Moortgat (eds.)*, 123–165.

- Carrier, J. (1979), *The Interaction of Phonological and Morphological Rules in Tagalog: A Study in the Relationship between Rule Components in Grammar*. Doctoral dissertation. Cambridge, Mass., M.I.T.
- Carter, H. (1962), *Notes on the Tonal System of Northern Rhodesian Plateau Tonga*. London: Her Majesty's Stationery Office.
- Carter, H. (1971), Morphotonology of Zambian Tonga: Some Developments of Meussen's System - I. *African Language Studies* 12.
- Carter, H. (1972), Morphotonology of Zambian Tonga: Some Developments of Meussen's System - II. *African Language Studies* 13.
- Carstairs, A. (1981), *Constraints on Allomorphy in Inflection*. Ph.D. dissertation. University of London.
- Chen, M.Y. (1979), Metrical structure: Evidence from Chinese poetry. *Linguistic Inquiry* 10:3, 371-420.
- Chinchor, N. (1979), On the treatment of Mongolian Vowel Harmony. *Cunyform Papers in Linguistics* 5-6, 171-187.
- Chomsky, N. (1955), *The Logical Structure of Linguistic Theory*. [publ. in 1975 New York: Plenum Press].
- Chomsky, N. (1965), *Aspects of the Theory of Syntax*. Cambridge, Mass. MIT Press.
- Chomsky, N. (1970), Remarks on Nominalization. In: R.A. Jacobs and P.S. Rosenbaum (eds.), *Readings in English Transformational Grammar*. Waltham, Mass.: Ginn & Co., 184-221.
- Chomsky, N. (1975), *Reflections on Language*. New York: Pantheon.
- Chomsky, N. (1980), *Rules and Representations*. New York, Columbia University Press.
- Chomsky, N. and M. Halle (1968), *The Sound Pattern of English*. New York: Harper and Row.
- Clark, E. and H. Clark (1979), When Nouns Surface as Verbs. *Language* 55, 767-811.
- Clark, M. (1979), *A Dynamic Treatment of Tone with Special Attention to the Tonal System of Igbo*. Ph.D. dissertation, University of Massachusetts at Amherst. [Distributed by the Indiana University Linguistics Club.]
- Clements, G.N. (1976), Vowel harmony in nonlinear generative phonology: An autosegmental model. [Later published by *Indiana University Linguistics Club*, 1980.]
- Clements, G.N. (1976a), The Autosegmental treatment of Vowel Harmony. In: W.U. Dressler and O.E. Pfeiffer (eds.), *Phonologica 1976*, Innsbruck.
- Clements, G.N. (1977), Tone and Syntax in Ewe. In: Clements, G.N. (ed.), *Harvard Studies in Phonology* Vol. 1, 75-186.
- Clements, G.N. (1977a), Neutral Vowels in Hungarian Vowel Harmony: An Autosegmental Interpretation. *North Eastern Linguistic Society* 7, 49-64.
- Clements, G.N. (1978), Tone and Syntax in Ewe. In: D.J. Napoli (ed.), *Elements of Tone, Stress and Intonation*. Georgetown University Press, 21-99.
- Clements, G.N. (1979), Review article of Elmiech, A tonal Grammar of Etsako. *Journal of African Languages and Linguistics* 1, 95-108.
- Clements, G.N. (1981), Akan vowel harmony: a non-linear analysis. In: G.N. Clements (ed.), *Harvard Studies in Phonology* Vol. II, 108-177.
- Clements, G.N. (1981a), The hierarchical representation of tone. G.N. Clements (ed.), *Harvard Studies in Phonology* Vol. II, 50-108.
- Clements, G.N. (1982), Principles of Tone Assignment in Kikuyu. In: *Clements and Goldsmith (eds.)*.
- Clements, G.N. and K. Ford (1979), Kikuyu Tone Shift and its Synchronic Consequences. *Linguistic Inquiry* 10, 179-210.

- Clements, G.N. and J. Goldsmith (eds.) (1982), *Autosegmental Studies in Bantu Tonology*. Fortis Press.
- Clements, G.N. and J. Keyser (1981), A Three-Tiered Theory of the Syllable. *Center for Cognitive Science Occasional Papers* #19.
- Cohen, M. (1974), Topics in Tonga Tone. Unpublished paper. Department of Linguistics, Cambridge, MA., MIT.
- Conklin, H. (1956), Tagalog Speech Disguise. *Language* 32, 136-139.
- Conklin, H. (1959), Linguistic Play in its Cultural Context. *Language* 35, 631-636.
- Cooper, W.E. (1976), *Syntactic Control of Timing in Speech Production*. Ph.D. dissertation, MIT.
- De Chene B. and S. Anderson (1979), Compensatory Lengthening. *Language* 55, 505-536.
- Difloth, G. (1976), Minor-syllable Vocalism in Senoic Languages In: *P. Jenner et al. (eds.)*, Part I.
- Dimssen, D. (ed.), (1979), *Current Approaches to Phonological Theory*. Bloomington.
- Dixon, R.M.W. (1977a), Some Phonological Rules of Yidiñ. *Linguistic Inquiry* 8, 1-34.
- Dixon, R.M.W. (1977b), *A Grammar of Yidiñ*. Cambridge University Press, Cambridge, England.
- Donegan, P. and D. Stampe (1979), The Study of Natural Phonology. In: *Dimssen (ed.)*, 126-174.
- Ekundare, J.F. (1972), Gokana phonological system. Long Essay. University of Ibadan, Nigeria.
- Elmiech, B. (1976), A Tonal Grammar of Etsako. *UCLA Working Papers in Phonetics* 35.
- Emeneau, M. (1967), Echo-words in Toda. In: *Collected Papers*. Annamalai University, Annamalaiagar.
- Emonds, J. (1980), Word Order in Generative Grammar. *Journal of Linguistic Research* 1, 33-54.
- Esau, H. (1973), *Nominalization and Complementation in Modern German*. Amsterdam/London: North Holland.
- Ewen, C. (1980), *Aspects of Phonological Structure with Particular Reference to English and Dutch*. Ph.D. University of Edinburgh.
- Fiorelli, P. (1958), Del raddoppiamento da parola a parola. *Lingua Nostra* 19, 122-127.
- Freidin, R. (1978), Cyclicity and the Theory of Grammar. *Linguistic Inquiry* 9, 519-549.
- Fudge, E. (1969), Syllables. *Journal of Linguistics* 5, 253-87.
- Fujimura, O. (ed.) (1973), *Three Dimensions in Linguistic Theory*. Tokyo, TEC.
- Fujimura, O. (1979), An Analysis of English Syllables as Cores and Affixes. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung*.
- Fujimura, O. and J. Lovins (1978), Syllables as Concatenative Units. In: *A. Bell and J.B. Hooper (eds.)*, 107-121.
- García-Bellido, P. (1980), Titled vs. Flapped /r/: Some remarks on the syllable structure of Spanish. *North Eastern Linguistic Society* 10, 109-25.
- Gianelli, L. and L.M. Savoia (1979), L'indebolimento consonantico in Toscana. *Rivista Italiana di Dialettologia*, 23-58.
- Goldsmith, J. (1974), English as a Tone Language. Ms., MIT [Later published in *Communication and Cognition* 1977, and *Phonology in the 1980's*, ed. by D. Goyvaerts.]

Goldsmith, J. (1976), Autosegmental Phonology. *Indiana University Linguistics Club*. [Published by Garland Press, 1979.]

Goldsmith, J. (1976a), An overview of autosegmental phonology. *Linguistic Analysis* 2, 23-68.

Goldsmith, J.A. (1976b), Tone melodies and the autosegment. In: R.K. Herbert (ed.), *Proceedings of the Sixth Conference on African Linguistics*. (Ohio State University Working Papers in Linguistics, no. 20) 135-147.

Goldsmith, J. (1979), The Aims of Autosegmental Phonology. In: *Dinnsen (eds.)*, 202-23.

Goldsmith, J. (1981), Towards an Autosegmental Theory of Accent: The Case of Tonga. *Indiana University Linguistics Club*, 1981.

Goldsmith, J. (1981a), English as a Tone Language. In: D. Goyvaerts (ed.), *Phonology in the 1980's*. Gent 1981.

Goldsmith, J. (1982), Accent in Tonga. In: *Clements and Goldsmith (eds.)*.

Goldsmith, J. In preparation. The Ki-Langi Verb.

Grafii, G. (1980), Universali di Greenberg e grammatica generativa. *Lingua e Stile* XV.3, 371-390.

Green, M. and G. Igwe. (1963), *A Descriptive Grammar of Igbo*. Oxford University Press.

Hale, K. (1981), On the position of Walbiri in a typology of the base. *Indiana University Linguistics Club*.

Halle, M. (1959), *The Sound Pattern of Russian*. The Hague: Mouton.

Halle, M. (1978), Formal vs. Functional Considerations in Phonology. *Indiana University Linguistics Club*.

Halle, M. (1980), Colloquium at University of Southern California.

Halle, M. and J.R. Vergnaud (1978), Metrical Structures in Phonology. Unpublished ms. MIT.

Halle, M. and J.R. Vergnaud (1980), Three Dimensional Phonology. *Journal of Linguistic Research* 1, 83-105.

Halle, M. and J.R. Vergnaud (1981), Harmony Processes. In: W. Klein and W. Levelt (eds.), *Crossing the Boundaries in Linguistics*. Dordrecht: Reidel, 1-23.

Haraguchi, S. (1977), *The Tone Pattern of Japanese: An autosegmental theory of tonology*. Tokyo: Kaitakusha.

Haraguchi, S. (1977a), Seisei oninon no dookoo. *Eigogaku* (English Linguistics) 16, 2-36.

Haraguchi, S. (1978), Remarks on the metrical treatment of <-ory>. *Eigogaku* (English Linguistics) 19, 2-13.

Haraguchi, S., Hirose, Y., Mikami, S., Seki, S., Takezawa, K. and Tabata, T. (1980), Inritsu riron no chooboo (An overview of metrical theory). *Eigogaku* (English Linguistics) 23, 2-39.

Harris, J. (1969), *Spanish Phonology*. Cambridge, Mass., MIT Press.

Harris, J. (1980), Nonconcatenative Morphology and Spanish Plurals. *Journal of Linguistic Research* 1, 15-31.

Harris, J. (M.S.), Spanish Syllable Structure. To appear in a volume in M.I.T. Press.

Hayes, B. (1980), Aklan stress: Disjunctive ordering or metrical feet? *North East Linguistic Society* 10, 179-89.

Hayes, B. (1981), A Metrical Theory of Stress Rules. Unpublished 1980 Doctoral dissertation, MIT, Cambridge, Mass., Revised version distributed by the Indiana University Linguistics Club, Bloomington, Indiana.

Hockett, C.F. (1955), A Manual of Phonology. *International Journal of American Linguistics* 21, No. 4, Part I. Baltimore: Waverly Press.

Hoekstra, T., H. van der Hulst and M. Moortgat (1980), *Lexical Grammar*. Dordrecht.

Hooper, J. (1976), *An Introduction to Natural Generative Phonology*. New York: Academic Press.

Howard, I. (1975), Can the 'Elsewhere Condition' Get Anywhere?. *Language* 51, 109-127.

Huang, C.-T.J. (1980), The metrical structure of terraced-level tones. *North East Linguistic Society* 10, 257-70.

Hyman, L.M. (1972), Nasals and nasalization in Kwa. *Studies in African Linguistics* 3, 167-205.

Hyman, L. (1977), On the Nature of Linguistic Stress. In: L. Hyman (ed.), *Studies in Stress and Accent*. Scopol 4.

Hyman, L.M. (1978), Historical tonology. In: V. Fromkin (ed.), *Tone: A Linguistic Survey*. Academic Press.

Hyman, L. (1981), The Accentual Treatment of Tone in Eastern Bantu. Paper read at the 1981 Conference on African Linguistics, Stanford, California.

Hyman, M. (In preparation) The representation of length in Gokana.

Hyman, L.M. and R.G. Schuh. (1974), Universals of tone rules: Evidence from West Africa. *Linguistic Inquiry* 5, 81-115.

Hyman, L.M. and B. Commie. (1981), Logophoric reference in Gokana. *Journal of African Languages and Linguistics* 3, 1.

Ingria, R. (1980), Compensatory lengthening as a metrical phenomenon. *Linguistic Inquiry* 11, 465-495.

Jaeggli, O.A. (1980), Remarks on To Contraction. *Linguistic Inquiry*, 11, 239-245.

Janner, P., L. Thompson and S. Starosta (eds.) (1976), *Austroasiatic Studies*. Parts I and II, University Press of Hawaii, Honolulu.

Jensen, J.T. (1980), The metrical structure of Swedish accent. *North East Linguistic Society* 10, 371-82.

Kahn, D. (1976), *Syllable-Based Generalizations in English Phonology*. M.I.T. dissertation, reproduced by Indiana University Linguistics Club.

Kaye, J.D. (1971), Nasal harmony in Desano. *Linguistic Inquiry* 2, 37-56.

Kaye, J. (1974), Morpheme Structure Conditions Live! *Montreal Working Papers in Linguistics* 3, 55-62.

Kean, M.-L. (1974), The Strict Cycle in Phonology. *Linguistic Inquiry* 5, 179-203.

Kenstowicz, M. and Ch. Kisseberth (1977), *Topics in Phonological Theory*. New York: Academic Press.

Kiparsky, P. (1968), Linguistic Universals and Linguistic Change. In: E. Bach and R. Harms (eds.), *Universals in Linguistic Theory*. New York: Holt, 171-202.

Kiparsky, P. (1968 = 1973), How Abstract is Phonology? *Indiana University Linguistics Club*. Also in Fujimura (1973).

Kiparsky, P. (1973), Abstractness, opacity, and global rules. In: *Fujimura (1973)*, 57-86.

Kiparsky, P. (1973a), Elsewhere in Phonology. In: Kiparsky, P. and S. Anderson (eds.), *Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston.

Kiparsky, P. (1977), The rhythmic structure of English verse. *Linguistic Inquiry* 8, 189-247.

Kiparsky, P. (1979), Metrical Structure Assignment is Cyclic. *Linguistic Inquiry* 10, 421-442.

Kiparsky, P. (1981), Remarks on the Metrical Structure of the Syllable. In: W. Dressler (ed.), *Phonologica 1980*. (Proceedings of the Fourth International Phonology Meeting).

Kiparsky, P. and C. Kiparsky (1971), Fact. In: D.D. Steinberg and Leon A. Jakobovits (eds.), *Semantics*. Cambridge: University Press.

- Kirshenblatt-Gimblett, B. (ed.) (1976), *Speech Play*. University of Pennsylvania Press, Philadelphia.
- Kisseberth, Ch. (1970), On the Functional Unity of Phonological Rules. *Linguistic Inquiry* 3, 3-33.
- Koutsoudas, A., G. Sanders and C. Noll (1974), On the Application of Phonological Rules. *Language* 50, 1-28.
- Ladd, D. Jr. (1980), *The Structure of Intonational Meaning*. Bloomington: Indiana University Press.
- Laughren, M. (1982), An Autosegmental Account of Tone in Zulu. In: *Clements and Goldsmith (eds.)*.
- Leben, W. (1971), Suprasegmental and segmental representation of tone. *Studies in Afr. Ling. Suppl.* 2, 183-200.
- Leben, W. (1973), Suprasegmental Phonology. *Indiana University Linguistics Club*.
- Leben, W. (1978), The representation of tone. In: V. Fromkin (ed.), *Tone: A Linguistic Survey*. Academic Press.
- Leben, W. (1980), A metrical analysis of length. *Linguistic Inquiry* 11, 497-509.
- Lee, B. (1982), *On the Role of Well-formedness Conditions in Phonology*.
- Lehiste, I. (1973), Phonetic disambiguation of syntactic ambiguity. *Glossa* 7, 107-122.
- Lepschy, A.L. and G. Lepschy (1977), *The Italian Language Today*. London: Hutchinson.
- Liberman, M. (1975), *The intonational system of English*. Ph.D. Dissertation. MIT. Distributed by *Indiana University Linguistics Club*.
- Liberman, M. and A. Prince (1977), On stress and linguistic rhythm. *Linguistic Inquiry* 8, 249-336.
- Lieber, R. (1980), *On the Organization of the Lexicon*. Ph.D. dissertation, M.I.T.
- Linell, P. (1979), *Psychological Reality in Phonology*. Cambridge: Cambridge University Press.
- Lowenstam, J. (1979), *Topics in Syllabic Phonology*, MIT diss.
- Luce, J. (1981), *A Phonemic Investigation of Accent in Tonga and English*. Ms., Indiana University.
- Lunt, H.G. (1973), Remarks on nasality: the case of Guarani. In: Stephen R. Anderson and Paul Kiparsky (eds.), *A Festschrift for Morris Halle*, 131-139. New York: Holt, Rinehart and Winston.
- Mahapatra, K. (1976), Echo-formation in Gta? In: P. Jenner et al. (eds.), Part II. Marantz, A. (1981), Re-replication. To appear in *Linguistic Inquiry*.
- Marchand, H. (1969), *The Categories and Types of Present-day English Word-formation*. München: C.H. Beck.
- Mascaró, J. (1976), *Catalan Phonology and the Phonological Cycle*. Ph.D. dissertation. M.I.T. Reproduced by the Indiana University Linguistics Club.
- Massamba, D. (1982), Tone in Ci-Ruri. In: *Clements and Goldsmith (eds.)*.
- Massamba, D. In preparation. Ph.D. dissertation, Indiana University.
- McCarthy, J. (1977), CT. *North East Linguistic Society* 7, 209-17.
- McCarthy, J. (1979), *Formal Problems in Semitic Phonology and Morphology*. Doctoral dissertation, Cambridge, Mass., MIT.
- McCarthy, J. (1979a), On Stress and Syllabification. *Linguistic Inquiry* 10, 443-465.
- McCarthy, J. (1981), A Prosodic Theory of Nonconcatenative Morphology. *Linguistic Inquiry* 12, 373-418.
- McCarthy, J. (1981a), Prosodic structure and expetive infixation. Unpublished
- McCarthy, J. (to appear), Prosodic Organization in Morphology.
- McCawley, J. (1973), Some Tonga Tone Rules. In: Stephen R. Anderson and Paul Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston.
- McCawley, J. (1977), Accent in Japanese. In: L. Hyman (ed.) *Studies in Stress and Accent*. Southern California Occasional Papers in Linguistics 4, 261-302.
- McCawley, J. (1978), What is a Tone Language. In: V. Fromkin (ed.), *Tone: A Linguistic Survey*. New York: Academic Press.
- Meussen, A.E. (1963), Morphotonology of the Tonga Verb. *Journal of African Linguistics* Vol. 2, Part I.
- Mohanan, K.P. (1981), *Lexical Phonology*, Ph.D. dissertation, M.I.T.
- Moortgat, M., H. van der Hulst and T. Hoekstra (eds.) (1981), *The Scope of Lexical Rules*. Dordrecht: Foris [Linguistic Models 1.]
- Nanni, D.L. (1977), Stressing words in <-ative>. *Linguistic Inquiry* 8: 4, 752-63.
- Napoli, D.J. and M. Nespor (1979), The syntax of word-initial consonant gemination in Italian. *Language* 55, 812-841.
- Nash, D. (1979), Yidin' Stress: A Metrical Account. *Cunyiform papers in Linguistics* 7-8, 112-130.
- Navarro Tomás, T. (1957), *Manual de pronunciación española*. New York: Hafner.
- Nespor, M. and I. Vogel (1979), Clash avoidance in Italian. *Linguistic Inquiry* 10, 467-482.
- Odden, D. (1980), Associative tone in Shona. *Journal of Linguistic Research* 1, 37-53.
- Odden, D. (1982), Stem Tone Assignment in Shona. In: *Clements and Goldsmith (eds.)*.
- Okote, F. (1972), Phonemic analysis of Gokana. Long Essay, University of Ibadan, Nigeria.
- Osburne, A. (1979), Segmental, Suprasegmental, Autosegmental: Contour tones. *Linguistic Analysis* 5, 161-83.
- Paul, H. (1896), Über die Aufgaben der Wortbildungslehre. *Sitzungsberichte der königl. bayer. Akademie der Wissenschaften, philologisch-philologische und historische Klasse*, 692-713. München.
- Pesetsky, D. (MS), *Russian morphology and lexical theory*. M.I.T.
- Pinney, M. (1980), Evidence for a rhythm rule in Quebec French. *North East Linguistic Society* 10, 369-82.
- Pike, K. and E. Pike (1947), Immediate constituents of Mazatec Syllables. *International Journal of American Linguistics* 13, 78-91.
- Pratelli, R. (1971), Le renforcement syntactique des consonnes en Italien. *La linguistique* 6, 39-50.
- Price, R. and S. Price (1976), Secret Play Languages in Saramakka. *Linguistic Dispute in a Caribbean Creole*. In: B. Kirshenblatt-Gimblett (ed.).
- Prince, A. (1976), *Applying Stress*. MS.
- Prince, A.S. (1980), A metrical theory for Estonian quantity. *Linguistic Inquiry* 11, 511-562.
- Pulleyblank, D. (1981), *Tone and the Cycle in Tiv*. Ms., MIT.
- Rardin, R. (1975), *Studies in Derivational Morphology*. Ph.D. dissertation, M.I.T.
- Riemsdijk, H.C. van (1978), *A case study in syntactic markedness*. Foris Publications.
- Riemsdijk, H.C. van and N.S.H. Smith (1973), Zur Instabilität komplexer phonologischer Segmente. In: A.P. ten Cate and P. Jordens (eds.), *Linguistische Perspektiven*. [Referate des VII Linguistischen Kolloquiums Nijmegen, 26-30 September 1972, *Linguistische Arbeiten* 51. Niemeyer 1973.

- Ringen, C. (1980), Hungarian Vowel Harmony. In: R. Vago (ed.), 135–154.
- Rischel, J. (1964), Stress, Juncture, and Syllabification in Phonemic Description. *Proceedings of the IXth International Congress of Linguistics*, 85–93.
- Rischel, J. (1972), Compound Stress in Danish without a Cycle. *ARPPUC 6*, University of Copenhagen.
- Rizzi, L. (1980), Violations of the WH Island Constraint in Italian and the Subjacency Condition. *Journal of Italian Linguistics* 5, 157–196.
- Rotenberg, J. (1978), *The syntax of phonology*. Ph.D. dissertation. MIT.
- Rubach, J. (1981), *Cyclic Phonology and Palatalization in Polish and English*. Warsaw, Wydawnictwa Uniwersyteku Warszawskiego.
- Schane, S.A. (1979a), The rhythmic nature of English word accentuation. *Language* 54, 559–602.
- Schane, S.A. (1979b), Rhythm, accent, and stress in English words. *Linguistic Inquiry* 10, 483–502.
- Selkirk, E. (1972), *The Phrase Phonology of English and French*. Ph.D. dissertation. MIT.
- Selkirk, E. (1974), French liaison and the \bar{X} notation. *Linguistic Inquiry* 5, 573–590.
- Selkirk, E. (1977), French schwa. Unpublished.
- Selkirk, E. (1978), On prosodic structure and its relation to syntactic structure. Paper presented at the Conference of the Mental Representation of Phonology. Distributed by *Indiana University Linguistics Club* in 1980.
- Selkirk, E. (1980), The role of prosodic categories in English word stress. *Linguistic Inquiry* 11, 563–605.
- Selkirk, E. (1980a), Prosodic domains in phonology: Sanskrit revisited. In: M. Aronoff and M.L. Kean (eds.), *Juncture*. Saratoga, C.A. Anna Libri.
- Selkirk, E. (1981), English Compounding and the Theory of Word Structure, In: *Moortgat, Van der Hulst and Hoekstra (eds.)*, 229–279.
- Sherzer, J. (1976), Play Languages: Implications for (Socio)Linguistics. In: *B. Kirshenblatt-Gimblett (ed.)*.
- Siegel, D. (1974), *Topics in English Morphology*. Ph.D. Dissertation, M.I.T.
- Siegel, D. (1977), The Adjacency Condition and the Theory of Morphology. *North East Linguistic Society* 8.
- Singh, R. (1981), The English Negative Prefix *in-*. *Montreal Working Papers in Linguistics* 17, 139–143.
- Stampe, D. (1972), *A Dissertation on Natural Phonology*. Garland Press.
- Stanley, R. (1967), Redundancy Rules in Phonology. *Language* 43, 393–436.
- Stein, M.J. (1980), Something else. *North East Linguistic Society* 10, 401–12.
- Stemberger, J.P. (1980), Length as a suprasegmental: Evidence from speech errors. Unpublished.
- Strauss, S. (1979), Against Boundary Distinctions in English Morphology. *Linguistic Analysis* 5, 387–419.
- Strauss, S. (1979a), Stress Assignment as Morphological Adjustment in English. Paper presented at the Linguistic Society of America Winter Meeting, Los Angeles.
- Thrainsson, H. (1978), On the Phonology of Icelandic Preaspiration. *Nordic Journal of Linguistics* 1, 3–54.
- Toman, J. (1980), *Wortsyntax*. Ph.D. dissertation, University of Köln.
- Vago, R. (1980), A Critique of Suprasegmental Theories of Vowel Harmony. In: *Vago (ed.)*, 155–183.
- Vago, R. (ed.), (1980a), *Issues in Vowel Harmony*. Amsterdam.
- References*
- Van der Hulst, H.G. (1981), De structuur van fonologische representaties. *GIOT* 4, 1–33.
- Vergnaud, J.-R. (1977), Formal properties of phonological rules. In: *Burris, R.E. and Hintikka, J. (eds.)*. Basic problems in methodology and linguistics. Dordrecht-Holland: D. Reidel, 299-318.
- Vergnaud, J.-R. (1979), A Formal Theory of Vowel Harmony. In: *Vago (ed.)*, 49–63.
- Vogel, I. (1977), *The Syllable in Phonological Theory: with special reference to Italian*. Stanford University, diss.
- Vogel, I. (1978), Raddoppiamento as a Resyllabification Rule. *Journal of Italian Linguistics*, 3.1, 15–28.
- Welmers, W. (1959), Tonemics, Morphotonemics and Tonal Morphemes. *General Linguistics* 4, 19.
- Wheeler, D. (1979), A Metrical analysis of Stress and related processes in Southern Paiute and Tubatulabal. *University of Mass. Occasional Papers* 5, 145–174.
- Wheeler, D.W. (1981), *Aspects of a categorial theory of phonology*. Ph.D. Dissertation. Amherst.
- Whitney, W.D. (1889), *Sanskrit Grammar*.² Cambridge, Mass., Harvard University Press.
- Williams, E. (1971), Underlying Tone in Margi and Igbo. *Linguistic Inquiry* 7 (1976),
- Williams, E. (1981), On the Notions “Lexically Related” and “Head of a Word”. *Linguistic Inquiry* 12, 245–274.
- Williamson, K. (1973), More on nasals and nasalization in Kwa. *Studies in African Linguistics* 4, 115–138.
- Williamson, K. (1979), Preliminary reconstruction of Ogoni group. Ms., University of Port Harcourt.
- Wolff, H. (1959), Niger-Delta Languages I: Classification. *Anthropological Linguistics* 1.
- Wolff, H. (1964), Synopsis of the Ogoni languages. *Journal of African Languages* 3, 38–51.
- Woo, N. (1969), Prosody and Phonology. *Indiana University Linguistics Club*.
- Yip, M. (to appear), *Chinese Secret Languages* – A form of Reduplication.
- Zide, N. (1976), A note on Gta? Echo forms. In: *Jenner et al. (eds.)*, Part II.
- Zwicky, A. (1970), The Free-Ride Principle and Two Rules of Complete Assimilation in English. *Papers from the Sixth Regional Meeting, Chicago Linguistic Society*. Chicago, Illinois.