

# EFFECTS OF DIALECT AND CONTEXT IN THE REALISATION OF GERMAN PRENUCLEAR ACCENTS

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## ABSTRACT

We investigated whether alignment differences reported for Southern and Northern German speakers (Southerners align peaks in pre-nuclear accents later than Northerners) are carried over to the production of different functional categories such as contrast. To this end, the realisation of non-contrastive theme accents is compared with those in contrastive theme-rheme pairs such as ‘Sam rented a truck and *Johanna* rented a car.’

We found that when producing this ‘double-contrast’, speakers mark contrast both phonetically by delaying and rising the peak of the theme accent (*Johanna*) and/or phonologically by a change in rheme accent type (from high to falling ‘*car*’).

The effect of dialect is complex: a) only in non-contrastive contexts produced with a high rheme accent Southerners align peaks later than Northerners; b) peak delay as a means to signal functional contrast is not used uniformly by the two varieties. Dialect clearly affects the realisation of pre-nuclear accents but its effect is conditioned by the pragmatic and intonational context.

**Keywords:** Intonation, Contrast, Dialect, Tonal Alignment, Intonational variation, German

## 1. INTRODUCTION

Unless we are phonetically trained speakers, we reveal our regional background when talking, even when speaking the acknowledged standard variety of our language. Our origin is not only (most easily) conveyed by diphthongs and vowels ([1]), but also by the speech melody ([2,3,4]). This paper deals with the intonational properties of Northern and Southern German speakers. In a recent study that compared the realisation of pre-nuclear (phrase-initial) accents in read sentences, it was reported that Southerners reach the  $f_0$ -maximum later with respect to the stressed syllable than Northern Germans do ([3]). There is no data yet about whether these dialectal alignment settings persist when producing accents that convey different functional categories. One functional category that is known to also influence the alignment of

pre-nuclear accents is thematic (topical) contrast. In contrastive contexts, the peak is aligned later than in non-contrastive ones ([5]).

While both [3] and [5] applied the same acoustic analyses, they are not readily comparable: [5] compared sentences such as ‘The Malaysians live from agriculture’ produced in a paragraph about Malaysians only and in a paragraph that explained the difference between Malaysians and Indonesians. Theme accent type (on ‘Malaysians’) did not change in contrastive contexts compared to non-contrastive ones but these accents were produced with later and higher peaks. Contrast also had an effect on rheme accent choice (more falling (e.g. H+L\*) accents than high (H\*L-%) ones on ‘agriculture’). [3], on the other hand, investigated dialectal differences in pre-nuclear accents for speakers from Munich and a not further specified Northern region. Sentences were read out of context (supposedly produced in a non-contrastive way with a non-contrastive theme accent and a high rheme accent) but these accents were not specified. They reported later L and H alignment for Southerners than for Northerners and these alignment strategies were carried over to English.

In this paper we included both the factors dialect and functional contrast using highly controlled materials and participants from two narrowly defined regions only (Munich, a city in the Southeast, and Münster, a city in the Northwest of Germany). Only one syntactic structure was studied: German subject-verb-object sentences such as “*Johanna* rented a car” were recorded as answers to context questions to elicit different information structures; the grammatical subject accent was investigated in four conditions, as non-contrastive or contrastive theme accent, and as non-corrective or corrective rheme accent (the latter two will not be reported here). The following questions are addressed:

- Do Northern and Southern German speakers differ in their choice of (theme and rheme) *accent type* when signalling contrastiveness?

- Does rheme accent type influence theme accent realisation?
- Do Southern Germans align all thematic rises later than Northerners, irrespective of context?
- Is there an effect of dialect on the use of f<sub>0</sub>-excursion when expressing contrast?

## 2. METHODS

Participants read sentences in response to four types of pre-recorded context questions.

### 2.1. Materials

Non-contrastive and contrastive theme accents were elicited as exemplified in (1) and (2), non-corrective and corrective rheme accents as shown in (3) and (4). Theme accents (indicated by italics) are always prenuclear accents, rheme accents (marked by bold face) are always nuclear accents.

- (1) What did Johanna rent? – *Johanna* rented a **car**.  
 (2) Sam rented a truck. And Johanna? – *Johanna* rented a **car**.  
 (3) Who rented a car? – **Johanna** rented a car.  
 (4) Martin rented a car? – **Johanna** rented a car.

10 trisyllabic (mostly sonorant) proper names with stress on the second syllable were used, five with a long vowel (e.g. Marina), and five with a short one (e.g. Mirella). These items served as the grammatical subject; they were combined with 10 different verb phrases of a comparable grammatical and rhythmic structure with six syllables each (e.g. knitted an apron). Controlling the right context of the target words is crucial, as the upcoming prosodic context influences the alignment of the peak (e.g., [6]). The test sentences (answers) were constructed by assigning the ten proper names to one of the ten verb phrase via a pseudo Latin-square so that each name occurred in every context with one of the 10 verb-phrases. The context questions were recorded by speakers from the respective areas. They were produced with a rising intonation contour and normalised for amplitude.

### 2.2. Participants

9 female speakers from a 50km range around Muenster and 9 female speakers from the city of Munich were recorded. Participants were linguistically naive. Recordings were done at the Psychology Institute of the University of Muenster and the IPS in Munich.

### 2.3. Procedure

Participants were seated in front of a computer screen. In 40 conditions, they heard a question and read the sentence from the screen. They were instructed to pronounce the sentences as an answer to the respective question. 10 filler sentences were presented without a context question; participants were told to simply read the sentence.

There were four randomised lists. Five filler trials were added at the beginning of each list. Every subject read two lists; if speakers produced an answer that did not fit the question (i.e. deviant intonation contour or phrase breaks), the complete trial (auditory question and visual display of sentence) was repeated (less than 7% of the cases).

### 2.4. Analysis

Only productions from the first list were analysed. One Southern German speaker had to be excluded because her phonemes were not Southern German.

#### 2.4.1. Intonation Annotation

Both the thematic (prenuclear) pitch accents on the target as well as the rhematic (nuclear) pitch accents on the object were annotated (Note that for these materials, theme accent is analogous to prenuclear accent and rheme accent to nuclear accent). Prenuclear pitch accents were labelled using GToBI ([7]). Except for six deaccented cases, theme accents were bitonal with the peak realised on the poststressed syllable. L\*H was labelled when the stressed syllable was perceived as low, LH\* was labelled when the stressed syllable was perceived as high (see also [5]). Rheme accents were realised with many different accent types; to be able to study their influence on theme accents, we only distinguished falling accents (falling or low stressed syllable preceded by a higher tone) and high accents (high stressed syllable, preceded and followed by low tonal targets). These broad categories were used as these accent types were shown to be categorically distinct in German ([8]).

#### 2.4.2. Acoustic-phonetic annotation

In the target words, the onset of the stressed syllable (C0), the onset of the stressed vowel (V0), the onset of the poststressed consonant (C1), and the onset of the poststressed vowel (V1) were manually annotated using the broadband spectrogram and the acoustic waveform in Praat. Furthermore, the f<sub>0</sub> maximum following the

accentual rise (H1) and the f0 minimum preceding the accentual rise (L) were marked (see also [3] and [5]). Only the results for the following dependent variables are presented:

- Alignment of the minimum with respect to the start of the stressed syllable (al(L,C0))
- Alignment of the maximum with respect to the poststressed vowel (al(H,V1))
- F<sub>0</sub> excursion of the f0-rise in semitones

### 3 RESULTS

#### 3.1. Accent types

In thematic accents, LH\* was used more frequently than L\*H (213 times vs. 120 times); neither contrast nor regional background had an effect on theme accent type. Context had an effect on the choice of (nuclear) rheme accent, though. As shown in Tab. 1, there were sign. more falling rheme accents than high ones in contrastive (c) contexts ( $\chi^2=24.6$ ,  $df=1$ ,  $p<0.0001$ ) than in non-contrastive ones (nc). Dialect had no effect.

Table 1: Effect of context on rheme accent type

	c	nc	Total
Falling rheme accent	111	65	176
High rheme accent	55	99	154
Total	166	164	330

#### 3.2. Theme accent realisation

Data were analysed using multi-level modelling (cf. [9], [5]), including dialect (north vs. south), contrast (non-contrastive vs. contrastive), vowel length (short vs. long), theme accent (LH\* vs. L\*H), and rheme accent (high vs. falling) as fixed factors, and items and speakers as random factors.

##### 3.2.1. Trough alignment (L)

L\*H accents had later troughs than LH\* accents (77.6ms vs. 26.1ms,  $p<0.0001$ ). In contrastive themes the trough was aligned later than in non-contrastive ones (59.0ms vs. 44.6ms,  $p=0.006$ ) but there was no effect of dialect and no interactions.

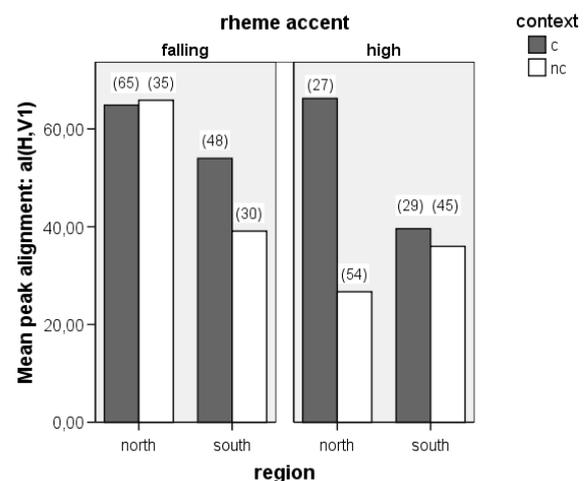
##### 3.2.1. Peak alignment (H)

Peak alignment was later for short vowels than for long ones (62.9ms vs. 46.7ms,  $p<0.0001$ ), later for contrastive themes than for non-contrastive ones (60.8ms vs. 48.8ms,  $p<0.009$ ) and earlier for Southern Germans than for Northerners (46.7ms vs. 62.9ms,  $p<0.0001$ ), with no interactions. These

initial results for regional background contradict [3] who found the opposite effect. However, there was a three-way-interaction between region, contrast and rheme accent ( $p=0.005$ ). In sentences with a *falling* rheme accent, Southern Germans realised the thematic peak earlier than Northerners (50.2ms vs. 74.8ms,  $p<0.0001$ ) without an effect of contrast or an interaction between region and contrast. In sentences with a *high* rheme accent, on the other hand, region had no effect, contrastive themes were realised with a later peak than non-contrastive ones (56.6ms vs. 37.6ms,  $p=0.007$ ), and – importantly – there was an interaction between contrast and region ( $p=0.011$ ), as shown in Fig. 1. In contrastive contexts, the picture does not change: Southerners aligned the peak earlier than Northerners (43.7ms vs. 69.6ms). In non-contrastive contexts, however, Southerners indeed produced later peaks than Northerners (37.0ms compared to 26.7ms); a similar magnitude as reported in [3] (34ms vs. 21.4ms) but that difference was not significant in our data.

Both regional background and contrast had an effect on peak alignment but this effect was mediated by the tonal context.

Figure 1: Interaction between context and dialect in sentences with a high and falling rheme accent. Numbers in brackets indicate number of cases.



##### 3.2.2. F0-excursion

F0-excursion was larger in contrastive themes than in non-contrastive ones (5.5st vs. 4.7st,  $p=0.002$ ), larger in LH\* accents than in L\*H accents (5.4st vs. 4.7st,  $p=0.004$ ) and larger when the rheme accent was falling (5.7st vs. 4.2st,  $p<0.0001$ ). Also, there was an interaction between region and contrast ( $p=0.016$ ). Southerners did not use f0-

excursion to express contrast (mean 5.1st), while Northerners used it extensively (5.7st vs. 4.3st).

#### 4. DISCUSSION

Northern and Southern German speakers do not differ in their choice of theme accent *type* when signalling contrast. Irrespective of context and dialect, LH\* is more frequent than L\*H. Noteworthy, contrast had an effect on the phonetic realisation of theme accents which were realised with a later trough as well as with a higher and later peak (replicating [5]). Further, contrast affected the choice of *rheme accent type*: in contrastive contexts, speakers realised significantly more falling rheme accents (e.g. H+L\*) than high ones (e.g. H\*L-%). The qualitative data together with the quantitative findings suggests that there are two strategies to mark contrast: either phonetically by delaying the peak of the theme accent and/or phonologically by modifying the rheme accent type (from high to falling).

Dialectal influences on peak alignment seem to be more intriguing than expected. [3] reported that Southerners aligned prenuclear pitch rises later than Northerners, both in terms of trough and peak alignment. Our data show that this finding is only valid for peak delay and only in sentences with a high rheme accent (e.g. H\*L-%), produced in non-contrastive contexts. The magnitude of peak delay in this condition is comparable to [3]. Given that speakers in [3] read the test sentences out of context, it can be expected that they were produced in a non-contrastive way with a high rheme accent. Southern Germans hence align peaks later than Northerners in a 'neutral' setting only (non-contrastive context, high rheme accent). In all other conditions, this extralinguistic difference is overridden by the linguistic use of peak alignment. However, speakers from the two dialects studied do not mark contrast uniformly: In sentences with a high rheme accent, Northern Germans employ peak delay and increased f0-excursion to distinguish contrastive from non-contrastive themes; Southerners hardly mark the difference. This difference can be explained by the proximity of an upcoming tonal event (e.g. [6]). In order to produce a high rheme accent later on, there needs to be a low tonal target following the theme accent. It seems that Southerners, whose peaks are already late in a neutral setting, cannot delay the peak further to express contrast, while Northerners can. In sentences with a falling rheme accent,

Southerners delay the peak to mark contrast, while Northerners only increase f0-excursion. In that condition, a low tonal target following the theme accent is optional; so Southerners *can* use peak delay to signal contrast. Northerners have a late peak in contrastive and non-contrastive contexts (if rheme accent is falling), which suggests that they produce a kind of 'tune' (cf. [10]): late prenuclear peak followed by falling rheme. To mark contrast in theme they increase the prenuclear f0-excursion.

#### 5. CONCLUSION

Contrast can be marked either phonetically by delaying the peak in the theme accent and/or phonologically by a change in rheme accent type. Only in the absence of a necessity to mark functional categories (non-contrastive context, high rheme accent), Southerners align peaks later than Northerners. Hence, dialectal background is indeed reflected in our speech melody but not in terms of a basic setting (i.e. Southern Germans have later peaks than Northerners); rather, alignment differences between Northern and Southern German speakers are conditioned by context, both by pragmatic and intonational context.

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