# L-tone affixation: Evidence from German dialects

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# Abstract

In a comparison of the tonal grammars of two German dialects, Swabian and Upper Saxon German, we observe a particular type of intonation contour that is similar in surface form, yet differs phonologically. Phonetically, the contour's shape is risingfalling; phonologically, the Swabian contour reads as  $L^*H + L$ 0%, and the one of Upper Saxon as  $L+ H^*L$  0%. Both contours are marked ones, and arise through a process that we call Laffixation, which is indicated by the '+' diacritic. Both contours share a similar semantico-pragmatic meaning, i.e. they express narrow focus. An alternative interpretation of the postnuclear low tone in Swabian as a phrase accent is rejected.

# 1. Introduction

From a point of view of intonational phonology, the contribution of dialectal variation of intonation has been relatively scarce. Very recently, Gussenhoven called for more research that covers "the prosodic systems of varieties of well-known European languages" which "are to all intents and purposes undescribed" [1, p. xviii]. The present paper is based on the author's dissertation on dialect intonation [2], which may contribute to a better understanding of modeling intonational variation within intonational phonology.

In intonational phonology, it has been a long debate on how to model postnuclear tones. A recent proposal advocates phrase accents having secondary associations with certain structural points in the phrase [3]. According to this view, the phrase accent associates secondarily with postnuclear stressed syllables in Standard Romanian, Standard Greek, and Standard German, whereas it associates secondarily with syllables near the phrase boundary independent of the prominence of that syllable in Standard Hungarian and Cypriote Greek.

Contrary to the phrase accent, Gussenhoven has proposed a system that allows for complex tones irrespective of their association with prominent syllables [4]. In his view, a nuclear base contour may be modified tonally. Thus, given a nuclear falling accent (H\*L) in British English, a modification such as L-prefixation results in a tonal sequence of L\*HL where the postnuclear tonal sequence HL forms a complex trailing tone. Due to the structural similarity between the base contour and the modified one, the postnuclear low tone is interpreted as belonging to accent itself (and not as a phrase accent).

This paper argues for complex trailing tones and rejects the assumption of a phrase accent. Based on an analysis of two varieties of German, evidence is given in favor of tonal affixation. In particular, this paper extends Gussenhoven's analysis of tonal prefixation in that tonal affixes are assumed (section 3.1), where in one variety the affix is realized as a tonal prefix (Upper Saxon German) and in another variety as a tonal suffix (Swabian German). Section 3.2 discusses the issue of the phrase accent and

proposes an argument against an interpretation of a postnuclear tone as a phrase accent. Finally, section 3.3 presents an argument in favor of the tonal affix view in terms of economy. The next section introduces the empirical basis of the present work.

# 2. The empirical basis

The analysis reported here is part of the corpus of the author's PhD project [2]. Ten speakers of Swabian and Upper Saxon, respectively, have been recorded at their homes' conducting the map task game. For details of data elicitation, recording procedures as well as the map task game see [2, p. 18ff]. Eleven female and nine male speakers participated, and the speaker's age ranges between 21 and 70. Selected intonation phrases have been labeled tonally following the proposed system of [2], which mainly is based on [4]. Based on [5], alignment measurements are calculated expressing the distance of a tonal target in relation to the beginning of the nucleus of the accented syllable (V0) and, to the end of the syllable rhyme (C1) [2, p. 196].

# 3. L-affixation

#### 3.1. Structural similarity between L-prefix and L-suffix

The proposed L-affixation affects nuclear contours structurally in a similar way, i.e. irrespective of the position of the affix (prefix or suffix), between the base contour and the modified one, a structural similarity remains. Evidence for this structural similarity comes from tonal alignment measurements which we will report on in this section separately for each of the two dialects.

#### 3.1.1. Swabian German data

Consider the tonal grammar of Swabian German in (1). According to [6], [2], the default or neutral accentuation pattern in declaratives is rising-falling (L\*H L%). Although this pattern deviates from almost all other German varieties and most European intonation languages, the rising-falling pattern appears to be a Southern German dialect feature, cf. [2], [7], [8].

(1) predicts different nuclear contours, among others a contour which is of interest here and that we colloquially refer to as rising-falling-low-plateau (L\*H +L 0%), cf. Fig. 1. In addition, a contour with a rather similar nuclear accent exists, i.e. a rising-falling-rising contour L\*HL H%, cf. Fig. 2.

(1) A tonal grammar of Swabian German, cf. [2, p. 130]

$$\left\{\begin{array}{c} \mathrm{H}^{*}\mathrm{L} \\ \mathrm{L}^{*}\mathrm{H} \end{array}\right\}_{0}^{n} \left\{\begin{array}{c} \mathrm{L}^{*}\mathrm{H} \\ \mathrm{L}^{*}\mathrm{H}\mathrm{L} \end{array}\right\} \left(\begin{array}{c} \mathrm{L} \end{array}\right) \left\{\begin{array}{c} \mathrm{H}^{*}\mathrm{M} \\ \mathrm{L}^{*}\mathrm{M} \\ \mathrm{0}^{*}\mathrm{M} \end{array}\right\}$$

OCP



Figure 1: Swabian German rising-falling-low-plateau contour  $(L*H+L\ 0\%)$  on the phrase bei mIr hoißt sie NEUe arena 'here it's called new arena'; capitals indicate accentuation.

At first sight, the tonal sequence of L-H-L in these contours might appear to be similar. However, the tones have different origins and are therefore phonologically distinct. In [2], we argue that in case of the rising-falling-low-plateau contour (L\*H +L 0%), the postaccentual low tone is a result of the process of L-affixation. In Swabian German, thus, the L-affix is realized as a suffix. In contrast, the L\*HL H% contour contains a tritonal nuclear pitch accent from the beginning.

Considering the phonetic details of these contours, a clear difference in tonal alignment of the postnuclear low tone is observed (cf. Table 1). As can be seen in Table 1, the accentual low tone (L\*) is realized at the beginning of the syllable nucleus (measured relative to the beginning of the syllable nucleus V0). The difference between the contours is not significant (p > 0.05), and the mean alignment point is 2.9 ms before the syllable nucleus in each contour. Given the invariant realization of the accentual low tone, this supports recent theories of the invariant alignment of tonal targets.

Table 1: Mean alignment data for Swabian German nuclear contours. The columns show the distance in ms between an  $F_0$  label (L or H) and a segmental boundary (V0 = beginning of the syllable nucleus; C1 = end of the syllable rhyme). A negative value indicates that the  $F_0$  label occurs before the segmental label.

Contour	n (87)	$L_{ref}^*V0$	$H_{refC1}$	$L_{refC1}$
L*HL%	56	1.4	-68.5	_
L*H+L 0%	22	-0.6	-36.7	184.3
L*HL H%	9	-24.1	35.4	224.5

As for the trailing high tone, however, a varying pattern arises. Independent samples t-test comparisons reveal significant differences for peak alignment between L\*H L% and L\*HL H% (df = 15, t = -3.88, p < 0.0007), and between L\*H+L 0% and L\*HL H% (df = 15, t = -2.67, p < 0.008), yet no difference between L\*H L% and L\*H+L 0% (p > 0.05). Thus, we establish a difference between two base contours



Figure 2: Swabian German rising-falling-rising contour (L\*HL H%) on the phrase jetz=hier an dem NONenweiher 'now here at the cosy pond'; capitals indicate accentuation.

(L\*H L% and L\*HL H%) and a structural similarity between a base contour and its modified version (L\*H L% and L\*H +L 0%). In the latter two contours, the same pitch accent (L\*H) is involved, while it is a different one in the former two contours. This difference is expressed, one, by a later H tone alignment, i.e. on average 35.4 ms after the accented syllable instead of in the accented syllable for a L\*H pitch accent and, two, by a later postnuclear L alignment compared with the modified rise-fall, cf. Table 1. In the next section, we will show that we observe a structural similarity of the tonal prefix as well.

## 3.1.2. Upper Saxon German data

Consider the tonal grammar of Upper Saxon German in (2). According to [2], the default or neutral accentuation pattern in declaratives is falling (H\*L 0%), cf. Fig. 3. This pattern is phonologically equivalent to Standard German and most other European intonation languages, cf. e.g. [8]. Phonetically, however, the simple falling contour differs considerably between other varieties of German and Standard German in terms of tonal alignment if compared with the data in e.g. [7].

The relevant contours for our discussion here are the risingfalling one (L+H\*L 0%), cf. Fig. 4, and the rising-falling-rising one (L+H\*L H%), as predicted by (2).

## (2) A tonal grammar of Upper Saxon German.

{	H*L L*H	$\Big\}_{0}^{n}$	(L)	H*L L*H	}	H% 0%	
ĺ	L*H	$\Big]_0$	(L) {	L*H	Ĵί	0%	

From the alignment data displayed in Table 2, we observe that the falling contour is shifted rightwards in case of an L-prefix. Comparing the accentual high tone, the alignment differs significantly between the falling (H\*L) and modified falling (L+H\*L) accent (df = 90, t = -8.93, p < 0.0001). The accentual high tone is realized about 15.7 ms after the syllable nucleus in case of the simple falling contour (H\*L 0%), thus early in the syllable, while it is realized about 100 ms later in case of a modified contour (cf. Table 2). The same holds



Figure 3: Upper Saxon German simple falling contour (H\*L 0%) on the phrase die SUMMT noch 'it is still humming'; capitals indicate accentuation.

for the alignment of the trailing low tone which differs significantly between the falling (H\*L) and modified falling accent (L+H\*L) (L<sub>ref</sub>C1 alignment between H\*L and L+H\*L df = 85, t = -3.31, p < 0.0006).

Table 2: Mean alignment data for Upper Saxon German nuclear contours. The columns show the distance in ms between an  $F_0$  label (L+, H\* and trailing L) and a segmental boundary (V0 = beginning of the syllable nucleus; C1 = end of the syllable rhyme). A negative value indicates that the  $F_0$  label occurs before the segmental label.

Contour	n (89)	$L_{ref}V0$	$H_{ref}^*V0$	$L_{refC1}$
H*L0%	42	-	15.7	65.9
L+H*L0%	37	-14.3	119.9	144.0
L+H*LH%	10	-47.0	110.9	182.3

On the basis of the alignment data, we observe a structural similarity of the tonal configuration of the base contour compared with the modified one. The process of L-affixation inserts a low tonal prefix which causes both tones of the falling pitch accent shifting to the right of about 100 ms. Given an average nucleus duration of 158 ms for phonologically long vowels, the H tone aligns well within the accented vowel, it is thus an accentual high target. This acoustic measurement supports the perceptual impression of a prominent high accented syllable. The fact that the base contour and the modified one share an accentual high tone (H\*) is evidence for a structural similarity between these contours.

The detailed phonetic alignment measurements of Swabian and Upper Saxon German nuclear accents provide evidence for a structural similarity between a base contour and its modified version. In both dialects, the proposed tonal modification affects the base contour in that the modified contour is structurally equivalent to the base contour.

#### 3.2. The issue of the phrase accent

Originally, the phrase accent was introduced to intonational phonology accounting for a focal accent rise in contrast to the tonal correlates of the word accent distinction in Swedish [9].



Figure 4: Upper Saxon German rising-falling contour (L+H\*L 0%) on the phrase en LAMM hab=ich da oben links in der ecke 'I have a lamb up there left in the corner'; capitals indicate accentuation.

Its function has thus been equivalent to a pitch accent in an intonation language. [10] borrowed the concept of the phrase accent to account for the course of pitch between the last pitch accent and the intonation phrase boundary, revised in [11] as an intermediate phrase boundary tone. The debate on the nature of postnuclear tones in intonational phonology has resulted in a proposal where a phrase accent functions as an intermediate phrase boundary tone and associates secondarily with either a structural (e.g. Standard Hungarian or Standard Greek) or a prominent position (e.g. Standard German, the latter is claimed, i.e. a phrase accent is assumed to associate with a postnuclear syllable that bears word stress [3].

Varieties of a language may differ with respect to the association point of the phrase accent [3]. Given the analysis of Standard German, Swabian and Upper Saxon German must not show the same association pattern as Standard German. Therefore, the first test would be to prove or reject an analysis where a postnuclear tone is associated with a particular structural position with respect to the end of the intonation phrase, e.g. Standard Hungarian. According to the structural hypothesis, a comparison of a nuclear pitch accent that is late in the phrase with one that is realized earlier would yield a particular syllable as a phrase accent's docking side. Comparing Fig. 5 where the nuclear accent is realized on the penultima with Fig. 6 where seven syllables follow the nuclear syllable, we observe no particular structural position for the postnuclear low tone to associate with. We therefore reject the structral hypothesis for Upper Saxon German.

The prominence hypothesis predicts that a postnuclear tone associates with a postnuclear prominent syllable, i.e. a syllable bearing word stress. In case of Fig. 6, the most prominent syllable would be the last one ('nar') of the compound *SÄNgerinnenseminar* 'seminar of female singers'. Obviously, the low tone does not align with that syllable. Instead, the fall aligns with the second postnuclear syllable.

Since both the structural and the prominence hypothesis do not account for the Upper Saxon data, we analyse the falling postnuclear part as belonging to the pitch accent. In the case of the simple falling contour (H\*L 0%), the low tone belongs



Figure 5: Upper Saxon German simple falling contour (H\*L 0%) on the phrase und dA steht ein ENgel 'and there is an angel'; capitals indicate accentuation.

to the pitch accent being a trailing tone. The alignment data reported in [2] further support this view. Accordingly, the low tone in the rising-falling contour (L+H\*L 0%) is treated as a trailing tone as well (cf. the structural similarity above).

### 3.3. Economy of the system

In terms of economy, the assumption of a tonal modification mechanism such as L-affixation keeps a proposed grammar minimal, as can be seen in (1) or (2). For instance, if we consider Upper Saxon German (2), the tonal analysis results in three base contours, (i) H\*L 0%, (ii) H\*L H%, and (iii) L\*H H% (the L\*H 0% contour is considered to be a phonetic variant of the L\*H H% contour, cf. [2]). The low tonal prefix (L) affects each of the three base contours resulting in (i') L+H\*L 0%, (ii') L+H\*L H%, and (iii') L+L\*H H%. Since the L tone can be observed in each contour, having the same result phonetically and semantically, the interpretation as a single underlying mechanism appers reasonable.

An alternative analysis – and non-economical variant – would be to assume different distinct pitch accents that comprise the Upper Saxon data. Apart from the falling (H\*L) and rising (L\*H) accents as well as the relevant boundary tone (H%), one would need to assume a rising-falling (L+H\*L) and a low-rising (L+L\*H) pitch accent. The latter two accents contain obvious redundant information, i.e. the L-prefix. From an economical point of view, the assumption of L-affixation reduces unnecessary redundancies and simplifies the tonal grammar.

# 4. Conclusions

This paper is concerned with tonal affixation. It is debatable whether postnuclear tones might be interpreted as phrase accents or as belonging to the nuclear accent. We argue for the second approach. The structural similarity between a tonal prefix and suffix based on phonetic and semantic data calls for a similar treatment of the particular tones, i.e. a low tone affix. Phonetic data lead to an analysis where we reject an interpretation of a postnuclear low tone as a phrase accent. And finally, economical reasons support an analysis of tonal affixation in



Figure 6: Upper Saxon German simple falling contour (H\*L 0%) on the phrase dieses SÄNgerinnenseminar a ein 'includes the seminar of female singers'; capitals indicate accentuation.

that the tonal grammar can be kept minimal.

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## 6. References

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