

On the Swedish Pitch Accents

by

Ingvar P. M. Löfstedt

B.A., Linguistics and Philosophy

The University of California at Los Angeles

(1991)

Submitted to the Department of Linguistics and Philosophy
in Partial Fulfillment of
the Requirements for the Degree of


MASTER OF SCIENCE

at the
Massachusetts Institute of Technology

June 1995

copyright 1995 Ingvar Löfstedt. All rights reserved.

The author hereby grants to MIT permission to reproduce and to distribute
publicly paper and electronic copies of this thesis document
in whole or in part.

Signature of Author.....

Certified by
Morris Halle, Institute Professor
Thesis Supervisor

Accepted by.....
Wayne O'Neil,
Chair, Department of Linguistics and Philosophy

ARCHIVE.

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

JUN 26 1995

LIBRARIES

ON THE SWEDISH PITCH ACCENTS

by

INGVAR P. M. LÖFSTEDT

Submitted to the Department of Linguistics and Philosophy on June 2, 1995

in partial fulfillment of the requirements

for the Degree of

Master of Science in Linguistics

ABSTRACT

The licensing conditions and the realization of the pitch accents (accents I and accent II) of a particular group of Swedish dialects--the R-High dialects--are examined. It is argued that the pitch accents reflect the presence/absence of a lexical high tone associated to the second syllable in simple words. The accent II pattern in compound words reflects primary and secondary stress, irrespective of lexical marking.

A series of ranked violable Optimality Theoretic constraints is proposed, which derives the facts of the R-High pattern. Also, an alternative account is proposed, where accent II involves a prosodic bracket on the second syllable within a bracketed grid (Halle & Idsardi (1994)). Previous accounts of the accents are reviewed: in particular, Jensen (1980), Bruce (1978), and Schmid (1986). It is shown that these accounts fail to predict the R-High pattern. The algorithm of Withgott and Halvorsen (1984) for computing stress in Norwegian words is shown to be unnecessarily complex for the Swedish facts.

The claim that accent II involves a tonal or prosodic mark on the second syllable is supported by neutralization patterns from Old Swedish. Vowels /u/ and /a/ were neutralized to /e/ in the second syllable of accent I words and in the third syllable of accent II words but not in the second syllable of accent II words. The high tone on the second syllable of accent II words rendered these vowels salient, thereby hindering the neutralization.

The phonetic realization of accent II in Swedish generally involves a high tone on the second syllable, exactly as one would expect if the underlying representation involves a high tone on the second syllable. Also, the analysis of the accents in terms of high and low tones can be applied to Danish *stød*, a glottal creak associated with a dip in the pitch curve, which marks accent I.

Thesis Supervisor: Morris Halle

ACKNOWLEDGMENTS

Special thanks to Morris Halle and Michael Kenstowicz for excellent teaching and discussion on the topics discussed in this thesis and phonological questions in general. I appreciated the help of Ken Hale and Alec Marantz, who came with important comments to members of my general committee. Edward Flemming, Stefanie Shattuck-Hufnagel, and Laura Dilley provided much technical help in the phonetics laboratory and phonetic/phonological insight in general. Thanks to my father Bengt Löfstedt for speaking the dialect that he speaks. Donca Steriade did me the service of getting me interested in phonology. Per Linell, Meg Withgott and Per Halvorsen generously provided me with their work. Gösta Bruce patiently answered questions about his work. Thanks to the faculty at MIT for providing me with a rich background in formal linguistics. Thanks to the staff for help in sinister domains. Fellow students: thanks for the bouquets. Jay Keyser brought me some sand from balmy Bermuda.

TABLE OF CONTENTS

1	Introduction	9
2	Accents I and II in Simple Words	11
2.1	Trochees	11
2.2	Combinations of Types I and II	15
2.3	The Phonetic Realization of the Accents in the R-High Dialects	21
3	Compounds	27
4	An OT Account	31
4.1	The Constraints	31
4.2	An Intermediate Stage?	36
5	A Bracketed-Grid Account	39
6	Previous Formal Accounts of Accents I and II	45
6.1	Jensen 1980	46
6.2	Bruce 1978	48
6.3	Schmid 1986	50
6.4	Computing Accent: Withgott & Halvorsen 1985	52
7	Historical Evidence for a High Tone on the Second Syllable	57
8	Other Dialects	63
9	A Note on Danish Stød	65
10	Conclusion	66
11	Appendix: Pitch Tracks of an R-High Dialect	68
	References	80

1. Introduction

A familiar curiosity of most dialects of Swedish are minimal pairs that differ only in terms of tone.¹ In the Småland dialect of Swedish, the string /anden/, when pronounced with sentential focus, has different meanings depending on the tonal contour:²

(1)



'the duck'



'the spirit'

The pronunciation with one high tone--accent I--means 'the duck', and the pronunciation with two high tones--accent II--means 'the spirit.' In Småländska, a syllable with main stress is associated to a high tone, independent of accent type.³ This is the unique high tone in an accent I word. In a trochee with accent II, there is a second high tone on the second syllable, following a dip after the stressed syllable's high tone.

It is the purpose of this paper to explore the mechanisms involved in the manifestation of accents I and II in a certain group of Swedish dialects, which I will henceforth refer to as the R-high dialects, named for the high tone that appears on the right edge of a simple accent II word. The licensing requirements and surface locations of the second high tone in simple and compound words in the R-high dialects will be discussed.

¹While the vast majority of Swedish dialects feature a tonal distinction between words, the realization of this distinction differs among the dialects.

²The difference is neutralized if the word is not in focus. Also, there are effects of sentential prosody which I abstract away from. I am only concerned with the citation form of the accents. However, see Bruce (1978) and (1986) for some discussion of sentential effects.

³The accent I variant can surface with a low tone associated to the stressed syllable, followed by a rising contour. As far as I know, high and low tones occur in free variation in these words.

The paper is organized as follows: First I show that the accents in simple⁴ words involves an idiosyncratic lexical marking on morphemes. I argue that in all simple words, the word accent is determined by the morpheme associated to the second syllable. In the case of compound words, the second high tone independent of lexical marking appears on the main stress syllable of the rightmost word of the compound. I then present an account of the the tonal facts of the R-high dialects by means of ranked violable constraints in the sense of Optimality Theory (henceforth, OT--see Prince & Smolensky (1993)) . I provide a unified treatment of compound words and simple words in the R-High dialects. I then provide an analysis along the lines of Halle & Idsardi's grid-bracketing system, and I show that it is empirically adequate. Next, I go over previous proposals of the accent I/II distinction in Swedish, namely Jensen (1980), Bruce (1978), and Schmid (1986). I show that these accounts do not capture the facts of the R-high dialect. Further, I present the algorithm for computing the accent of a simple word in Norwegian, as put forth in Withgott & Halvorsen (1984, 1985), and show that it is inappropriate for the Swedish facts. The claim that the accent distinction involves a tone on the second syllable is also supported by patterns of vowel-centralization in Old Swedish. The glottal creak of Danish can be considered as a low-tone phenomenon marking accent I . In this way, the Scandinavian accents and *stød* are conceptually unified.

⁴I use the words 'simple' and 'compound' to refer to the prosodic structure of the words, rather than the morphological structure. Swedish, like many other Indo-European languages, has affixes that behave prosodically like words. This will be discussed below.

2 Accents I and II in Simple Words

This section will describe licensing conditions of accents I and II in simple words. Also, the phonetic correlates of the accents in the R-High dialects and the underlying representation of the accents will be addressed.

2.1 Trochees

In this section, I discuss the factors that determine the accent type of simple words. I will first regard accents I and II as primitive notions, and later introduce their phonetic correlate in the R-High dialects. For clarity of exposition, I will first discuss bisyllabic words with initial stress. Bisyllabic trochees are the minimal word that features the accent I/ II distinction; all monosyllabic stems are of type I, as are all words stressed on the final syllable.

The distinction accent I/II involves lexical marking, as the following examples show.

(2)

accent I /smoking/ 'smoking jacket'
 /fänrik/ 'military officer'

accent II /pudding/ 'pudding'
 /tallrik/ 'plate'

Since the accent I/II distinction is idiosyncratic, dialects often differ as to whether or not a given word has a lexical high tone. Generally, it is the case that older native Swedish trochees have accent II, whereas newer loans have accent I. The words for 'smoking jacket' and 'pudding' are, of course, both borrowed from English, but the accent I on 'smoking' reveals that it is a newer loan.

The distinction of accent I and accent II is not limited to stems, but also applies to suffixes. Again, for expositional reasons, I will focus on bisyllabic words; that is, monosyllabic suffixes associated to monosyllabic stems. Some affixes, when associated to a monosyllabic stem, have accent I. Others have accent II.

The most common type I affixes are listed below:

- (3)
 type I affixes
- /isk/ (adjective-formative)
 /myt+isk/ 'mythical'
 - /re/ (comparative)
 /bättre/ 'better'
 - /is/ (slang suffix)
 /bagatel:/->/bag:is/ 'bagatelle'
 - /en/ non-neuter singular definite article
 /tall+en/ 'the pine'
 - /et/ neuter singular definite article
 /barn+et/ 'the child'
 - /en/ plural definite article
 /barn+en/ 'the children'
 - /na/ plural definite article
 /bo+n+na/ 'the nests'

Although there are in fact not that many type I suffixes, they are statistically very important, since the four definite articles are among the most frequently occurring morphemes of the language. Also, the /is/-suffix is perhaps the most productive source of neologisms in the language.

The following are the most common monosyllabic type II suffixes (polysyllabic ones will be discussed below):

(4)

type II suffixes

Noun suffixes

/a/, /u/ (fem. theme vowel) /flik:+a/ 'girl'
/flik:+ur/ 'girls'
/e/, /a/ (masculine theme vowel) /tomt+e/ 'troll'
/tomt+ar/ 'trolls'

Adjective suffixes

/a/ (linking element for superlative)
/fin/--> /fin+a+st/
/a/ plural /fin/ 'nice'--> /fin+a/ (nice, pl)
/a/ feminine (or default) sfx /fin+a/ 'nice, fem'
/e/ masculine sfx
/fin/ 'nice' --> /fin+e/ 'nice, m.' (dialectal)

Verb suffixes

/a/ infinitive
/tal+a/ 'speak, inf'
/a/, /e/ present tense linking vowels
/jag+a+s/ 'is chased', /jag+a+r/ 'chases'
/läs+e+s/ 'is read'
/a/ imperative
/jag+a/ 'chase!'
/de/ preterite
/val+de/ 'choose, pret'
/e/ irrealis
/vor+e/ 'be, irr.'
/en/ passive participle
/skriv+en/ 'write, passive part'
/it/ past participle
/skriv+it/ 'write, past part'

Derivational suffixes

/ning/, /ling/ (noun-formatives)
/häls/ 'greet'-->/häls+ning/ 'greeting'
/ätt/ 'family'-->/ätt+ling/ 'descendent'
/nad/ (noun-formative)
/byg:/ 'build'-->/byg:+nad/ 'building'
/lig/ (adj formative)
/läs/ 'read'--> /läs+lig/ 'readable'
/ig/
/mes/ 'coward'-->/mes+ig/ 'cowardly'

The distinction between affixes of type I and type II in the lists above reflects tonal realizations independent of the stem. A given monosyllabic stem, say /hund/ 'dog', does not influence the accent of the affixed word. So if the monosyllabic suffix is of type I, the word takes accent I; if the affix is of type II, the word takes accent II. So combining /hund/ with a type I affix like the definite article /en/ yields an accent I word. Combining the same stem with a type II suffix, say the plural /ar/, yields an accent II word. There is no distinction between type I and II in monosyllabic stems; all monosyllables take accent I.

We have noted that trochees differ as to their accent type. This involves, in the case of unsuffixed stems, an idiosyncratic lexical marking on the stem. In the case of a monosyllabic stem followed by a monosyllabic suffix, this involves a lexical marking on the suffix.

Type II suffixes include some bisyllabic suffixes, as well. The following suffixes, when added to a monosyllabic stem, induce accent II.

(5)

Bisyllabic accent II words

/ande/ 'pres. participle'

/läs/ 'read' -> /läs+ande/

/ende/ 'pres. participle'

/bu/ 'dwell' -> /bu+ende/ 'inhabit, pres. part'

/else/ (noun-formative)

/händ/ 'occur' -> /händ+else/ 'occurrence'

/are/ (agentive)

/läs/ 'read' -> /läs+are/ 'reader'

/are/ (suffix denoting origin)

/italien+are/ 'Italian person'

2.2 Combinations of Types I and II

We have noted the distinction between affixes of type I and type II when they are associated to a monosyllabic stem. If one associates a type I suffix to a monosyllabic stem, and then affixes a type I affix to that (resulting in the structure [stem + I + I]), the word takes accent I. The following example illustrates this:

(6)

Stem	+afx I	+afx I	acc I
/bäst/	/is/	/en/ →	/bästisen/
'best' (slang nom)		(def art)	'the best friend'

This result is hardly surprising, since there is no accent II morpheme in the structure.

Next, consider the case where a monosyllabic stem is associated to a type I affix followed by a type II affix. Interestingly, the resulting word features no second high tone; it takes accent I.

(7)

Stem	+afx I	+afx II	acc I
/nurd/	/isk/	/a/ →	/nurdiska/
'north'	(adj. form)	(pl)	'nordic, pl'
/bäst/	/is/	/ar/ →	/bästisar/
'best'	(slang sfx)	(pl)	'best friend, pl'

Note that although the second affix is of type II, the resulting word takes accent I. Tonally, 'best friends' is identical to 'the best friend', although in underlying representation, 'best friends' has a type II suffix in its third syllable.

Third, consider the case of a monosyllabic stem followed by a type II suffix and a type I suffix.

(8)

Stem	+afx II	+afx I	acc II
/tall/	/ar/	/na/ →	/tallarna/
'pine'	(pl)	(def art)	'the pines'

Here, the word does take accent II, unlike the case above where the order of suffixes was I + II, and the output surfaced with accent I ('best friends').

Finally, in the case of a monosyllabic stem followed by two type II suffixes, accent II emerges.

(9)

Stem	+afx II	+afx II	acc II
/nurd/	/lig/	/a/ →	/nurdliga/
'north'	(adj frm)	(pl)	'northern, pl.'

The following chart summarizes the realization of high tone in a monosyllabic stem with varying suffixes:

(10)

Monosyllabic stems with varying affixes

structure of word			accent type of word
stem	+I	+I	I
stem	+I	+II	I
stem	+II	+I	II
stem	+II	+II	II

The following generalization captures the facts in the chart:

(11)

Generalization A

The suffix immediately following a monosyllabic stem determines the accent type of the word.

The next question to consider is how polysyllabic stems of types I and II interact with suffixes of different types. As the following example shows, the combination of a stem of type I with and a suffix of type I yields an output form with accent I.

(12)

Stem I	+afx I		acc I
/fänrik/	/en/	-->	/fänriken/
'officer'	(def art)		'the officer'

Interestingly, if a type II suffix is affixed to a bisyllabic stem of type I, the resulting word has accent I.

(13)

Stem I	+afx II		acc I
/fänrik/	/ar/	-->	/fänrikar/
'officer'	(pl)		'officers'

If a bisyllabic stem is of type II and the suffix is of type I, then the resulting affixed word has accent II.

(14)

Stem II	+afx I		acc II
/tallrik/	/en/	→	/tallriken/
'plate'	(def art)		'the plate'

Finally, the combination of a stem of type II and an affix of type II yields a word of type II.

(15)

Stem II	+afx II		acc II
/tallrik/	ar	→	/tallrikar/
'plate'	(pl)		'plates'

The patterns of bisyllabic stems and affixes are summarized in the following chart.

(16)

Bisyllabic stems with affixes.

Structure of word		accent type
stem	afx	
I	I	I
I	II	I
II	I	II
II	II	II

The following generalization naturally summarizes the patterning in the chart:

(17)

Generalization B:

The bisyllabic stem (not the suffix) determines the presence of a high tone on the right edge of the word.

In Generalization A (11), we noted that, in the case of monosyllabic stems, it is the lexical marking on the first affix that determines whether the word surfaces with accent I or accent II. In Generalization B, we note that in the case of bisyllabic stems, it is the lexical marking on the stem that determines the accent type of the word.

Generalizations A and B are unified for words with initial stress if a lexical mark on the *second* syllable determines the accent of a simple word; the presence of a lexical marking on syllables after the second syllable has no bearing on the presence/absence of a high tone on the right edge of the word. Hence, I agree with Bruce's observation for words with initial that 'the word accent is predictable if the morpheme occupying the post-stress syllable is known' (1978, 17) In particular, if we compare two trochees, one type I and one type II, and add both an affix of type I and an affix of type II to these two stems, the distinctness of the stem-types is maintained in the surface representations. The following words illustrate this fact:

(18)

stem I	afx II	afx I	acc I
/fänrik/	/ar/	/na/	/fänrikarna/
'officer'	(pl.)	(def.art.)	'the officers'

stem II	afx II	afx I	acc II
/tallrik/	/ar/	/na/	/tallrikarna/
'plate'	(pl.)	(def.art.)	'the plates'

The words for 'the officers' and 'the plates' differ in that the 'the plates' has accent II high tone on the final syllable, whereas the word 'the officers' has accent I. This is the result of the lexical marking on the stem, in the second syllable of the word.

It is important to note that the accent-determining suffix is the second syllable, not the post-stress syllable. This not only allows for a unification of Generalizations A and B, but also accounts for the general lack of influence of accent II morphemes in words with pre-stressed syllables. Consider the following chart, where an accent II suffix is in the post-stress syllable of two words, one with initial stress, and one with stress on the second syllable.

(19)

Accent II	Accent I
/le'n+a/ 'lean, pl'	/italie'nsk+a/ 'Italian, pl'
/le'n+a/ 'lean, fem. adj'	/italie'nsk+a/ 'Italian, pl'
/le'n+e/ 'lean, masc.adj.	/italie'nsk+e/ 'Italian, masc, adj' (dialectal)
/ta'l+a/ 'speak, inf'	/beta'l+a/ 'pay, inf'
/ta'l+ar/ 'speak, pres'	/beta'l+ar/ 'pay, pres'
/ta'l+a/ 'speak, imp'	/beta'l+a/ 'pay, imp'
/stä'll+de/ 'place, past'	/bestä'll+de/ 'order, past'
/skriv+en/ 'write, pass part'	/beskri'v+en/ 'describe, pass part'
/skri'v+it/ 'write, past part	/beskri'v+it/ 'describe, past part'

Accent I	Accent II
/se'gl+ing/ 'sailing'	/bese'gl+ing/ 'sealing'
/klä'dnad/ 'clothing'	/beklä'd+nad/ '....'
/tyd+lig/ 'apparent'	/bety'd+lig/ 'significant'

The list could easily be made longer. When the accent II morpheme follows a monosyllabic stem, and therefore occupies the second syllable, it triggers accent II in the word. If the accent II suffix follows a bisyllabic stem, it occupies the third syllable of the word, and does not trigger accent II. It is evident that an accent II morpheme must be in the second syllable, not merely the post-stress syllable, to influence the accent of the word.⁵

2.3 The Phonetic Realization of the Accents in the R-High Dialects

In this section, I discuss the phonetic manifestation of accents I and II in a particular group of dialects of Swedish.

Noreen's definitive grammar of Swedish provides a lucid description of the accents in the standard Stockholm dialect of the turn of the century. As the terms of modern tonology were not at his disposal, he described the tones

⁵There are only three exceptions to this rule that I know of. The nominal feminine thematic vowels /a/ (sg.) and /o/ as well as the masculine nominative suffix /are/ determine the accent of the word in a word-medial post-stress syllable. This can be seen in the minimal pair /italie'nsk+a/ 'Italian, pl' (accI)-- /italie'naska/ 'Italian woman' (accII). Likewise, /italie'nskor/ 'Italian women' has accent II, as does /italie'nare/ 'Italian man'. Given the general pattern that a morpheme must be in the second syllable to determine the accent type of the word, the prestressed syllables must be unsyllabified. Thus, the strict prosodic hierarchy is in question. (Notice, however, that it is rather strange that a suffix triggers the ability of the stem to syllabify.)

While all of these suffixes are nominal suffixes, nominality is not sufficient for triggering accent II word medially. So the agentive /are/--homophonous with the previous example--forms nouns out of verb stems, but must be in second position to trigger accent II: /ba'g+are/ baker'--with accent II-- but /förfø'r+are/ 'seducer'--with accent I.

Apparently, almost all prestressed stems are of type I--hence they surface with accent I. However, the monomorphemic adjective /ale'na/ 'alone' suggests that a prestressed morpheme can be of type II.

musically, using the notes A, H (= B in American musical terminology) and C.

Noreen (1907, 458) describes the acute words (what we call accent I) as having the following tonal contours (the translation is mine, as are bracketed glosses and notes). According to Noreen, 'the Stockholman dialect (as spoken by people born and brought up in the capital)' has

1. Monosyllabic [words] with the...slightly sinking normal [=high] tone...*c*, most often preceded by a somewhat rising portamento.... A prestress syllable lies a minor third lower, e.g. *bety'g* with the tonal contour *Ac*, *Götebo'rg* with *AAc*....
- 2 Bisyllabic [words] with the minor third falling from the normal tone, *cA*, e.g. *get'ter*, ['goat, pl]' *fly'ter*, ['float, pres']*bo'ken*, [book, def art']....Prestress syllables are treated as above.
- 3 Trisyllabic [words] also with a sinking minor third, *cAA*, e.g. *getterna* ['goat, pl, def art']. *gyllene* ['golden']....Prestress syllables as above.
- 4 Quadrosyllabic [words] with the tone contour *cAAA*, e.g. *nejlikorna* Prestress syllables as above.

The same dialect features the following contours in the 'grave' patterns, i.e. accent II (Noreen 1907, 459 ff):

- 1 Monosyllabic [words]...fall from the mid tone to the low tone to then rise a minor third to the normal tone, hence having the tonal contour $H\bar{A}C$, e.g. *fa'n* ['Satan'], *må'n* ['moon, def art, contracted form'], *nå'n* ['some, contracted'], *sa* ['say, past, contracted']....Prestress syllables as above. [All examples involve contractions of accent II trochees—the form for 'Satan' is historical contraction /fan+en/ 'the Satan'].
- 2 Bisyllabic [words] have the same tonal contour with the fall associated to the first syllable and the rise associated to the second syllable,

that is, H \overline{A} c., e.g. *ta`la* 'to speak', *ka`lfvar* ['calf, pl'].... Prestress syllables as above, so e.g. *grefvin`na* [duchess], *barones`sa* [baroness], *gallimati`as* [?]with AH \overline{A} c, AAH \overline{A} c, AAH \overline{A} c.

3 Trisyllabic [words] have the same tonal contour with the low tone associated to the second syllable, that is HAc, e.g. *ä`gare* ['owner'], *ka`lfvarna* ['calf, pl, def art'], *le`fvande* [live, pres part].... Prestress syllables as above.


4 Quadrosyllabic [words] have the same tonal contour, but with a low tone on both medial syllables, that is, HAAc, e.g. *ko`nungarna* [king, pl, def art], *hederliga* [honest, pl].... Prestress syllables as above.

Translating this to modern terms, the words with accent I have a high tone on the stressed syllable followed by low tones. Words with accent II have a mid tone associated to the stressed syllable, a high tone associated to the final syllable⁶. and low tones intervening (or, in bisyllables, associated to the end off the first syllable). Prestress syllables are always low.


If we abstract away from the distinction between the high and mid tones in the description, the accents I and II differ minimally in that accent II has a second high tone on the right edge, in addition to the one associated to

⁶More recently, Linell described an R-high dialect in his 1971 manuscript. He notes that in simple accent II words, 'the F₀ rise' occurs 'on the last syllable' (Linell 1971, 11) He provides examples of accent II words, with the F₀ -rise displayed by means of an upward-pointing arrow (Linell 1971, 12):


(20)




jordande ('inter, pres part')



Steninge (a place-name)



skökorna ('whore, pl, def')



penisar ('penis', pl)

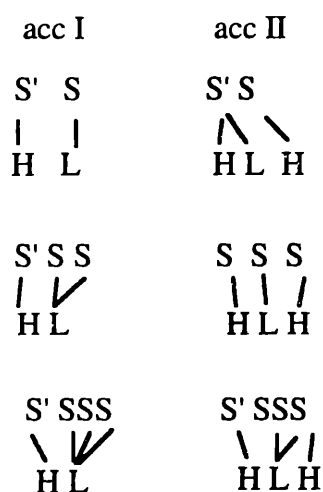
Linell claims that this pattern is also described in Lyttkens & Wulff (1886) and Danell (1937). Perhaps he is referring to the fact that these authors denote a level of stress on the final syllable on accent II words (e.g. tall-ri-kar-na would be 4-0-0-1). But this mark of stress may be what Kock (1878) calls *levis*, an expiratory stress. Kock (1878) emphasizes that in his dialect there is a tonal high in the second syllable, but an expiratory stress on the final syllable of accent II words.

· the stressed syllable. In this sense, it is conceptually preferable to assume no distinction between mid and high tones.

This move is also supported on empirical grounds. The values of the high tones are apparently set by the sentential prosody, not by the word prosody. Therefore they should not be represented in the word prosody. Gårding (1977, 55) notes that 'there is a constant relation between the two accents and the sentence intonation which is independent of dialect. For a given intonation and stress pattern...the pitch curve of Accent I recurs towards the end of Accent 2.' She goes on to note that 'a question gives the same value to the second peak as to the single peak of Accent 1.' Since the sentence prosody will determine the value of the rightmost high tone in a word--i.e. the unique one in an accent I word and the second one in an accent II word--lexical distinction between mid and high tones in the word-level is redundant.

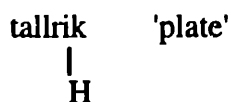
Assuming that mid tones are high tones at the word level of computation, the distinction between accent I and accent II can minimally be described as involving a high tone on the right edge of the word. The following are schematic representations of the phonetic realizations of accent I and accent II words of the dialect Noreen described, grouped as trochees, trisyllabic words, and quadrosyllabic words:

(20)



Both accents feature a high tone on the stressed syllable; this is not distinctive. However, the accent II words feature a high tone on the final syllable, whereas the accent I words feature the default low tone. It is therefore most natural to follow the suggestion of Withgott and Holvorsen (1985) and Schmid (1986) and claim that the accent of a word is determined by the presence/absence of a high tone. We noted earlier that the lexical marking of accent of a simple word involved a diacritic on the second syllable. It is then natural to assume that the accent type of a word is the result of the presence/absence of a high tone on the second syllable of the word. That is, accent II involves a high tone on the second syllable in underlying representation, while accent I involves no high tone on the second syllable. In the R-High dialects, accent II's lexical high tone is then reassociated to the rightmost syllable. The accent II trochee stems are therefore represented with a high tone on the second syllable:

(21)



The accent II monosyllabic affixes are represented as associated to a high tone in UR:

(22)

/a/ 'inf
|
H

When such a morpheme occurs after a monosyllabic stem, the high tone is associated to the second syllable:

(23)

vis+a 'show, inf
|
H

The bisyllabic accent II suffixes have a high tone on the first syllable of the affix, such that the high tone falls on the second syllable of the affixed word:

(24)

/ande/ 'pres. part'
|
H

/lek+ande/ 'play, pres. part'
|
H

In the R-High dialects, these high tones become associated to the right edge of the word.

The accent I morphemes, on the other hand, lack a high tone on the second syllable and receives a low tone by default:

(25)

/fänrik/ --> /fänrik/
|
L

The monosyllabic suffixes lack a high tone in their representation, and become linked to a low tone by default:

(26)

/en/ 'def art' → /en/
 |
 L

When affixed to a monosyllabic stem, this low tone is associated to the second syllable:

(27)

/hund+en/ 'the dog'
 |
 L

Recall that lexical high tones after the second syllable have no reflex on the surface accent of the word.

(28)

/fänrik+ar+na/ 'military officers'
 |
 H

As mentioned above, this word takes accent I. In the R-High dialects, the word is pronounced with only one high tone, associated to the stressed syllable. No high tone appears on the right edge.

(29)

fänrikarna
 | ↘
 H L

Cases of lexical high tones after the second syllable will be discussed below.

3 **Compounds**

Having discussed the manifestation of accent II in simple affixed words in the R-high dialects, I will now discuss the manifestation of accent II in

compound words⁷ in these dialects.⁸ As far as I know, all dialects which feature two high tones in simple words with accent II assign tones to compounds in the following way.

Accent II in compound words mark primary and secondary stress; i.e., the primary and secondary stressed syllables are associated to a high tone. Primary stress falls on the first stressed syllable of the compound; secondary stress falls on the rightmost stressed syllable. I designate the surface location of high tones with apostrophes.

The lexical marking type I/II is irrelevant in compounds; the distinction type I/II is neutralized. The following chart lists four hypothetical compound words of varying types. Both the first and the second member of the compound appear as either type I or type II trochees. The surface tonal representation is identical in both cases.

(30)

I + I
/fä'nrik/ /smo'king/ --> /fä'nriks+smo'king/

⁷A handful of semantically monomorphemic Swedish words have the prosodic properties of compound words. These are referred to in the literature as pseudocompounds:

a'lbatro'ss 'albatross'	ko'libri:' 'humming-bird'	pa'radi:s 'paradise'
ra'ppaka'lja 'garbage'	a'lmana'k:a 'almanac'	sy:'nagu:'ga 'synagogue'
a'rbe:'te 'work'	a'bo're 'perch'	

I will not address this interesting issue here.

Also, there are morphologically bimorphemic words that are prosodically monomorphemic, e.g. /mo'ndag/ 'monday' takes accent I, although the word can be analysed as a compound 'moon day'. I assume that these forms are lexically marked. Note that the marking of the compound does not involve a marking on the constituents of the compound; so /mo'n+Se'n/ 'moon shine' is a regular compound.

Withgott and Halvorsen (1985) claim that in Norwegian, accent I words consistently assign accent I to a compound, if they are the first word in the compound.

⁸Dialects which mark accent II with a single tone (which appears late in the stressed syllable or in the post-stress syllable) have quite different--and rather obscure--rules for determining the pitch type of compounds. See Bruce (1974) for very interesting data.

I + II
/fä'nrik/ /pu'ddi'ng/ --> /fä'nriks+pu'dding/

II + I
/ta'lrik/ /smo'king/ --> /ta'lriks+smo'king/

II + II
/ta'lrik/ /pu'dding/ --> /ta'lriks+pu'dding/

As these examples illustrate, a compound of two words features a high tone on the main stress syllable of each word, independent of lexical high tone marking.⁹ Therefore, I will not discuss lexical marking in the remainder of this chapter.

In a triple-compound, the high tones are associated to the stressed syllable of the first and last Prosodic Word. The bold-face letters are the vowels of the syllables that are stressed when the words that constitute the compound are pronounced in isolation.

(31)

[[student rum] diskuʃun] --> stude'ntrumsdiskuʃu'n
'student' 'room' 'discussion' 'discussion in a student's room'

The second syllable of /student/, the leftmost word, receives primary stress, so a high tone surfaces on that syllable in the compound. The final syllable of /diskuʃun/, the rightmost word, receives secondary stress, so a second high tone surfaces there in the compound. Although the unique syllable of /rum/ is stressed when the word is spoken in isolation, no high tone surfaces on it, since neither primary nor secondary stress falls on that syllable.

⁹The assignment of primary and secondary stress is conceptually independent of assignment of tones. For example, in the dialect of Skåne, compounds have only one high tone, which appears on the syllable with primary stress (the leftmost stressed one), but speakers have intuitions that there is secondary stress on the rightmost stressed syllable, although no tone appears on it. (Gösta Bruce, p.c.) For a discussion of stress assignment in Swedish, see Schmid (1986).

The irrelevance of morphological bracketing to the surface placements of high tones is clearly illustrated by the fact that a given compound word can be ambiguous, depending on the underlying morphological bracketing. For example, consider the following surface representation:¹⁰

(32) /stu'r+ mästar+ mö'te/
 'great'+ 'champion'+ 'meeting'

This can mean 'great meeting of champions' (from the bracketing [stor [mästar [möte]])) or it can mean 'meeting of great champions' (from the bracketing [[stor[mästar]]möte]). The ambiguity reveals that morphological bracketing is irrelevant to the computation of high tone-linking in compounds. The irrelevance of morphological structure shows that a cyclic account of stress as proposed by Halle and Vergnaud (1987) for German and English would be an inappropriate way to account for the distribution of high tones in Swedish compounds.

The significance of the stressed syllables at the edges of the compound is dramatically illustrated in the following compound constructed of six prosodic words¹¹.

(33)

[provi'ns	[[[järn]	[väg]	staSuns]	[före+stä'ndare]]]
province +	iron +	way+ station+		worker
'provincial railroad-station director'				

¹⁰The examples are from Elert (1972)

¹¹The prefix /före/ in the word /föreståndare/ is a prosodic word; such prefixes will be discussed below.

4 An OT Account

In this section I offer an OT analysis of the tonal facts of the R-high dialects. To provide a unified account for high distribution in simple affixed words and compound, I posit the following constraints:

4.1 The Constraints

(34)

Constraints

*M-Link

A tone may not be multiply linked.

Max 2 H

Each word (including compounds) has maximally 2 high tones

Align (1 stress, H)

The primary stressed syllable in a compound word is associated to a high tone.

Align (2 stress, H)

The secondary stressed syllable in a compound word is associated to a high tone.

Fill

Output representations with high tones in addition to the ones in UR are dispreferred.

Align (H, R)¹²

Align the right edge of a word to a high tone.

¹²This alignment may involve associating the distinctive lexical tone with a syllable that is perceptually prominent. This would be a plausible explanation of this constraint if word-final lengthening is attested in Swedish. Also, Kock (1878) claims that there is an expiratory effect on the final syllable in accent II words, independent of tone, called *levis*. Alignment of the tone to *levis* may also be involved.

Max 2H is a statement of the observation that no word of Swedish--simple or compound--has more than two high tones. (Some dialects which feature only one high tone, e.g. Skånska, involve Max 1H)

Align (1 stress, H) is a statement of the familiar fact that a syllable with primary stress is pronounced with a rise in pitch. Align (2 stress, H) states that also secondary stress syllables are associated to a high tone. I assume that universal grammar dictates that Align (1 stress, H) will always be ranked higher than Align (2 stress, H). Align (2 stress, H) is satisfied vacuously in simple words, since they lack secondary stress.

The constraints *M-Link, Max 2 H, Al (1 stress, H) and Al (2 stress, H) are not violated in Swedish.

The ranking (Al (1 stress, H) >> Fill) is evident, since high tones on stressed syllables are not in UR, but are inserted. Otherwise, the lexical representation would be massively redundant.

The ranking (Fill >> Al (R, H)) is evident, since high tones cannot be inserted to satisfy Al (R, H) in the case of accent I words. To satisfy Al (edge, H) on the right edge, the high tone must already be in the representation.¹³

The ranking (Al (2 stress, H)) >> Al (R, H)) is evident from the fact that the second H in compounds is associated to the secondary stress syllable, not the rightmost syllable.

These relative rankings force the following absolute ranking:

(35)

*M-Link, Max 2 H, Al (1 stress, H), Al (2 stress, H) >> Fill H >>

Align (R, H)

We must also account for the fact that a lexical high tone cannot satisfy Al (1 stress, H). A priori, lexically marked highs and inserted highs should be

¹³This ranking will not be needed provided a constraint that maintains contrast, as suggested below.

equally able to satisfy the alignment. Given the ranking of our constraints, the optimal form of any accent II word would precisely be one where the lexical high tone satisfies the Al(stress, H), since the actual attested output involves a violation of Fill. (*M-link and Max 2H, which are never violated in output forms, are not included in my tables, for clarity)

(36)

UR	tallrik (II)+en (I); stress is on first syllable				
		al(1stress,H)	al(2stress,H)	Fill	al(R,H)
>a	ta'llriken	/	/	/	*
b	tallri'ken	*	/	/	*
c	ta'llri'ken	*	/	*	*
d	ta'llrike'n	/	/	*	/

The actual output, (d) is less optimal than candidate (a), where the lexical high tone is associated to the stressed syllable. In fact, if lexical high tones could associate to the stressed syllable, the distinction accent I/II would always be neutralized, since an accent II word would only have a high tone on the stressed syllable.

To deal with this issue, I rely on ideas developed by Edward Flemming (1995) in his work on neutralization. Ranked constraints are applied to pairs of (potential) lexical entries. One of the constraints that has been shown to play a major role in segmental phonology is one that maintains an underlying contrast. The following is one such constraint;

(37)

Contrast: Distinguish underlying representations with lexical high tones from ones without lexical high tones.

If this is ranked higher than Fill, the problem of aligning the lexical high to the stressed syllable is solved, as shown below:

(38)

	Al (1 stress, H)	Al (2 stress, H)	contrast	Al(RH)
UR	tallriken tallri'ken			
a	ta'llriken ta'llriken	/l/ /l/	*	* *
b	ta'llriken ta'llri'ken	/l/ /l/	/	* *
c	ta'llriken ta'llrike'n	/l/ /l/	/	* *

The Contrast constraint must be lower than Al (2 stress, H), since it is violated in all compounds, while the latter is not. The constraint that maintains the contrast between accent I and accent II forms --which is ranked higher than the other constraints--rules out the unwanted output (a), although this candidate features fewer Fill violations than the actual output, (b). Candidate (b) is chosen above candidate (c), which maintains the accent contrast by keeping the lexical high tone on the second syllable, since candidate (c) violates the constraint on aligning a high tone to the right edge.¹⁴Note that we no longer have any justification for ordering Fill above Al (Right, H), which was to hinder accent I forms from adding a high tone on the right edge. This possibility is ruled out by Contrast, since that would neutralize the distinction between accent I and accent II; all outputs would be

¹⁴In subsequent charts, I provide only a single candidate in the UR, although it should be understood that for 'contrast' to work, each prosodic word with at least two syllables must be entered with both accent I and accent II. I do this for visual clarity.

accent II. Henceforth, Fill will not be included in the tables, since it plays no crucial role in determining outputs.

The following is an illustration of how the constraints derive the facts of compounds; consider the compound /puddings+tallrik/, made of two accent II words:

(39)

		Al (1 stress, H)	Al (2 stress, H)	contrast	Al (RH)
UR	puddi'ng+tallri'k				
	a pu'ddingtallri'k	*	/	* /	/
	b puddi'ngtallri'k	**	/	/ /	/
	>c pu'ddingta'llrik	/	/	* *	*
	d puddi'ngta'llrik	*	/	/ *	*

As usual, I leave out the unviolated constraints Max 2H and *M-Link. Al (stress, H) chooses (c) as the winning candidate, although it is the worst violator of Contrast, which is ranked lower.

The following chart illustrates how the constraint Al (2 stress, H) is crucial in choosing the correct candidate in multiple compounds.

(40)

		Al (1 stress, H)	Al (2 stress, H)	contrast	Al (RH)
UR	puddi'ng+tallri'k+puddi'ng				
	a pu'ddingta'llrikpudding	*	*	* * *	*
	>b pu'ddingtallrikpu'dding	/	/	* * *	*
	cpuddingta'llrikpu'dding	*	/	* * *	*

The constraint Al (2 stress, H) ensures that candidate (b) is the optimal form, as compared to (c) which is equally optimal in terms of the other constraints. Candidate (a) is ruled out by both Al (1 stress, H) and Al (2 stress).

In this account, the placement of high tones in simple words and compound words involve one constraint ranking that applies to both simple words and compound words in the same way.

4.2 An Intermediate Stage?

An important question in current OT literature is the requirement of intermediate representations. While most standard work in Optimality Theory has shunned the intermediate representations, I have not found a satisfactory parallel derivation for the R-high dialects of Swedish, the crucial problem being the following: lexically marked suffixes that appear later than the second syllable do not have any ramifications in the surface representation of tone. This is dealt with straightforwardly if we posit an intermediate level where these high tones are deleted from the computation; but a pure parallel system does not have this as an option.

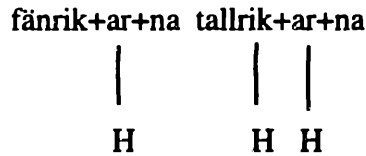
In the underlying representation, all accent II morphemes are associated to a high tone. However, as argued above, only the high tone associated to one of the first two syllables is considered in the computation. We know that a lexical tone later than the second syllable is not reflected in the surface pronunciation, as the following minimal pair from the R-High dialect shows:

(41)

fänrik+ar+na	tallrik+ar+na
H	H H

These are the surface forms of the following UR's:

(42)

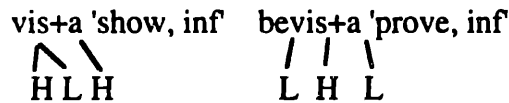


The high associated to /ar/ is not accessible to the computation. Otherwise, 'the officers' would have a H on the final syllable just like 'the plates'.

Similarly, we noted that stems with prestress syllables generally do not have accent II, even when an accent II suffix is in the post-stress syllable.

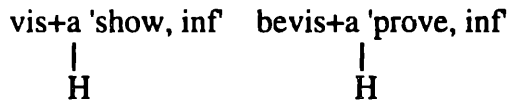
Minimal pairs like the following will be remembered:

(43)



These correspond to the following UR's:

(44)



The infinitive suffix has a high tone associated to it in UR, but this is not revealed in the surface form of 'to prove'. As illustrated below, the constraints provided incorrectly predict that the output of the word should take accent II, not accent I. In the R-High dialect, the candidate which is incorrectly chosen as optimal has a high tone on the right edge.

(45)

	Al (1 stress, H)	Al (2 stress, H)	contrast	Al (RH)
UR bevisa'				
a bevi'sa	/	/	*	*
>b bevi'sa'	/	/	/	/

If the high tone on the suffix is in the computation, candidate b is incorrectly chosen as more optimal than candidate a, the actual form. This is the case by virtue of Contrast. It should be preferable to have a candidate which has accent II, thereby revealing the accent II in the UR, rather than a candidate which has accent I, since there is no accent I morpheme in the UR. Also, the Alignment of high tones on the right edge is violated by the actual output, but maintained in the candidate b, but this is ranked sufficiently low that it does not determine the output form.

Naturally, one could force a parallel system to capture the facts, by encoding the association to the second syllable in the definition of Contrast:

(46)

Contrast (syl 2) Surface representations should
distinguish the presence/absence of a lexical high
tone on the second syllable.

But this amounts to no more than a description the facts. As far as I know, no Contrast condition similar to (28) has been shown to apply in other languages.

Instead, I suggest that high tones associated to syllables later than the second syllable are deleted in an intermediate level. Then those high tones are no longer part of the representation in which the Contrast constraint applies. I formalize the rule of lexical high tone deletion as follows:

(47)

Lexical high Delinking

$$\begin{array}{c} \text{H} \\ | \\ \# \text{ S S} \dots \text{S} \end{array}$$

The word is then evaluated by ranked constraints in the usual fashion.¹⁵

5 A Bracketed-Grid Account

In this section I apply the grid-bracketing approach to prosodic computation developed by Halle and Idsardi (1994) to the Swedish accent II data. Here, accent II involves a bracket after the second grid-mark on the word; accent II is a reflex of tertiary stress.

This grid-bracketing system is an extension of the grid-bracketing system developed by Halle & Vergnaud (1987), where prosody is calculated by means of a grid with parallel lines of marks and parentheses. This plane is distinct from the plane of syllable structure. Stress-bearing units project a mark to the first line of this grid; metrical constituents are groupings of these marks. Metrical grids are constructed by two mechanisms. One mechanism projects a subset of the marks on a given line onto the next line. Another mechanism inserts brackets, thereby grouping the marks of a given line. Brackets are inserted in the computation--e.g. edgemarkings (e.g. LLL, read: Left bracket to the Left of the Leftmost slot)--or lexically, by idiosyncratic markings. A distinguishing aspect of the framework is the notion that unbounded constituents count as grouped. A left/right bracket bracket groups

¹⁵Note that tones on the first syllable are not delinked. I have stated the Lexical High Delinking in this fashion, as it seems like a natural phonological rule to have tones licensed within a two-syllable window, rather than deleting all lexical high tones except those associated to the second syllable. However, this leaves the possibility of monosyllabic stems with lexical high tones, which are unattested in Swedish. For example, I cannot rule out the possibility of a monosyllabic word that should trigger accent II when associated to an accent I suffix. Also, I cannot rule out a polysyllabic stem with a lexical high tone associated to the first syllable.

The generalization that accent II involves a rise in F₀ in or near the second syllable suggests that accent II is represented by a high tone on the second syllable (and not on the first syllable).

It seems plausible that the lack of monosyllabic stems with a lexical high tone may involve problems of neutralization: there may be a ban on lexical high tones associated to stressed syllables, since these syllables surface with a high tone anyhow. (Norvin Richards, p.c.)

For the time being, I will merely stipulate the lack of lexical high tones on the initial syllable as a rule of Swedish, although clearly this should follow from other principles.

all elements to its right/left (but this grouping does not skip brackets). For example, consider the following bracketed grids:

(48)

```

      (xxx
      xxx)
      (xxx)
  
```

All of the patterns above are metrically identical. In addition to slots and brackets, the system features head-parameters (L(ef) and R(igh)), which determine which particular slot within a group is promoted to a higher level of computation. So if we have a grouping '(xxx', and the head-parameter Right, the rightmost mark projects to the next line. If we have the same grouping with head-parameter Left, the leftmost of the three marks projects to the next line. There can be several lines in a grid, corresponding to several levels of prosodic prominence.

In this section, I apply this system to the Swedish facts, to capture the accent II facts of simple words and compounds. The rightward spreading of high tone in an accent II word is most clearly represented in this system by having an unbounded grouping starting at the second syllable flanked by a left bracket, such that the grouping ends at the edge of the word:

(49)

```

      tal    rik    ar    na
      x    (x    x    x
  
```

The high tone, in this account, is a manifestation of secondary prosodic prominence (but, unlike Jensen's (1980) account, it does not correspond to word stress). The lexical distinction accent I/II is represented here with a left

bracket associated to the slot in the bracketing grid. Accent II is a left bracket before the second grid-mark:

(50)

tall rik
x (x

Accent I lacks such a bracket:

(51)

fän rik
x x

Since the accent II lexical marking is irrelevant after the second syllable, we must posit a rule of bracket-deletion:

This rule makes the following deletion:

(52)

fän rik ar --> fän rik ar
x (x (x x (x x

To illustrate how this rule and the head-parameters and edgemarkings derive the correct output in a simple Swedish words of type I and II, I will go through a sample derivation of /fä'nrik+ar+na/ 'the military officers' and /ta'lrikarna/ 'the plates'.

The basic parameters that I assume in the word-level are the following:

(53)

line 0: RRL, Heads R¹⁶

line 1: LLL, Heads L

¹⁶This assigns initial stress to the words. This is a simplification of the facts, in the interest of exposition--see Schmid (1986) for the multivaried patterns of Swedish stress.

accent II stems bear a left bracket before the second grid-slot (LRL). Accent II suffixes a left bracket before their leftmost (or unique) grid-slot.

(54)

LEXICAL BRACKET DELETION

(--> 0/ x_

By convention, this does not apply to 'x)(x'.

The words enter the computation with Lexical left brackets:

(55)

UR	0	fan	rik	ar	na		tal	rik	ar	na
		x	x	(x	x		x	(x	(x	x
RRL	0	x)	x	(x	x		x)	(x	(x	x
LEXICAL BRACKET DELETION										
	0	x)	x	x	x		x)	(x	x	x
h:R	0	x)	x	x	x		x)	(x	x	x
	1	x					x			x
LLL	0	x)	x	x	x		x)	(x	x	x
	1	(x					(x			x
h:L	0	x)	x	x	x		x)	(x	x	x
	1	(x					(x			x
	2	x					x			

After assigning the RRL, we apply lexical bracket deletion, since lexical marking later than the second syllable is irrelevant to the computation.

Next, a right bracket is inserted after the stressed syllable. Since these words are stressed word-initially, they have a right bracket to the right of the leftmost slot.

For projection onto the next line, the head-parameter Right is set. This ensures that stressed syllables and the rightmost syllable after a non-deleted lexical Left bracket project.

Since the stressed syllable is more prominent than the final syllable in accent II words, the edgemark LLL on line 1 and the head-parameter L are set.

Working with the assumption that high tones are manifestations of prosodic prominence, the Halle-Idsardi system derives the outputs with appropriate prosodic complexity on the syllables with high tones. In the case of an accent I word, the first syllable is prosodically the richest. In the case of an accent II word, the first and last syllable are the most prominent (with the first being more prominent).

The compound-word module calculates with the full bracketed grid of each simple word as its input. To capture the facts of high tone distribution in compound words, the Halle-Idsardi approach would first require a step of conflation, whereby the distinction of accent I and II is obliterated. (Recall that the lexical marking is irrelevant in compounds.). The following edgemarkings and head-parameters derive the correct facts:

(56) line 2: RRL, LRL, Heads R
 line 3: LLL, Heads L

The following derivation shows how the correct output is generated:

(57) Derivation of a triple compound

UR: talriks+puddings+fänrik (II+II+I)

output of word level:

	tal	riks	pud	ding	fän	rik
0	x)	(x	x)	(x	x)	x
1	(x	x	(x	x	(x	
2	x		x		x	

conflation

0	x)	(x	x)	(x	x)	(x
2	x		x		x	

RRL, LRL

0	x)	(x	x)	(x	x)	(x
2	x)(x		x	

heads: R

0	x)	(x	x)	(x	x)	(x
2	x)(x		x	
3	x				x	

LLL

0	x)	(x	x)	(x	x)	(x
2	x)(x		x	
3	(x				x	

h:L

0	x)	(x	x)	(x	x)	(x
2	x)(x		x	
3	(x				x	
4	x					

The output of the word-level serves as the input to the compound calculation. I assume that all the prosodic words that make up the compound are put together and computed at once.¹⁷ Conflation takes place, deleting line 1 of the word level calculation, neutralizing the accent I/II distinction.

¹⁷The facts of Swedish secondary stress force a departure Halle and Vergnaud's treatment of secondary stress for English and German. Cyclic computation would be incorrect, since (as we saw above) the morphological bracketing is irrelevant for the location of high tones in compounds.

The edgemarks RRL and LRL are set. These brackets, along with the Right head-parameter, make the leftmost and rightmost brackets on line 2 project; i.e. the first and last stressed syllables project. Since the second of these groupings is unbounded on the Right edge, it correctly predicts that no matter how many stressed syllables project onto line 2, the rightmost one projects to line 3.

The LLL edgemarking and L head-parameter on line 3 ensure that it is the main stress in the leftmost word that is the most prominent syllable in the compound. The resulting bracketing correctly predicts that the two most prominent syllables in the compound /tal'rikspuddingfän'rik/ are the main stress in the leftmost word and the main stress in the rightmost word. By later processes, these two most prominent syllables are associated to high tones.

The Halle-Idsardi bracketed grid derives the correct output in affixed stems and compound words. The similarity is technically manifested in identical parameter settings (edge RRL, LRL and heads R) on lines 0 (in the simple word) and line 2 (in the compound word).

6 Previous Formal Accounts of Accents I and II

In this section, I evaluate some attempts to account for the phonetic realization of accent I/II in the literature, and I show that they do not predict the R-high facts.¹⁸

¹⁸As I am only focusing on accounts that deal with the accents in terms of notions in UG, I will not discuss formalizations like Öhman (1966), Telemann (1969), Lindau (1970), and Elert (1972). These are formalized descriptions of the environments where the accents occur. These accounts are not concerned with the underlying representation of the tones in terms of UG, and are therefore not immediately relevant to my project.

6.1 Jensen (1980)

The central claim of Jensen's analysis is that accent II always involves secondary stress; that is, every word with accent II is a compound, as far as stress computation is concerned. Accent II affixes are inherently stressed. Accent II stems are marked with final stress, which percolates to the the main stress syllable by the abstract, lexically marked rule of retraction.

For example, the accent II word /se'nap/ 'mustard' is listed in the lexicon as stressed on the final syllable, just like the /sena't/'senate', which surfaces with final stress. Since 'mustard', as opposed to 'senate' is lexically marked for Retraction, the stress becomes also realized on the first syllable.

His analysis is untenable, as we have noted that the manifestation of accent II is quite different in simple affixed words as compared to compound words. In particular, we have noted that in a simple word, accent II involves lexical marking, whereas in a compound word it does not. Furthermore, we have noted that the tonal contour of simple words is unlike that of compounds in R-High dialects: compounds have the second high tone on the rightmost stressed syllable, whereas simple words have it on the rightmost syllable, which does not receive secondary stress. Since the affixed words and compound words differ both in the licensing condition and their surface location, it does not seem reasonable to say that these are one and the same phenomenon.

Jensen's analysis suffers another conceptual weakness. The crucial assumption underlying his analysis is the claim that all accent II phenomena involve stress. However, it can be shown the syllables that are lexically marked with a high tone are in fact distinct phonotactically from stressed syllables.

Stressed syllables in Swedish always feature a branching nucleus (long vowel) or a branching rime (coda consonant), modulo word-final consonant extrametricality¹⁹. The following words exemplify a branching rime under stress:

(58) Branching rimes under stress

/ma¹.ta/ 'Malta'
 /ka¹.la/ 'to call'
 /ka¹(l)/ 'cold'

The following examples show a branching nucleus:

(59) Branching Nucleus under stress

/ha: ¹ .ge/ 'field';	* /ha ¹ .ge/
/ta: ¹ (g)/ 'grasp';	* /ta ¹ (g)/
/ta: ¹ / 'to take'	* /ta ¹ /

Note that if a word is an open (stressed) monosyllable, it must surface with a long vowel. an Underlying Representation /CV/ *must* surface as /CV:/.

Now, if high tone always involved stress, then we would expect a simple accent II word like /fli¹kk+a/ (girl, fem theme vowel) to surface as */fli¹kka:¹/, with a long vowel, just like the compound /fli¹k:+ka:¹(p)/ 'theft of a girl' (from /flik:/ 'girl' and /ka(p)/ 'theft') The actual output form [fli¹kk+a] for the simple accent II word would be predicted to be ungrammatical as a surface representation, since it violates the requirement of branching rime/nucleus under stress, just as the surface form *[flik:+kap] (with a short vowel in /ka(p)/) is in fact ungrammatical. In general, the association of high tone to a syllable with a short vowel in an open syllable would be a puzzle to an approach like Jensen's.

¹⁹For discussion, see Schmid (1986), Löfstäd (1992) and references cited there.

6.2 Bruce (1978)

The account of accents I and II presented in Bruce (1978) (also Lorentz 1984, Schmid 1985) relies on the notion of mapping of a H-L-H template, with differing timings for accent I words and accent II words. This is to account for simple words, not compounds. For accent I, the low tone is associated to the stressed syllable, and the remaining highs are associated to the adjacent syllables (or else deleted). In accent II words, the first high tone is associated to the stressed syllable, the other tones being associated left-to-right. This is schematized as follows:

(60)

accent I	H	L*	H
accent II	H*	L	H

where '*' signifies alignment with stressed syllable

The following sample derivations show how the approach works in a accent I word /o+fänrik/ 'and military officer' (with a proclitic conjunction) and an accent II word /tallrik+ar/ 'plates':

(61)

o fä'nrik
 \ /
 H L* H

ta'llrikar
 |
 H* L H

o fänrik
 / \ /
 H L H

tallrikar
 / \ /
 H L H

This approach is empirically inadequate for the R-high pattern, for several reasons. First, the idea that the accent distinction can be reduced to a distinction in the timing of a pitch contour is untenable, given the R-high pattern: accent I features one high, and accent II features two highs. No variation in the timing of the contour will produce that effect.

One strategy to sidestep the problem of the double-high pattern is to view the contour as 'a stable precontour followed by a delayed and time compressed basic accent 1.' (Gårding (1977, 55)) But this is falsified by the R-High pattern:

(62)



It is immediately obvious that the precontour is not stable, but varies depending on how many syllables intervene between the stressed syllable and the final syllable. For every syllable that is added to the word, there is one more low tone syllable in the contour before the second high.

So the account of Bruce (1978) is empirically inadequate for the R-high dialects of Swedish. Withgott & Halvorsen (1985) have argued that the account also fails to account for the data of Norwegian. It seems *a priori* likely that all the Scandinavian tonal accents involve identical or similar underlying representations. Since Bruce's proposal fails to capture the facts of

the R-High dialects and the East Norwegian facts, a different underlying representation should be pursued.

Empirical shortcomings aside, the theory as it stands has a deep computational complexity. It will be remembered that a lexical marking within the first two syllables determines the accent type of the word. In this account, all morphemes are marked with a timing of an F_0 contour, and that the word inherits its timing of the F_0 contour from the post-stress syllable. This would be exceedingly difficult to formalize.

6.3 Schmid (1986)

The account of accent I and II in Schmid 1986 (181, ff) suffers from empirical inadequacies as well, at least with respect to the R-high dialect. The account, which is highly similar to the account of Norwegian accent II in Withgott and Halvorsen(1985), has the following basic principles of tone assignment.

(63)

- (a) The default tone is L
- (b) acc II: stressed syllable --> H
- (c) No tone shifts postlexically

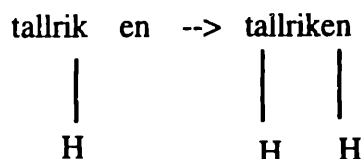
The second high tone in accent II words is not accounted for, but is 'part of sentence level prosody.' (Schmid 1986, 182). This, however, is not the correct way to approach the Swedish facts. While it is *necessary* for the second high to be licensed by sentence level prosody (i.e. focus), such licensing is not *sufficient* for its realization. Lexical information (tonal representation) is necessary to distinguish the cases where the second high surfaces in focus (accent II) from where it does not surface in focus (accent I).

A second problem lies in the ban on postlexical tone shifts. The ban on tone shifts is meant to capture the intuition that accent I fail to trigger accent

II after a monosyllabic stem (for example, /hund+en/ has no high tone on the second syllable). However, the distinction lexical/postlexical cannot be used to distinguish suffixes of type I and type II. A word like /nurd+isk+a/, shows that an accent I suffix can be affixed before an accent II suffix.

Interpreting the point on tone shifts merely as a claim about type I and type II suffixes, it is falsified by the R-high pattern. A type I suffix will indeed surface with a high tone if affixed to a stem of type II.

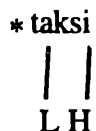
(64)



The lexical high tone on the second syllable surfaces on the type I suffix /en/.

A second problem for Schmid's (1986) account of the accents is that it predicts that accent I words will feature a high tone after the stressed syllable. While this is apparently what happens in Norwegian (as in Withgott & Halvorsen (1985)), I have seen no evidence that this happens in Swedish dialects. She predicts that following output for an accent I word under sentential stress (focus):

(65)



This is just the opposite of the actual citation form:

(66)



Descriptive inadequacy aside, Schmid's accounts of the pitch accents do not even begin to address the question of how the accents are represented in underlying representation. All the computation assumes that the accent-type of the word in question is already known.

6.4 Computing Accent: Withgott & Halvorsen (1985)

In this section I will discuss Withgott and Halvorsen's (1984, 1985) algorithm for determining the accent type of a given word.²⁰ I will argue that their account is unnecessarily complex, and empirically problematic, at least for Swedish.

Morphemes are marked in the lexicon as being associated to a high tone, or else being unmarked. This is the familiar accent I/II distinction. Furthermore, there is a tone-neutral class of suffixes, which do not influence the tone of the final form. Also, affixes are marked in terms of dominance. Weakly dominant affixes 'contribute tone when combined with a non-derived base.' Strongly dominant affixes 'also impose tone on derived forms.' (Withgott & Halvorsen (1985, 282)). Finally, category information determines accent: the morpheme /om/ is associated to a high tone when it is a verbal prefix, but a low tone when it is a nominal prefix. Lexical marking, dominance, and category information interact to determine the accent type of a word

Basically, a hierarchy is involved in determining the accent. If the word features a strongly dominant affix, this affix determines the accent. For example, while /ferd+sel/ 'traffic' has accent I, the addition of the strongly dominant accent II affix /ut-/ triggers accent II.

²⁰They go over both simple and compound words. I will only focus on the simple words in their analysis.

(67)

/ferd+sel/ 'traffic' (accent I) + /ut-/(acc II) --> /ut+ferd+sel/ accent II

If there is no strongly dominant affix, a weakly dominant affix determines the accent. This is illustrated in the following pair:

(68)

/latter/ 'laughter' (accent I) + /-lig/ (acc II)--> /latter+lig/ accent II

In example (67) above, the word /ferd+sel/ includes the type I weakly dominant affix /sel/. The attachment of the strongly dominant type II affix /ut-/ determines the accent of the word, irrespective of the type of the weakly dominant affix /sel/.

If there is no dominant affix at all, the accent of the word is determined by an algorithm involving the stem and the following suffixes. There is a rule associating a tone to the stressed syllable. Monosyllables are inherently stressless, stress being a comparative notion, so they do not have any tone associated to them in the lexical level. The lexical high tone associates to the stressed syllable; otherwise a low tone is inserted by default. The surface phonetic reflex of the tonal distinction in East Norwegian involves a tone on the stressed syllable, a low tone for accent I words and a high tone for accent II words. The algorithm of stress assignment goes morpheme by morpheme rightwards from the stressed syllable. Since there is no tone erasure, the word's tone is determined by the first suffix if the stem is a monosyllable. If the stem is a bisyllable--and therefore stressable--it determines the accent type of the word.

Strongly dominating affix and neutral affixes play no role in Swedish phonology. As Schmid (1986, 79) notes, the Swedish cognates to the examples of strongly dominant affixes are prosodic words.²¹ The examples of strongly dominant affixes /ut-/, /om-/, /på-/, and /u-/ (Withgott & Halvorsen (1985, 282)) correspond to Swedish /ut-/, /om-/, /på/, and /o-/. Their prosodic status as words is evident from segmental considerations and from prosodic considerations. The open prefixes /ut/, /på-/, and /o-/ always surface with long vowels. Since a vowel is long iff it is in a stressed open syllable, as discussed above, we have evidence that they are in fact stressed.

Their status as prosodic words is also apparent when one considers the tonal patterns in the R-High dialects. If they are prosodic words, we expect all words that involve such prefixes to be prosodically like compounds. In particular, we expect one high tone to appear on the stressed prefix, and one high tone to appear on the rightmost stressed syllable. This is indeed the case. Some examples from Swedish follow:

(69)

/u't+ri'kes/	'international'
/u't+rikes+politi'k/)	'international affairs'
/u't+rikes+politik+speciali'st/	'specialist in international affairs'
/u't+ta'l+a/	'proclaim, inf'

So the notion of strongly dominant prefix is unwarranted in Swedish, given the segmental and prosodic facts. The behavior of these prefixes fall under the rubric of compound words.

²¹ More examples of such prefixes are /av-/ 'off-', /ur-/ 'ur-', /in-/ 'in-', /under-/ 'under', /sär-/ 'separate', /miss-/ 'mis-', . Suffixes are: /-bar/ 'able', /-dom/ '-dom', /-full/ '-ful', /-lös/ '-less', /-sam/ '-ant'.

Also, tone-neutral affixes have no role in Swedish tonology. The examples of a tonally neutral affixes that Withgott and Halvorsen provide is /-aktig/ ‘-like’, /-het/ ‘-ness’, and /-løs/ ‘-less’. In Swedish, the corresponding suffixes are prosodic words, like the prefixes mentioned above. Those tone-neutral affixes which feature a single extraprosodic consonant after a stressed open syllable have long vowels:

(70)

/feg+het/ [fe:’ghe:’t] ‘cowardliness’

/tid+løs/ [ti:’dlø:’s] ‘timeless’

Also, these suffixes are prosodic words. This can be seen in the R-High dialect, where the second high tone associates to the stressed syllable of these morphemes if they are the final morphemes in the word. The high tone does not surface on the final syllable:

(71)

/tju:’v+a’ktig/ ‘thief-like’

/fe’:g+he:’t+en/ ‘the cowardice’

/sø’mn+lø:’s+a/ ‘sleepless’

So the tonal influence of these suffixes falls under the rubric of compound words.

Notice that all the strongly dominant affixes are prefixes, and all the tone-neutral affixes are suffixes. Assuming that these affixes are prosodic words in Norwegian, as in Swedish, then their influence on the tonal surface representation can be derived from the compound rule of Withgott &

Halvorsen: 'the tone of the compound reflects the tone of the first member.' (1985, 287) If the first member of a compound determines the accent type of the compound, it follows without further specification that a stressed prefix--a prosodic word--will determine the accent of the compound. So strong dominance follows from the compound rule. Also, it follows from the compound rule that prosodic words later than the first syllable will not influence the accent of the compound. Since suffixed prosodic words will always be non-initial, tone neutrality follows from the compound rule.

If we carefully examine the notion of weakly dominant suffixes, it seems that this, too, is an unnecessary notion. These are postulated to deal with some exceptional cases where a type II affix triggers accent II when associated to a type I trochee. The only cases given in support of this involve epenthetic /e/ in the stem. For example, the stem /latter/ in /latter+lig/ can be given the UR /latr/²², in accordance with the fact that type I trochees ending in /er/ generally lacked the vowel before the /r/ in earlier stages of the language.

The exceptional nature of an accent II suffix like /lig/ determining word accent in the third syllable can be seen in the Swedish minimal pair /vi's+lig/ 'showable', with accent II, compared to /bevi:'s+lig/, with accent I. In all cases except for those with epenthetic /e/ before a sonorant, /lig/ must be in the second syllable in the surface representation in order to determine the accent of the word.

The issue of category information seems confused. The claim that a given morpheme can be marked in two ways depending on its morphological use is not coherent. Rather, there are two different homophonous

²²The same occurs in Swedish: /he:der/ takes accent I; /he:der+lig/ takes accent II. This suggests the UR /hedr/. This poses an interesting challenge for a parallel derivation as in OT.

morphemes. There is no need to account for any similarity or difference between two homophonous morphemes.

As the dominance hierarchy seems to be unjustified and category information incoherent, we are then back to an account of tonal contours that involve lexical high tone marking. Withgott & Halvorsen's algorithm makes the prediction that it is the morpheme associated to the post-stress syllable of the word that determines the accent of the word. This is not a tenable theory for the facts of Swedish, since it fails to account for the countless cases of post-stress accent II morphemes that fail to trigger accent II in the word (see (19)) Clearly, reference to the second syllable must be made.

With no feasible alternative available, I therefore assume that accent II in simple words involves a lexical high tone on the second syllable of the word.

7 Historical Evidence for a High Tone on the Second Syllable

The accounts of accent II provided above crucially rely on a marking--a high tone or a prosodic bracketing--on the second syllable, which is realized on the right edge of the word. It is often the case that phonological representations correspond to previous historical states of the language. Historical sound changes suggest that a high tone surfaced on the second syllable in accent II words.

A brief survey of some vowel changes in the transition from Old Swedish to New Swedish show that the second syllable in accent II words have a particular status. In particular, this syllable has been invulnerable to the vowel neutralizations that occurred in the second syllable of accent I words and in the third syllable of accent II words. I propose that the high tone on the second syllable of accent II words made the vowel more salient than

the second syllable of accent I words and the third syllables of accent II words, both of which were associated to low tones.

The bisyllabic comparative in Old Swedish in nominative singular neuter was /-ra/ (Kock 1878, 112). The regular comparative form of the comparative is /-re/ in New Swedish (an accent I suffix) as the following examples from Kock (1878, 113ff) show. The Old Swedish orthographic form is to the left of the arrow; the contemporary orthographic form is to the right. The roman 'I' and 'II' designates the accent that the word has in present-day Swedish.

(72)

værra --> *værrē* 'worse' (I)
störra --> *större* 'bigger' (I)

In some exceptional lexical items, the comparative form has a high tone associated to it. In these cases, the historical vowel was retained, as the following examples show:

(73)

fyrra --> *förra* 'previous' (II)
nyrra, nörra --> *norra* 'northern' (II)
syrra --> *södra* 'southern' (II)
östra --> *östra* 'eastern' (II)
væstra --> *västra* 'western' (II)
högra --> *högra* 'right' (II)
vinstra --> *vänstra* 'left' (II)

Apparently, the vowel in the comparative was neutralized only if the vowel was not associated to a high tone.

Similarly, the vowel in the superlative suffix centralized from /a/ to /e/ only in words which are now pronounced with accent I. The words which retained the vowel /a/ also retained accent II. The following show pairs of Old and New Swedish words, where the vowel remained /a/ and the word is now pronounced with accent II:

(74)

<i>hvitaster</i>	-->	<i>hvitast</i> 'white, sup'	(II)
<i>sannaster</i>	-->	<i>sannast</i> 'true, sup'	(II)

The list could be made much longer; the ending /ast/ is the normal superlative ending in contemporary Swedish.

In some exceptional words, the superlative lost the accent II; in all these sentences, the vowel became centralized to /e/.

(75)

<i>inn<u>a</u>rster</i>	-->	<i>inn<u>e</u>rst</i> 'inner, sup'	(I)
<i>yt<u>a</u>rster</i>	-->	<i>yt<u>e</u>rst</i> 'outer, sup'	(I)
<i>yw<u>a</u>rster</i>	-->	<i>ö<u>e</u>rst</i> 'topmost'	(I)
<i>n<u>i</u>p<u>a</u>rster</i>	-->	<i>ned<u>e</u>rst</i> 'bottom-most'	(I)

As in the comparative forms, the centralization is elegantly explained by reference to the absence of a lexical high tone. The high tone (accent II) makes the vowel in the second syllable salient, thereby hindering its centralization. The lack of a high tone on the second syllable renders the vowel perceptually non-salient, making it vulnerable to centralization.

The two contemporary variants of the Old Swedish word *þusand* 'thousand' (Kock 1878, 114) provide a minimal pair showing the correlation between accent II and vowel neutralization. It can be pronounced *tusegn*, with accent I, or *tusagn*, with accent II. The explanation involving tones and salience seems appropriate.

The following pairs of words, grouped by the last two sounds, show similar variation:

(76)

a	<i>Pet<u>a</u>r</i>	-->	<i>Pet<u>e</u>r</i>	(a name)	(I)
b	<i>Gunn<u>a</u>r</i>	-->	<i>Gunn<u>e</u>r</i>	(a name)	(II)
a	<i>lov<u>a</u>n</i>	-->	<i>lov<u>e</u>n</i>	'praise'	(I)
b	<i>klag<u>a</u>n</i>	-->	<i>klag<u>e</u>n</i>	'complaint'	(II)
a	<i>us<u>a</u>l</i>	-->	<i>us<u>e</u>l</i>	'bad'	(I)
b	<i>gam<u>a</u>l</i>	-->	<i>gam<u>e</u>l</i>	'old'	(II)

The a-words in the pairs are pronounced with accent I in contemporary Swedish, with a centralized vowel. The b-words are pronounced with accent II in contemporary Swedish, with a low vowel. The account provided above explains the difference.

So far, I have provided indirect evidence for the existence of a high tone on the second syllable in Old Swedish trochees. Below, I provide evidence that this high tone did not drift rightward as in the R-high dialect discussed in this paper. Instead, the high tone remained associated to the second syllable. The evidence for this claim comes again from vowel centralization. An accent II morpheme retained its full vowel quality when associated to the second syllable, but became centralized when associated to a later syllable. As suggested above, the maintenance of the vowel quality was contingent on the high tone. Kock (1878, 123 ff.) provides data showing that the (def. nom. sg. fem. and neut.) passive participle, verbal plural, (def. nom. fem. and neut.) superlative, (neut.) comparatives, and plural morphemes show this alternation.

The nom. sg. fem. and neut. definite form of the passive participle was /a/ in Old Swedish. The corresponding vowel in contemporary Swedish is /a/ if the morpheme occurs in the second syllable:

(77)

takna --> *tagna* 'take, nom. sg. fem./neut. def.'
köpta --> *köpta* 'buy, nom. sg. fem./neut. def.'

If the same morpheme occurred later in the word, the vowel was centralized to /e/:

(78)

ælskaþa --> *älskade* 'love, nom. sg. fem./neut. def.'
lusnaþa --> *lossnade* 'fall off, nom. sg. fem./neut. def.'

If the lexical high tone of accent II remained on the second syllable, the centralization is transparently accounted for.

The now archaic plural verbal morpheme /u/--which was still used at the turn of the century--shows a similar pattern of centralization to /e/. In the second syllable, the vowel remained full:

(79)

skutu --> *skotu*
gavu --> *gåfvu* 'gave, pl'

In a later syllable, the vowel was centralized:

(80)

ælskaþu --> *älskade* 'love, pl'
lusnaþu --> *lossnade* 'fall off, pl'

The definite nom. sg. fem./neut. superlative /sta/ is a third morpheme which followed this pattern. The following are examples of the vowel being maintained in New Swedish in the second syllable:

(81)

<i>længsta</i>	-->	<i>längsta</i> 'long, nom. sg. sup.'
<i>læghsta</i>	-->	<i>lågsta</i> 'low, nom. sg. sup.'

Predictably, the vowel is centralized in a later syllable:

(82)

<i>sannast<u>a</u></i>	-->	<i>sannast<u>e</u></i> 'true, nom. sg. sup.'
<i>hvitast<u>a</u></i>	-->	<i>vitast<u>e</u></i> 'white, nom. sg. sup.'

A fourth morpheme that follows this pattern is the neut. comparative /ra/. The vowel was retained in the second syllable:

(83)

<i>sy<u>pr</u>a</i>	-->	<i>sö<u>dr</u>a</i> 'southern'
<i>væ<u>str</u>a</i>	-->	<i>vä<u>str</u>a</i> 'western'

The vowel was centralized in later syllables:

(84)

<i>sannar<u>a</u></i>	-->	<i>sannar<u>e</u></i> 'true, neut. comp'
<i>hvitar<u>a</u></i>	-->	<i>vitar<u>e</u></i> 'white, neut. comp'

A fifth morpheme that follows this pattern is the nominal plural /ar/.

The vowel was retained in the second syllable:

(85)

<i>andar</i>	-->	<i>andar</i> 'spirit, pl'
<i>uxar</i>	-->	<i>oxar</i> 'bull, pl'

The vowel was centralized (and the /r/ dropped) in later syllables:

(86)

domarar --> *domare* 'judge, pl'
rövarar --> *rövare* 'pirate, pl'

Ample historical evidence shows that the high tone that lexically marked accent II on the second syllable remained on the second syllable in the surface representation, contrary to the R-high dialects. The presence of the high tone hindered vowel reduction, which was common in corresponding syllables with low tones, both second syllables and later syllables.

8 Other Dialects

If accent II involves a lexical high tone on the second syllable, we expect (R-High effects aside) that the most common realization of accent II should involve a pitch peak on (or immediately near) the second syllable. This is indeed the case.

Gårding (1977, 51 ff) has pitch tracts of various dialects of Swedish. Those dialects with one tone in the accent II pattern feature a high tone near or in the second syllable. This can be seen in pitch tracts that are provided for each of the dialects. In the dialect of Southern Sweden and Western Norway, the single high tone is late in the initial syllable. (Gårding (1977, 51)) In the dialects of Gotland and Bergslagen, the high tone appears in the second syllable. (Gårding (1977, 52))

Those dialects which have two high tones in accent II apparently feature the second one in the second syllable unless the dialect is a R-High variant. The dialect of Central Sweden has a high tone in the second syllable,

judging from Gårding (1977, 53); this corresponds to pitch tracts I have made of a native speaker from Stockholm. ²³

The following is a proposal of how to formalize the facts of the contemporary Central Swedish pattern. The constraints are as for the R-High dialect above, with the addition of 'Faithfulness', which hinders the delinking of the high tone from the second syllable:

(87)

Faithfulness: Do not delink a lexical high tone

Accent I words satisfy this constraint vacuously. The ban on multiply linked tones rules out any tone shifting to satisfy edge-alignment.

The following illustrates the role of faithfulness in simple words.

(88)

		Al (1 stress, H)	Al (2 stress, H)	Faith	Al(R,H)
UR	tallri'ken				
	>a ta'llri'ken	/	/	/	*
	b ta'llrike'n	/	/	*	/

The Faithfulness constraint hinders the high tone from conforming to the R-High pattern, as in candidate (b), which would be more optimal provided the Al (R, H). Because of Faithfulness, candidate (a) is the optimal candidate. Other than that, the calculation is as in R-High above.

²³It seems that Gårding's description of dialect 2B (Göta) is incomplete; this is the dialect of my informant. The accent I words come in two forms, occurring in free variation (as far as I know): both speakers of the Göta dialect that I have recorded mark the stressed syllable with either a low tone or with a high tone. If the low tone is chosen, the following contour is rising--the degree of its rising is variable. If the high tone is chosen, the contour is falling. However, the variability in accent I should be studied some more. Interestingly, the stressed syllable in an accent II word--simple or compound--is always associated to a high tone, never to a low tone. I believe that this is due to the fact that it would be difficult to discern the presence of the lexical high tone if the contour is rising, anyway. That is, the maintenance of contrasts dictates that the high tone associated to the stressed syllable be low.

In compounds, however, the second high tone is associated to the syllable with secondary stress, since Al (2 stress, H) is higher ranked than Faithfulness. I have removed the constraints on Cor_{contrast} for clarity.

(89)

	Al (stress, H)	Al (2 stress, H)	Faith	Al(R,H)
UR	puddi'ng+tallri'k+puddi'ng			
	>a pu'ddingtallrikpu'dding	/ /	*	*
	b pu'ddi'ngtallrikpudding	/ *	*	*
	c puddingtallrikpu'ddi'ng	* /	*	*

The facts result fall out of the interaction of Max 2H (unviolated and unrepresented, as usual), Al (1 stress, H), Al (2 stress, H) and Al (R, H). Fill violations do not take place, as there are lexical high tones in the representation.

9 A Note on Danish *Stød*

Standard Danish lacks a tonal accent I/II distinction. Instead, the type I words are pronounced *stød*, 'a momentary or near closure of the vocal folds' (Gårding (1977, 39)). The *stød*²⁴ occurs at the beginning of the stressed vowel. The words that correspond to accent II words lack this feature.

I have argued that, in Swedish, accent II involves a mark--a high tone--on the second syllable of the word. The Swedish accent I words lack this feature, and by default are pronounced with a low tone.

In Danish, it works in the opposite direction. The low tone on the second syllable--the accent I words--is marked by the *stød*, while the accent II words are unmarked.

²⁴Basbøll (1985) has shown that West Jutland *stød* involves different issues.

But is it feasible to consider the partial glottal closure as a manifestation of a low tone? It seems very plausible. Gårding notes: 'The acoustic effect of this speech gesture is *an abrupt fall in the fundamental frequency* followed by a short gap in the speech wave which may be interspersed by slow and irregular vocal fold vibrations.' (Gårding (1977, 39), italics mine) She continues:

According to an investigation by Riber Peterson (1973 and p.c. [to Gårding–I.L.]), the acoustic record of the *støds* produced by one subject did not display either gap or creak. The only manifestation of the *stød* was a dip in the pitch curve. It is perhaps this sudden drop of pitch that should be regarded as the common feature of all the *stød* variants. (Gårding (1977, 39 ff.))

Just as Swedish type II words feature a lexically marked high tone, Danish type I words feature a lexically marked low tone. The question of how the *stød* should be formalized, and what other tonal issues are involved in its surfacing will not be addressed in this paper, but now we are better prepared to tackle this and other interesting questions of Scandinavian tonology.

10 Conclusion

The pitch accents of simple words in Swedish are phonetic manifestations of lexically marked high tones on the second syllable. A high tone on the second syllable yields accent II; the lack of a high tone yields accent I. In the R-High dialects, as described in Noreen (1907), this lexical high tone is associated to the rightmost syllable of the word. In the same dialect, compounds feature two high tones, as well. One surfaces on the primary (=leftmost) stressed syllable, and one surfaces on the secondary (=rightmost) stressed syllable. These facts are readily formalized in an OT framework and in a bracketed grid; the previous accounts of Jensen (1980), Bruce (1978), and Schmid (1987) fail to capture these facts. The algorithm for

computing tone that is presented in Withgott & Halvorsen (1985) is argued to be unnecessarily complex for the Swedish facts. The idea of regarding accent II as a lexical high tone marking on the second syllable is supported by vowel-neutralizations in Old Swedish and tonal contours of various dialects. If Danish *stød* can be analysed as a lexical low tone mark corresponding to accent I, *stød* and tonal accents are unified as lexical tones.

11 Appendix: Pitch Tracks of an R-High Dialect (Småland)

Speaker: Bengt Löfstedt, the father of the author.

Frame: 'Det var __ jag sa.' ('It was __ I said.')

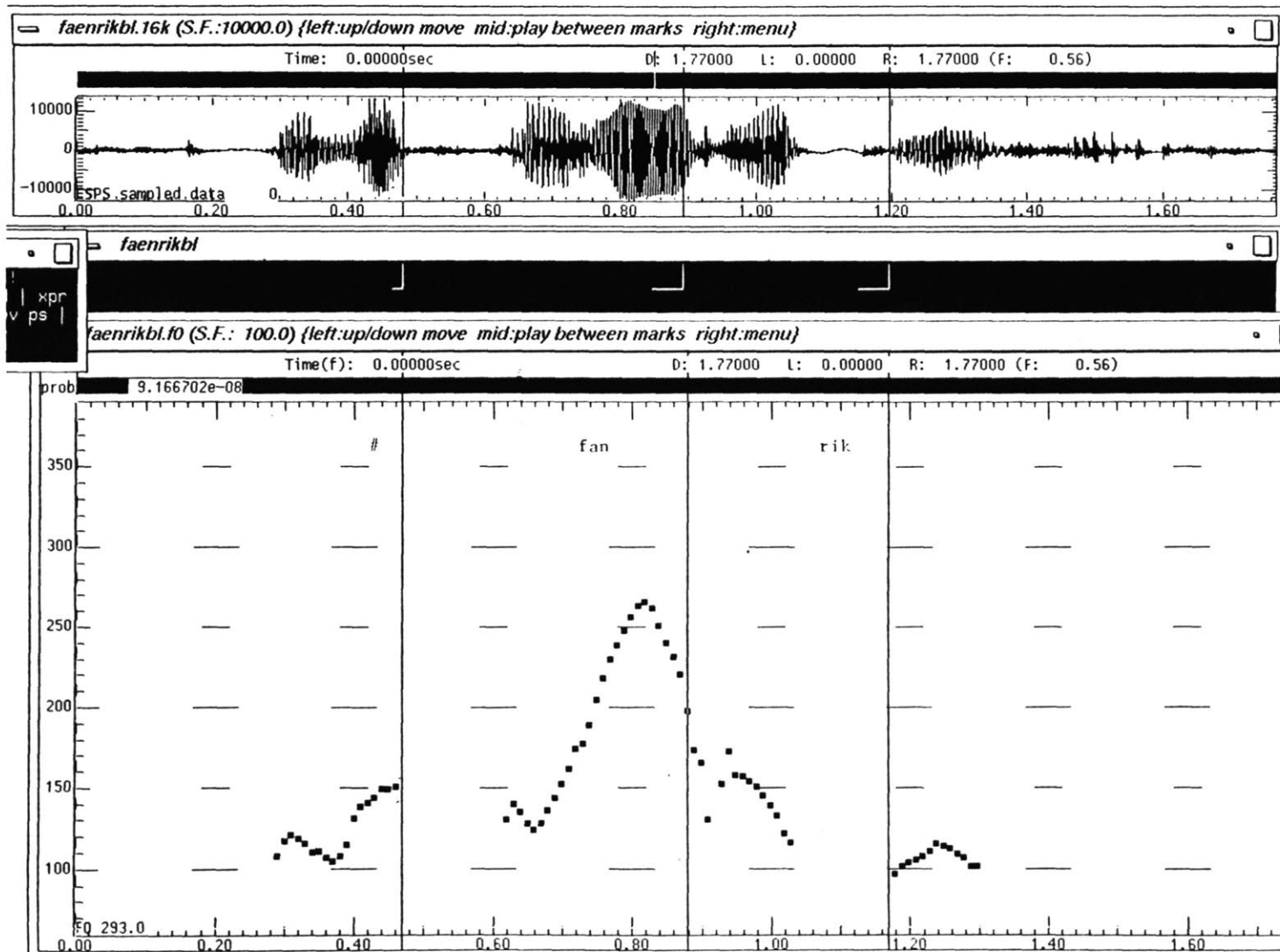
				accent
1	fänrik	(I)	'military officer'	I
2	fänrik+en	(I+I)	'the military officer'	I
3	fänrik+ar	(I+II)	'military officers'	I
4	fänrik+ar+na	(I+II+I)	'the military officers'	I
5	tallrik	(II)	'plate'	II
6	tallrik+en	(II+I)	'the plate'	II
7	tallrik+ar	(II+II)	'plates'	II
8	tallrik+ar+na	(II+II+I)	'the plates'	II
9	nord+isk+a	(0+I+II)	'nordic, pl'	I
10	nord+lig+a	(0+II+II)	'northern, pl'	II

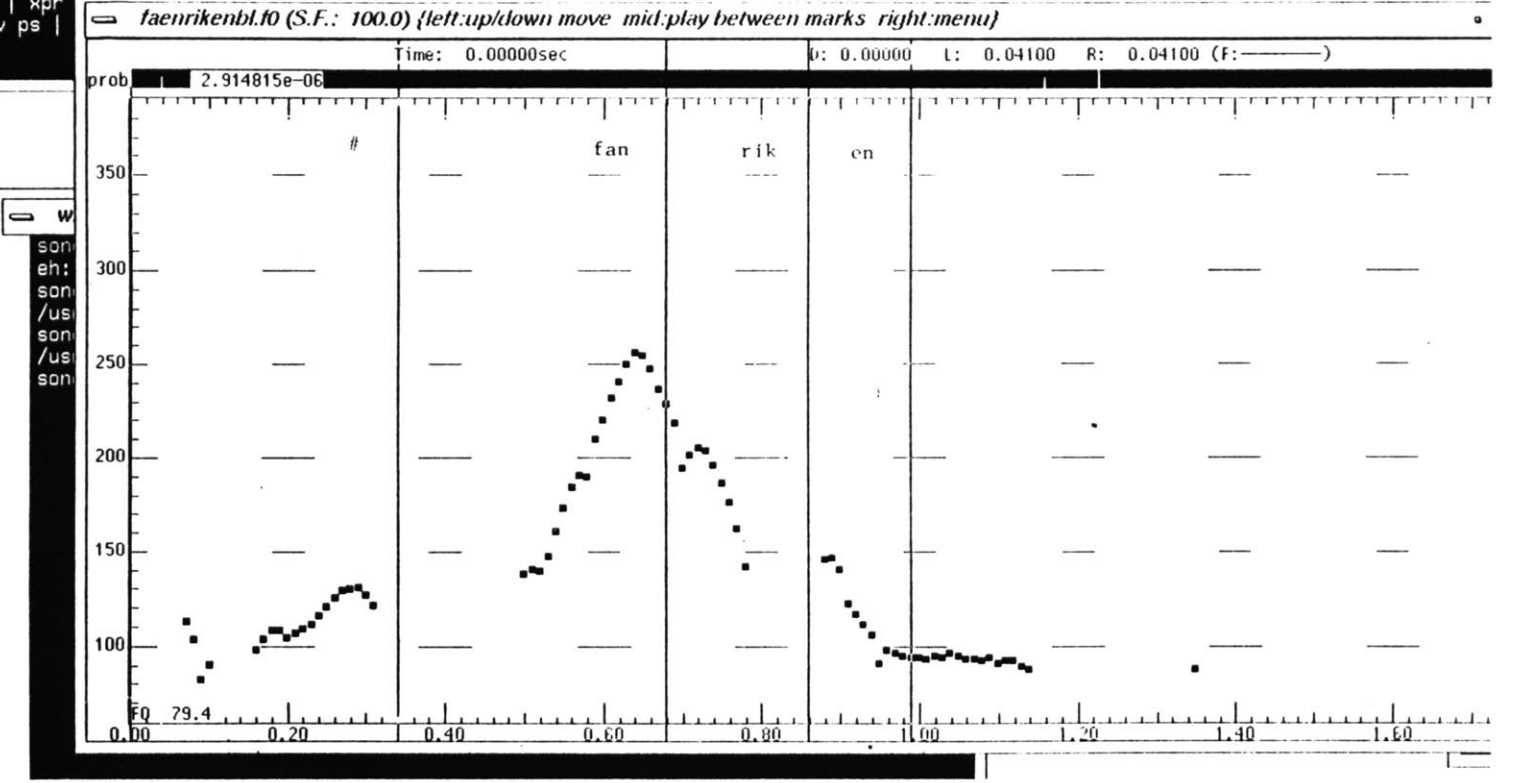
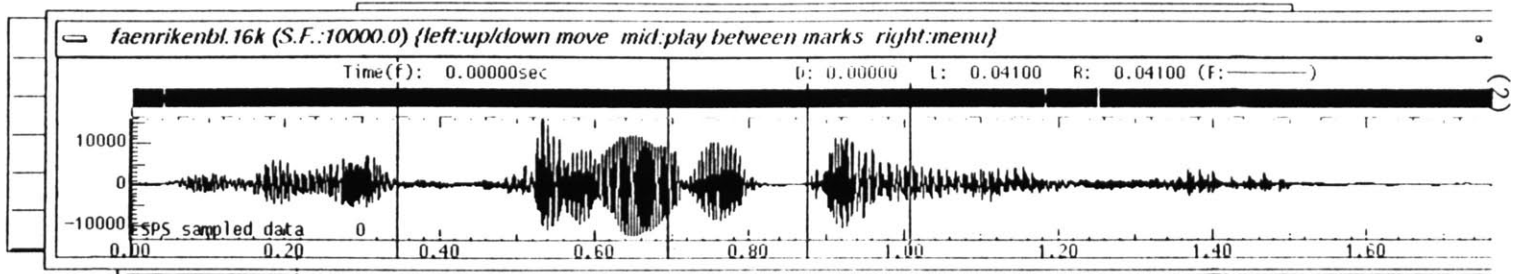
(a minimal pair showing the reflex of the second syllable)

11 provi'nsjärnvägsstationsföreståndare

'provincial railroad-station director'

(an example of a multiple compound)

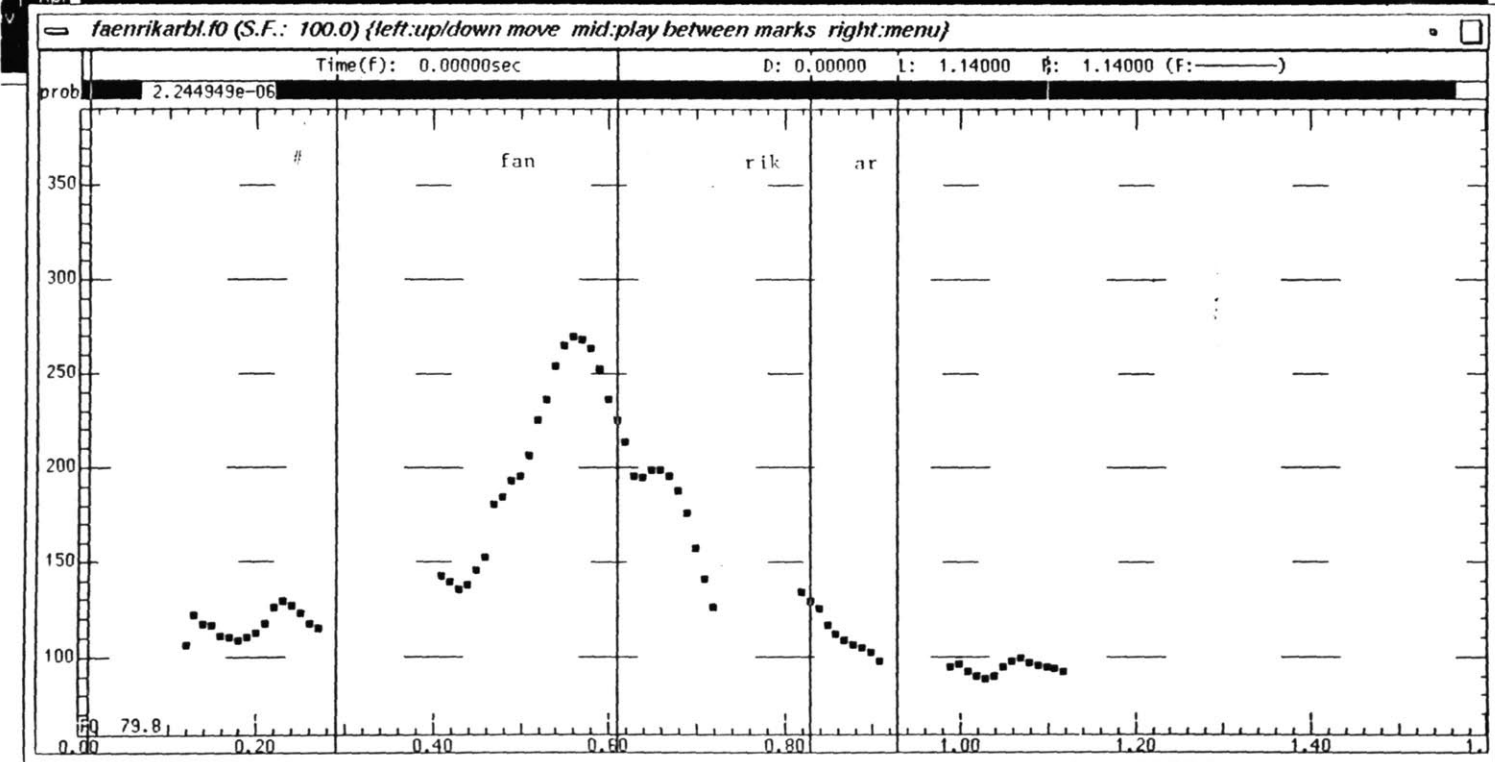
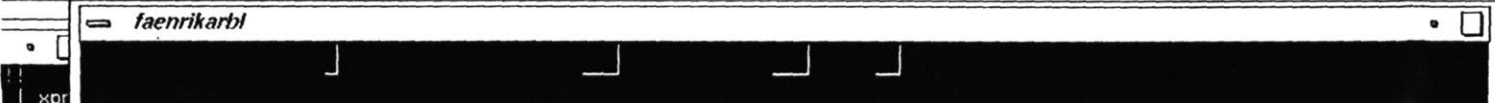
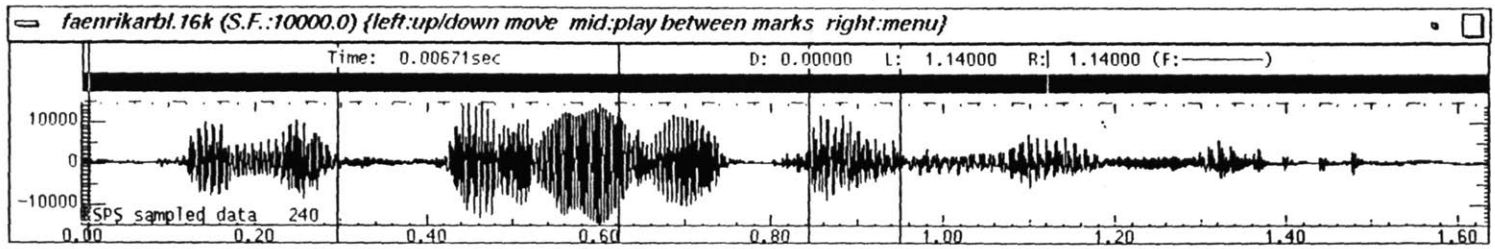


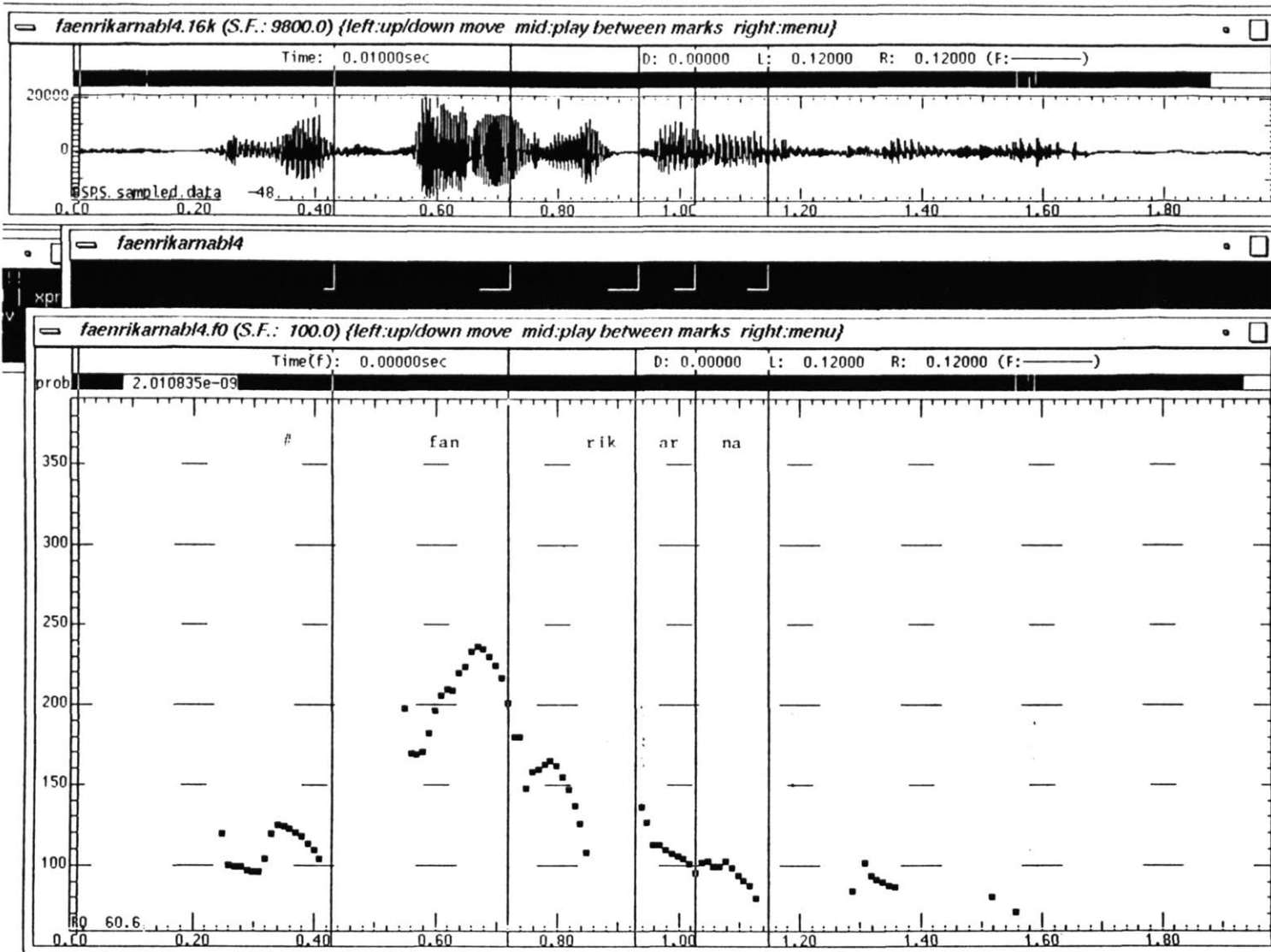


w
son
eh:
son
/us
son
/us
son

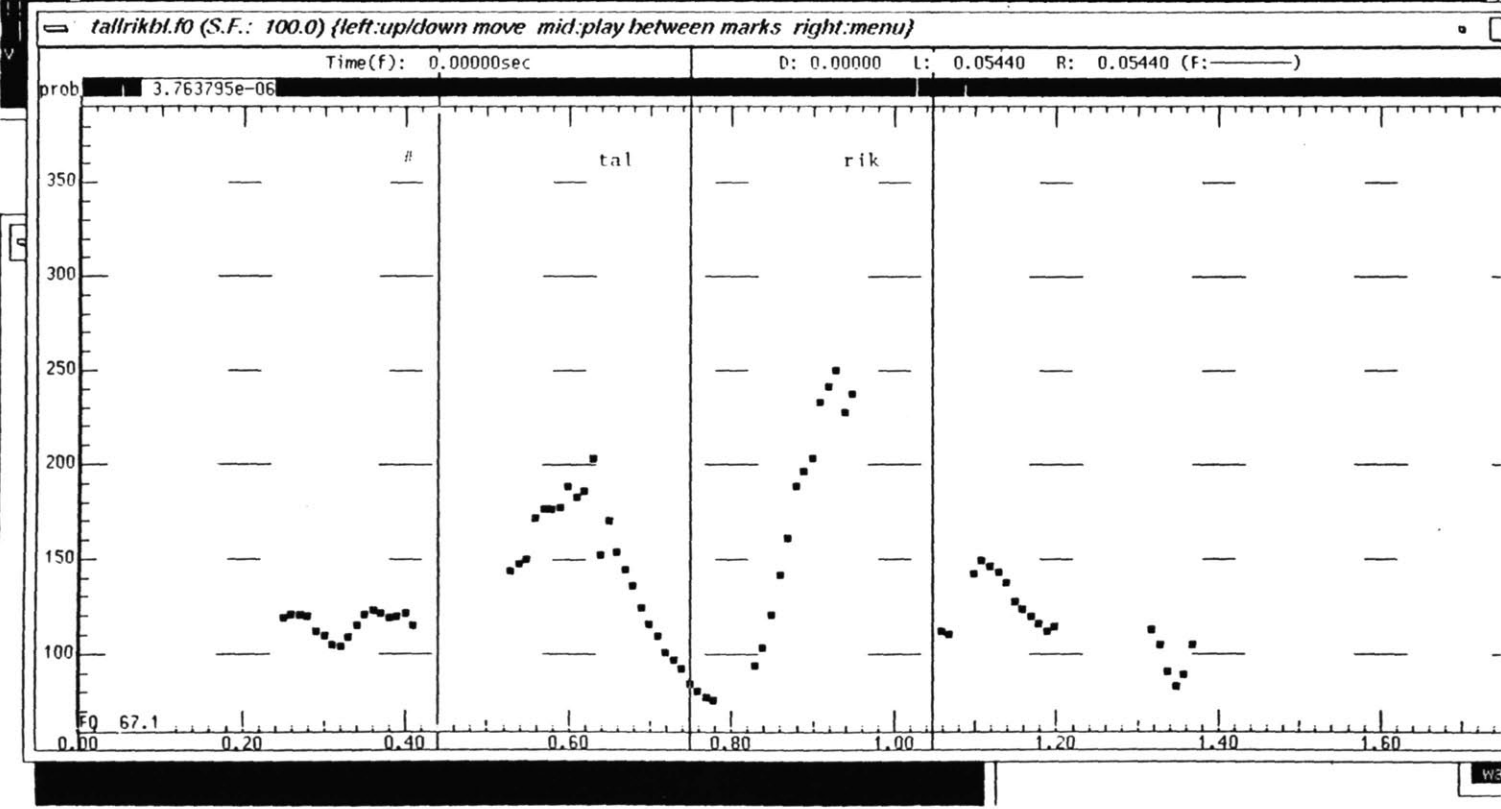
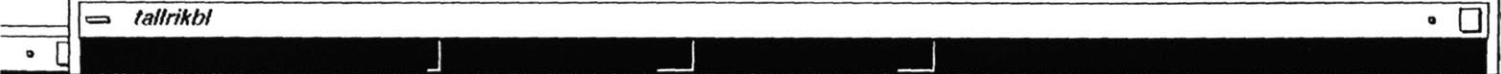
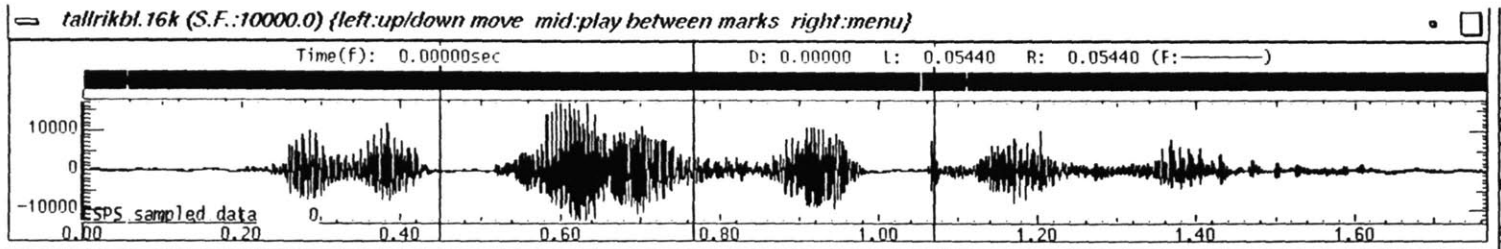
70

(2)



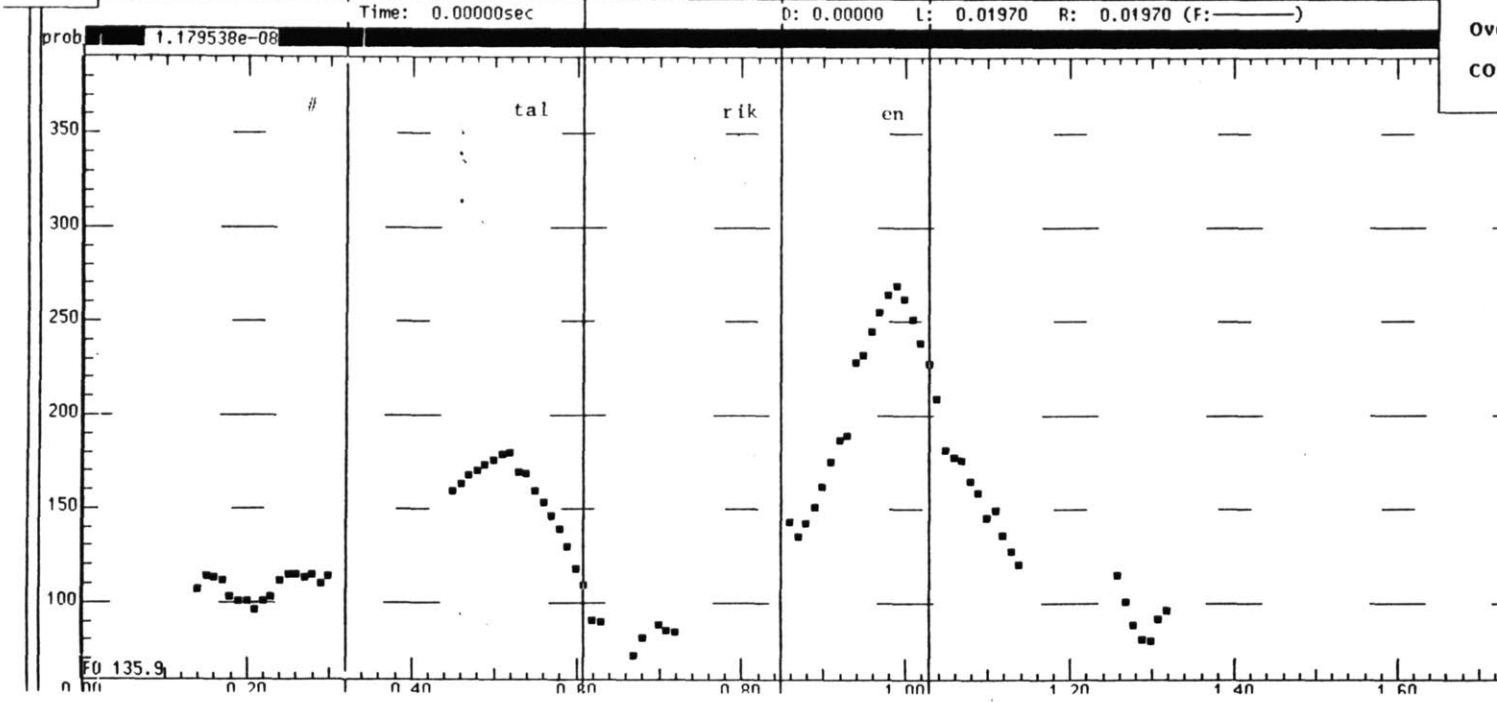
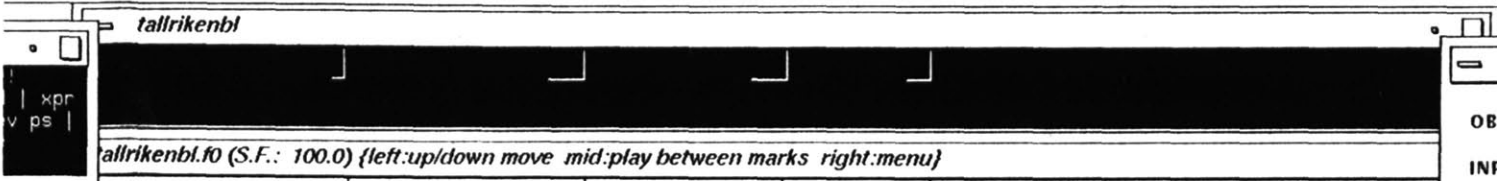
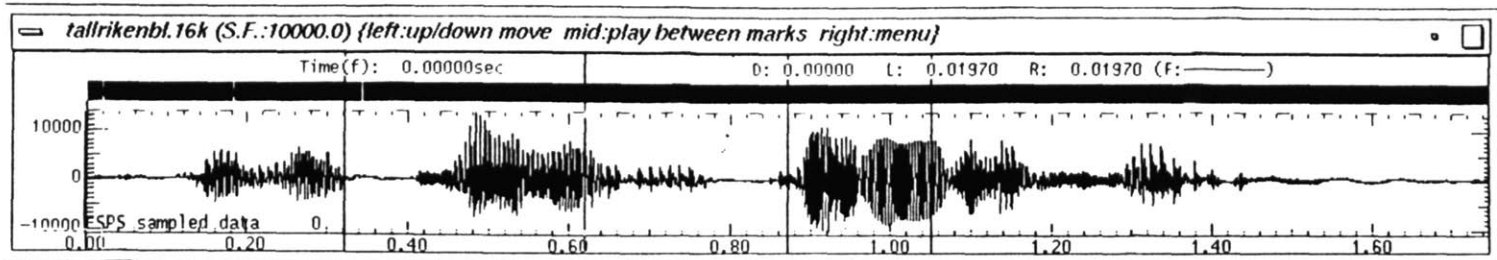


(4)

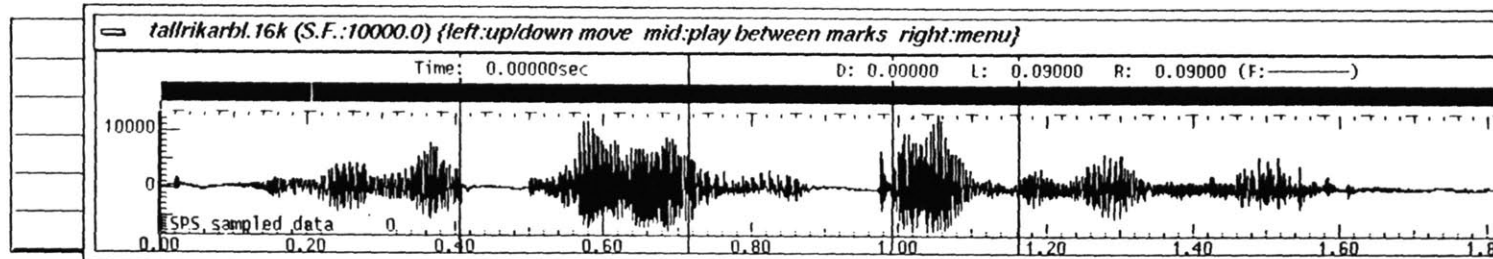


(5)

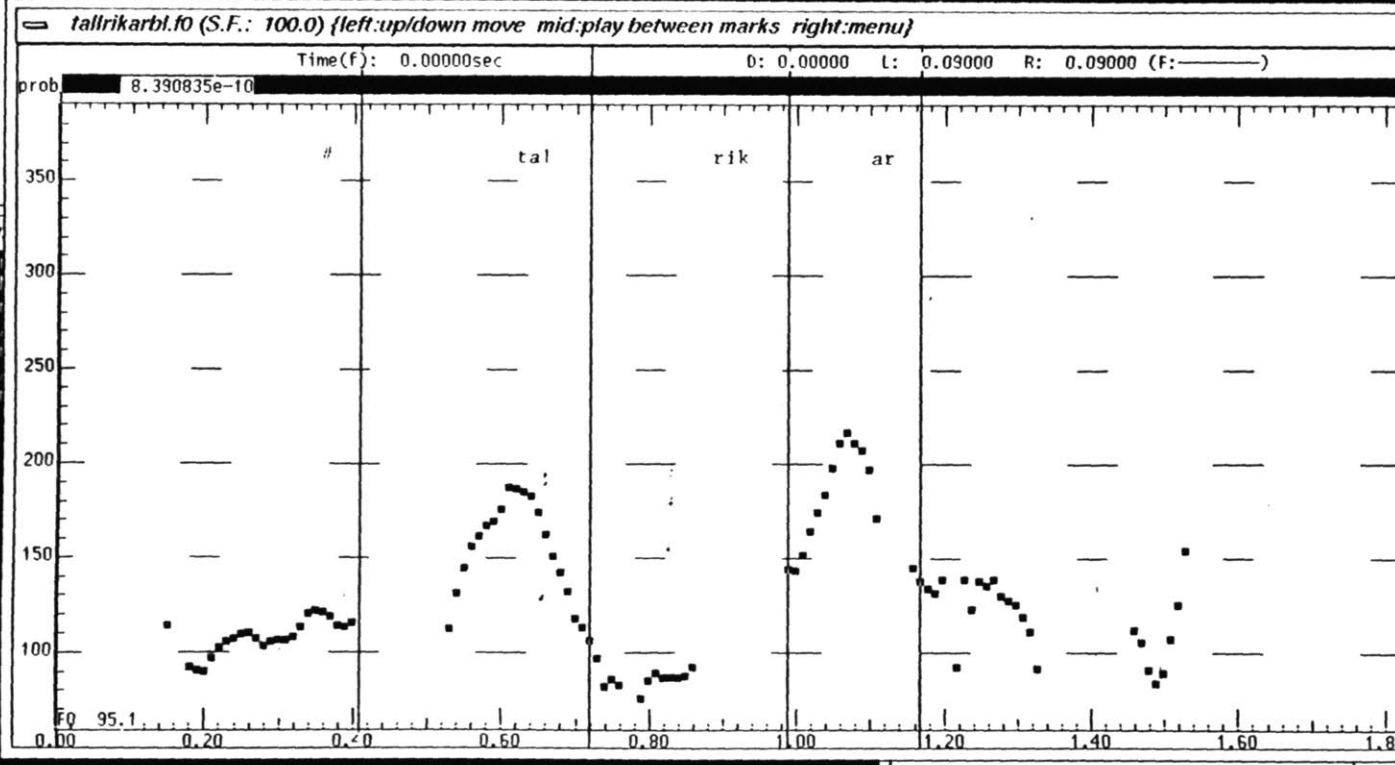
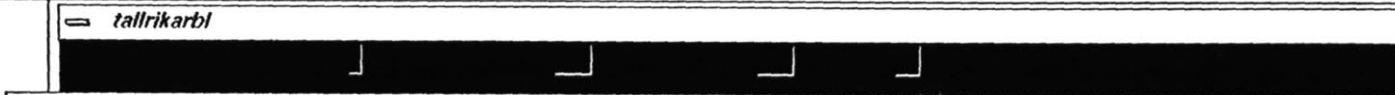
73



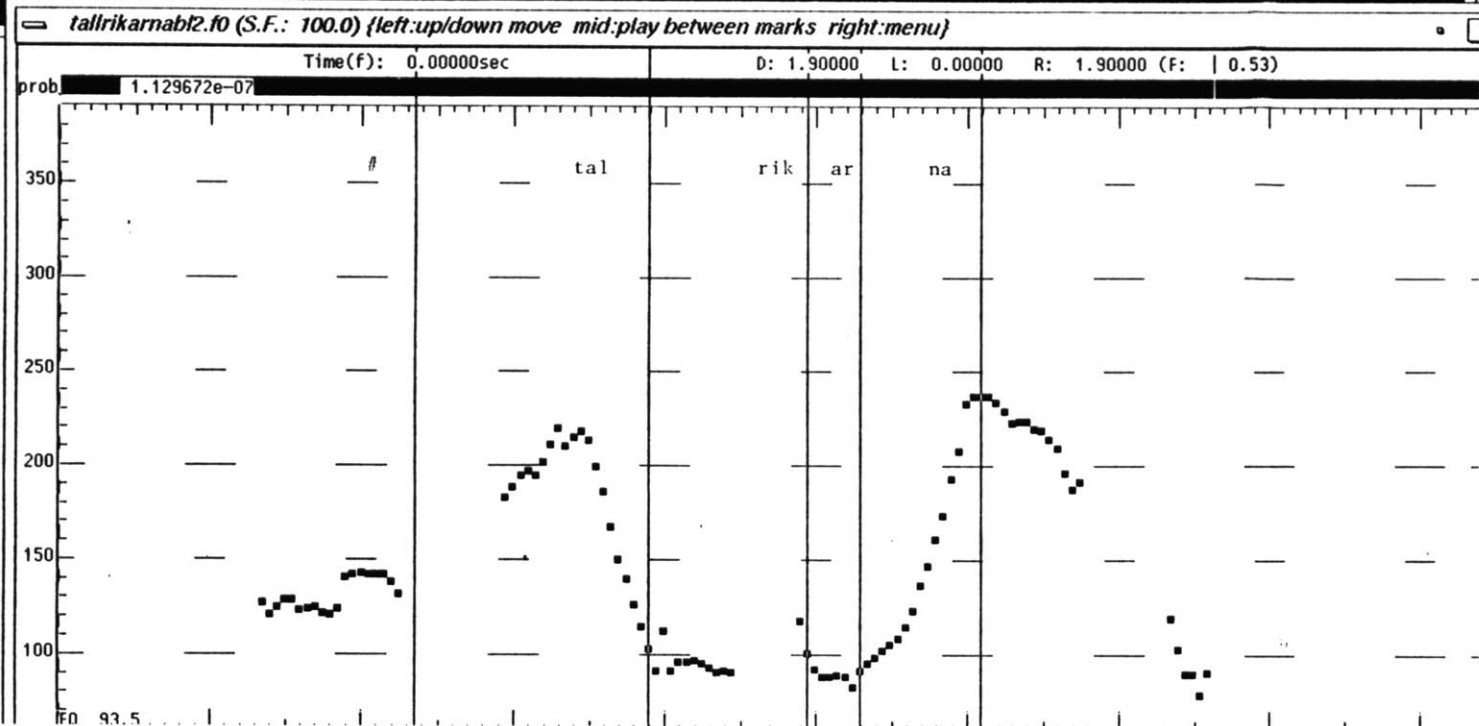
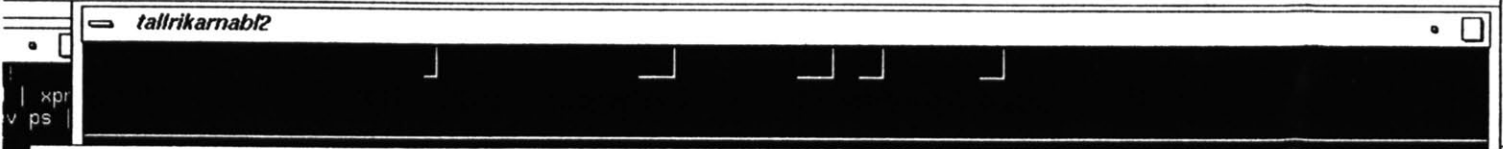
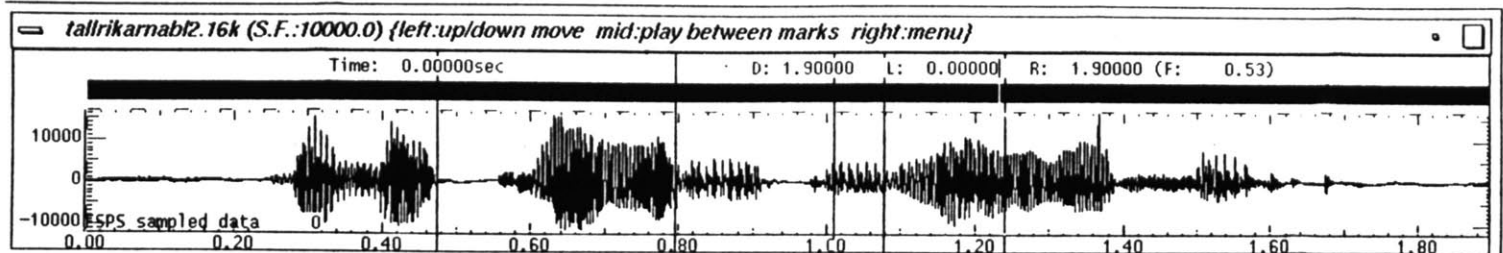
(9)



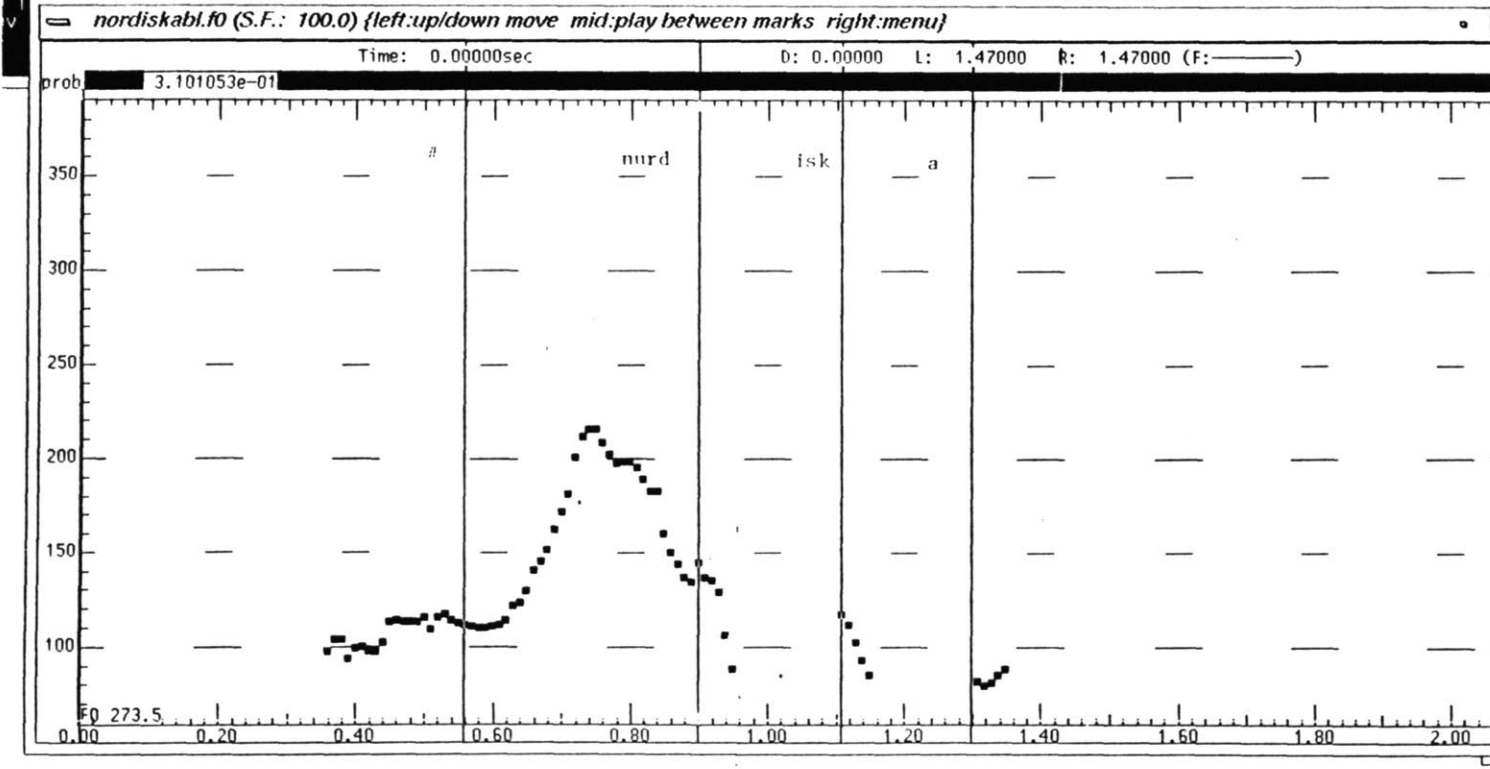
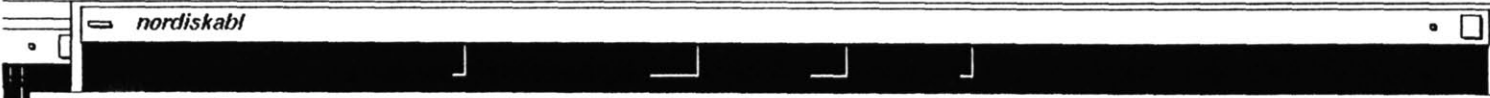
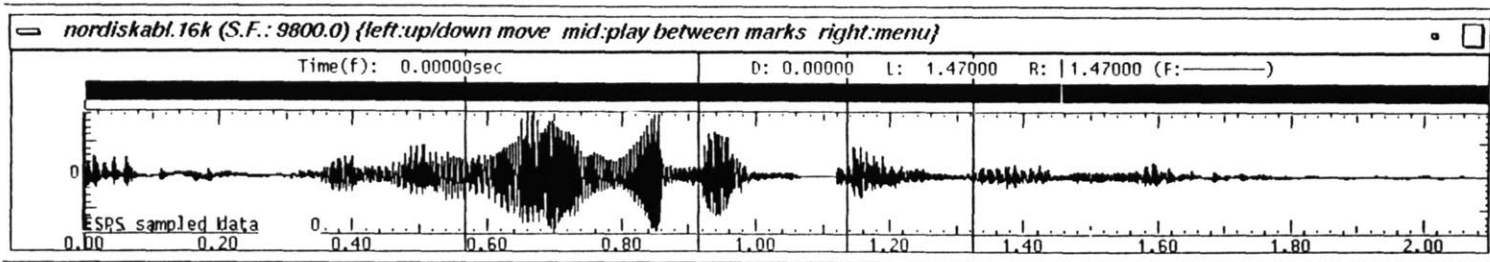
xpr
v ps



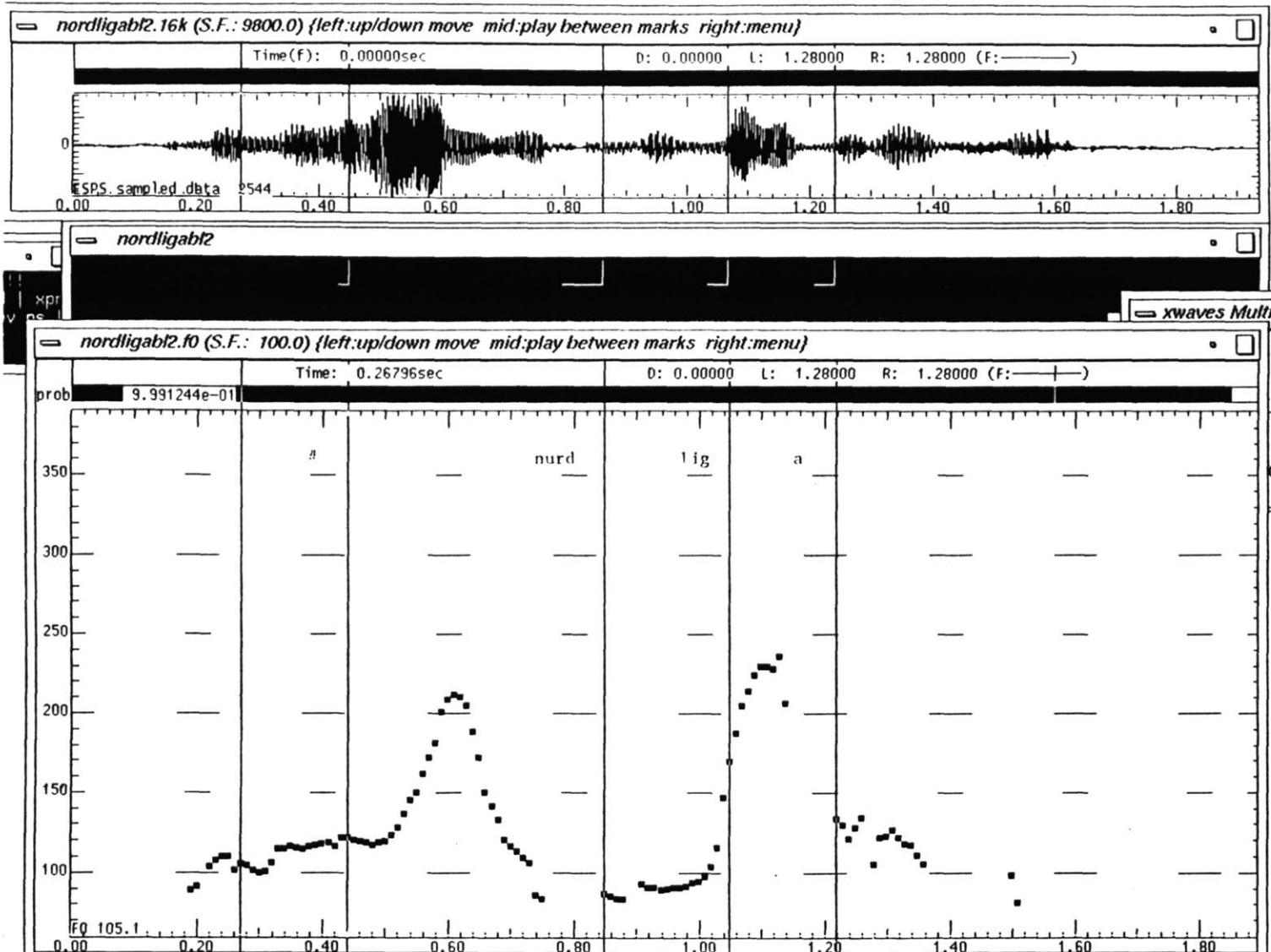
wir
sonor
eh:
sonor
/usr
sonor
/usr
sonor

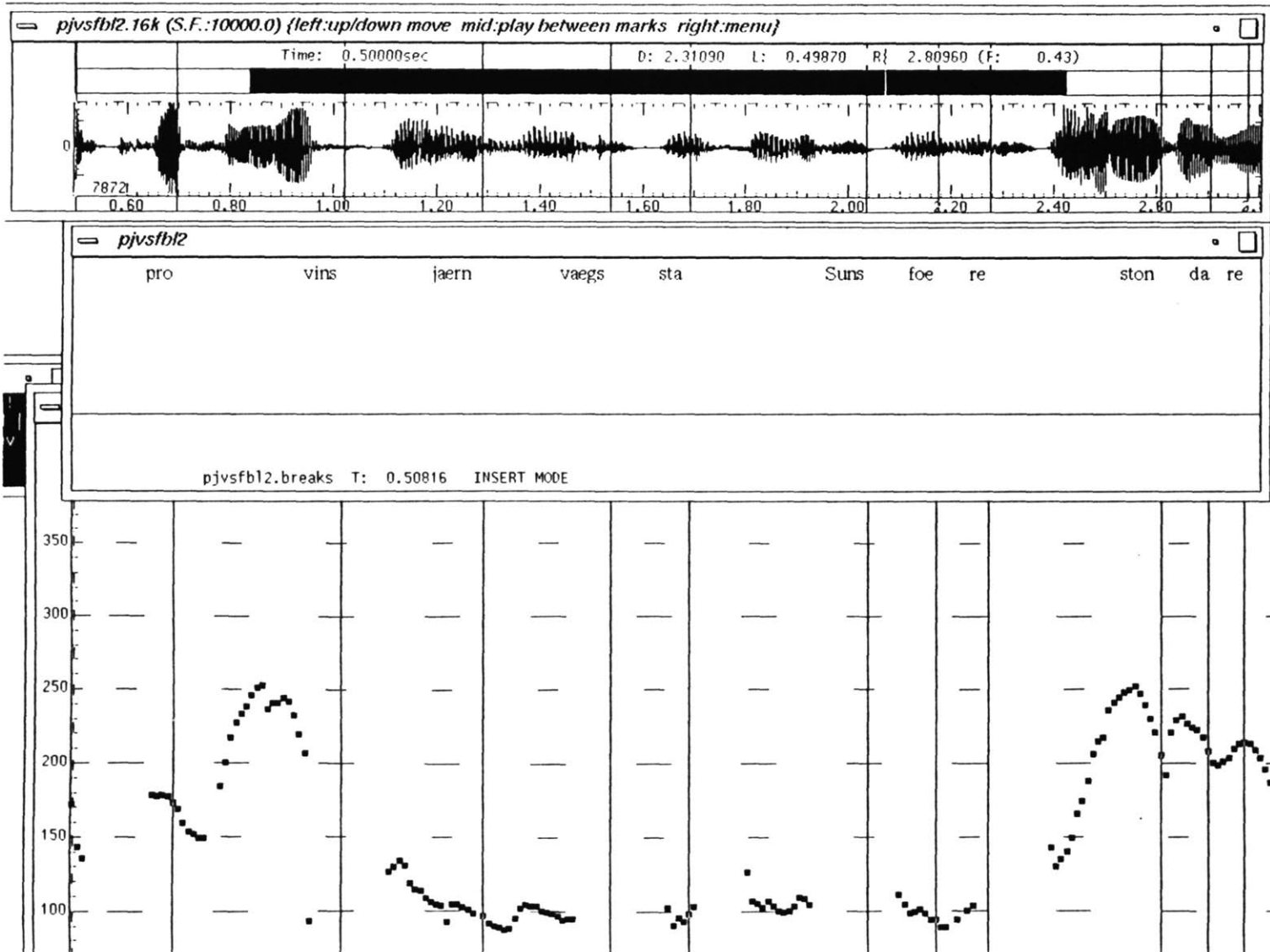


(8)



(6)





References

- Bruce, G. 1974. Tonaccentregler för sammansatta ord i några sydsvenska stadsmål. *Svenskans beskrivning* 8, 62-75.
- Bruce, G. 1978. *Swedish Word Accents in Sentence Perspective*. Travaux de l'institut de linguistique de Lund XII: Gleerups.
- Bruce, G. 1986. How Floating is Tonal Accent? In *Nordic Prosody IV*, ed. K. Gregersen, H. Basbøll, 41-49. Odense: Odense University Press.
- Danell, G. 1937. *Svensk Ljudlära*. Stockholm: Svenska Bokförlaget.
- Elert, C.-C. 1972. Tonality in Swedish: Rules and a List of Minimal Pairs. In *Studies for Einar Haugen*, ed. E.S. Firchow, K. Grimstad, N. Hasselmo, W. O'Neil, 174-188. The Hague: Mouton.
- Flemming, E. 1995. The Analysis of Contrast and Comparative Constraints in Phonology. Talk presented at MIT Phonology Circle.
- Gårding, E. 1977. *The Scandinavian Tone accents*. Travaux de l'institut de linguistique de Lund XI, Gleerups.
- Halle, M. & W. Idsardi. 1994. General Properties of Stress and Metrical Structure. DIMACS Series in Discrete Mathematics and Theoretical Computer Science 17, 37-69.
- Halle, M. & J.-R. Vergnaud. 1987. *An Essay on Stress*. Cambridge, Mass.: MIT Press.
- Jensen, J. 1980. Stress and Accent in Swedish. *Nordic Journal of Linguistics* 3: 25-58.
- Kock, A. 1878. *Språkhistoriska undersökningar om svensk akcent I-II*. Gleerups: Lund.
- Lindau, M. 1970. Prosodic Problems in a Generative Phonology of Swedish. Working Papers 2, Phonetics Laboratory, Lund University, 1-47.
- Linell, P. 1971. Några synpunkter på betoningens roll i svensk satsprosodi. Ms., University of Uppsala.
- Löfstedt, I. 1992. Swedish Segment Length and Structure Preservation. *Studia Linguistica* 46: 93-127.

- Lorentz, O. 1984. Stress and Tone in an Accent Language. In *Nordic Prosody III: Papers from a symposium*, ed. C.-C. Elert, I. Johansson, E. Strangert, 165-178. Stockholm: Almqvist & Wiksell.
- Lyttkens, I.A. & Wulff, F. 1886. *Om samhörighet och dess förhållande till ljudenlighet i fråga om språkbeteckning*. Lund: Gleerups.
- Noreen, A. 1907. *Vårt Språk II*. Lund: Gleerups.
- Öhman, S. 1966. Generativa regler för det svenska verbets fonologi och prosodi. *Svenskans beskrivning* 3, 71-87.
- Prince, A., Smolensky, P. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Ms. Rutgers University, New Brunswick, and University of Colorado at Boulder.
- Schmid, K.B. 1985. Alternativa analyser för svensk prosodi. *Svenskans beskrivning* 15, 451-463.
- Schmid, K.B. 1986. *Non-linear Approaches to Swedish Word Prosody*. Doctoral dissertation, Brown University, Providence, Rhode Island.
- Telemann, U. 1969. Böjningssuffixens form i nusvenskan. *Arkiv för nordisk filologi* 84: 163-208,
- Withgott, M. & P. Halvorsen. 1984. Morphological Constraints on Scandinavian Tone Accent. Stanford University Report No. CSLI-84-11.
- Withgott, M. & P. Halvorsen. 1985. Phonetic and Phonological Considerations Bearing on the Representation of East Norwegian Accent. In *Autosegmental Studies in Pitch Accent*, ed. H. van der Hulst and N. Smith. Dordrecht: Foris.