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Björn Köhnlein

Rule Reversal Revisited

Synchrony and diachrony of tone and prosodic structure in the Franconian dialect of Arzbach

This thesis deals with the tone accent opposition in the so-called “Rule B area” in Franconian. Rule B is known for its reversal of tonal melodies: in 1921, Adolf Bach published a description of the Arzbach accents, stating that the tonal melodies in Arzbach display a reversal of those in the rest of the area (Rule A). The study at hand not only provides crucial but as yet missing empirical data on Rule B but also suggests synchronic and diachronic typological analyses of the phenomenon.
Newly gathered phonetic data from the Arzbach dialect show that the tone accents in Arzbach are reversed in declaration but not in interrogation, where they strongly resemble the Rule A contours. This important observation was unreported so far.
On the basis of these findings, detailed synchronic autosegmental analyses for Arzbach and three other Franconian dialects show that we can understand the tone accent opposition as one of different foot structures for the two accents (resulting in head domains of different size). All analyses are formalized in Optimality Theory. The diachronic section of the thesis explores the origin of the semi-reversed tonal contours in Rule B. It argues that Rule B and Rule A developed out of a common predecessor but adapted in different ways to declaration melodies from non-accent dialects, which lead to opposite declarative contours.
This study is of interest to phonologists concerned with tone, prosodic structure, and their interaction. Furthermore, it addresses (acoustic) phoneticians as well as dialectologists, especially those interested in Germanic prosody.

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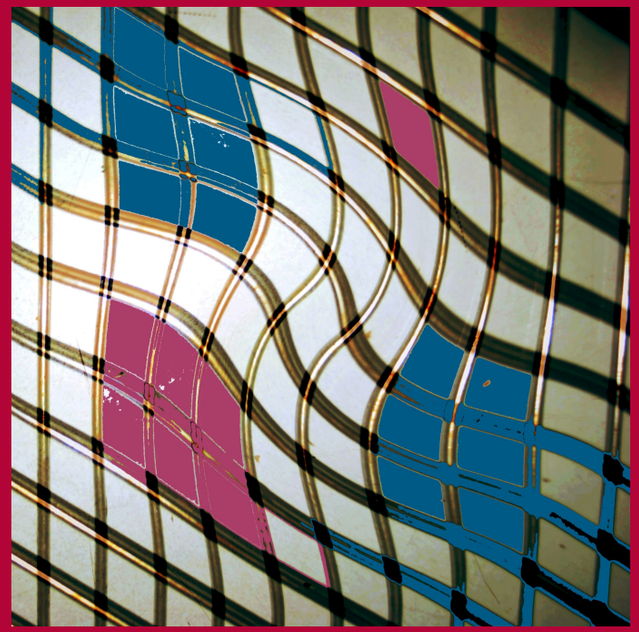

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Meinen Eltern gewidmet

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Before I first went to Arzbach, the local priest Josef Ernst offered me his help after i had written him a letter. He brought me in touch with two people from Arzbach: Horst and Melitta Gerharz. They not only were the most patient speakers one could think of during all the pretests, they also gathered ten more participants. Furthermore, they offered their house for many recordings and perception tests, served coffee, tea, and exceptionally good cakes to everyone involved. They always made me feel at home, so that very soon, going to Arzbach for work trips did not feel like work anymore but was rather visiting good friends. Horst and Melitta's

endless support made completing this thesis so much easier. I will always be thankful for that and hope to return to Arzbach many times.

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1. Introduction

1.1 The issue

First described in Bach (1921), the Franconian dialect of Arzbach is known for what is arguably the most curious phenomenon that has been discovered in the Franconian tone accent area to date: its reversal of tonal melodies. According to Bach, the Arzbach accents display opposite tonal melodies to those that had been described for other dialects in the area. He motivates his claim on the basis of declarative intonation: Bach states that Arzbach speakers use falling tonal contours where other dialects do not, and vice versa (Bach 1921, 267). The particularity of the data is reflected in Bach's astonishment when he reports his findings:

(1)

"This fact is so striking that – when I believed I noticed it eight years ago – I was tempted to doubt the correctness of my observations."[1]

Bach (1921), 267, translation: B.K.

Having overcome his doubts, Bach expresses absolute certainty that the area surrounding Arzbach, the *Westerwald*, will be of great interest to tone accent researchers (Bach 1921, 267).

If this prediction was meant to indicate confidence that more empirical research would be carried out in that particular area, Bach was mistaken. Since 1921, no additional studies of the phenomenon have been conducted in the Westerwald. However, this does not mean that the Arzbach facts were not noted: in particular in German dialectology, they are well known and accepted. For instance Wiesinger (1970) discusses Bach's findings in detail and names the phenomenon *Rule B*, opposed to *Rule A*, which applies in the majority of the area. These terms are intended to indicate that Rule B displays a reversed *lexical distribution* of the accents from the rest of the area. The core of this assumption is nicely captured by the term *rule reversal*, which was introduced by Schmidt (1986) in order to express the peculiarity of the Rule B area.

More recently, however, Bach's discovery has also been approached with skepticism: doubting the existence of an entirely reversed lexical distribution, de Vaan (1999) suggests that Bach may have "merely mixed up the terms for TA1 (= tone accent 1, B.K.) and TA 2, the dialect belonging to Rule A" (de Vaan 1999, 27).

[1] „Diese tatsache ist so auffällig, daß ich, als ich sie vor nunmehr acht jahren feststellen zu glauben sollte, in die versuchung kam, an der richtigkeit meiner beobachtungen zu zweifeln."

Schmidt (2002), on the other hand, explicitly points out the reliability of Bach's descriptions (Schmidt 2002, 210).

These differences in the evaluation of Bach's claims indicate that clarification is necessary. A verification of Bach's observations is particularly desirable since the Arzbach facts – as reported by Bach – entail important consequences for the (typological) treatment of the phenomenon (most obviously from a diachronic but also from a synchronic perspective). This is also expressed by de Vaan, who regrets that "a more accurate analysis of the Westerwald situation cannot be given for lack of relevant information" (de Vaan 1999, 27).

It is the goal of this thesis to fulfill this desideratum and a) provide relevant empirical information on Rule B and b) suggest synchronic and diachronic analyses of the phenomenon, from a dialect-internal as well as from a typological perspective.

To gain empirical data, I visited the place where Bach discovered what later became known as Rule B: almost ninety years after the dialect had been described for the first and only time, a new investigation of the Arzbach accents was launched to gain a better insight into the phonetics and the phonology of the dialect itself as well as into the typological relation between Rule B and Rule A.

Three basic questions guided me during my research. They are stated in (2):

(2) Research questions

1. Do the tonal melodies in Rule B really display a phonetic reversal of those that we find in Rule A?

2. How can we account for the synchronic tonal mapping in Rule B, and how is it related to Rule A?

3. What is the diachronic relation between Rule B and Rule A?

1.2 The Franconian tone accents

1.2.1 Background

The tone accent opposition. The Franconian tone accents are a prosodic opposition of two word accents named Accent 1 and Accent 2. The occurrence of these accents is restricted to bimoraic syllables carrying word stress. The tone accents are functionally relevant for the distinction of lexical items and morphological units. In (3), I provide four relevant minimal pairs from the Mayen dialect (data from Schmidt 1986). Accent groups are indicated by superscript numbers:

(3)

Accent 1		Accent 2	
[man^{1}]	'basket'	[man^{2}]	'man'
[ðɔʊf^{1}]	'pigeon'	[ðɔʊf^{2}]	'baptism'
[haos^{1}]	'house, dat. sg.'	[haos^{2}]	'house, nom. sg.'
[ʃdaːn^{1}]	'stone, pl.'	[ʃdaːn^{2}]	'stone, sg.'

In the majority of the area, the accents are realized with falling tonal contours for Accent 1 and high-level or falling-rising pitch contours for Accent 2 in isolated words. However, in non-isolation, the realization of the accents largely varies with regard to sentence position (non-final, final), pragmatic condition (at least declaration and interrogation, sometimes continuation), and information structure (focus, pre-focus, post-focus).

Next to pitch, further phonetic correlates of the accents are duration and intensity: Accent 2 is often phonetically longer than Accent 1, whereas Accent 1 usually shows larger intensity drops (see e.g. Heike 1962 and 1964, Schmidt 1986 and 2002, Gussenhoven & Peters 2004, Peters 2006a). Recently, empirical evidence from perception tests with manipulated stimuli (Werth 2007, to appear) has been provided indicating that pitch is the relevant auditory cue. Furthermore, the accent opposition can lead to vowel splits: Accent-1 vowels tend to lower and / or diphthongize, whereas Accent-2 vowels tend to raise and / or monophthongize (see e.g. Verstegen 1946, Dols 1953, Gussenhoven & Driessen 2003, Goossens 1956, 1998, Cajot 2006, Gussenhoven 2007, Köhnlein to appear).

Geography. Figure 1.1 shows the borders of the Franconian tone accent area (map by Schmidt & Lüders, taken from de Vaan 2006):

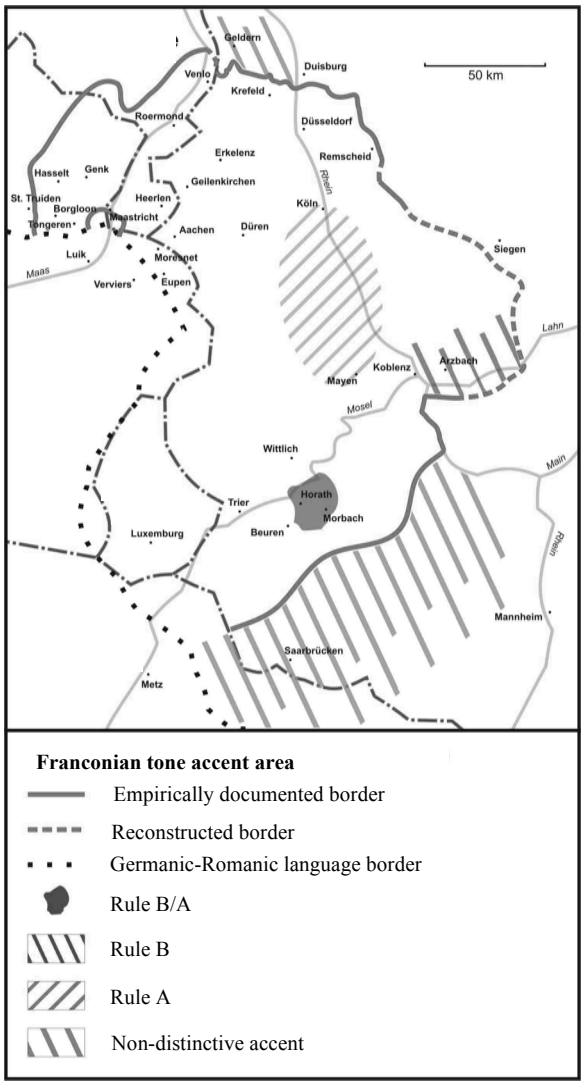


Figure 1.1: The Franconian tone accent area. Everything inside is Rule A, except for the marked areas (Rule B, Rule B/A) and the (north) west where Rule A2 is spoken.

The tone accent area comprises Ripuarian, Moselle Franconian and Limburgian dialects and is spoken in parts of Germany, the Netherlands, Belgium, and Luxembourg. Rule B is spoken in the south east of the area; the possible borders of

this area are based on descriptions by Bach (1921, southern border), the maps of the Mittelrheinischer Sprachatlas (1994-2002, western border) as well as on reconstructions by Wiesinger (1970, northern border). Figure 1.1 is more conservative in indicating the possible northern extension than Wiesinger is in his reconstructions: Wiesinger assumes that Rule B extends to the Siegen area. Initial empirical pilot studies (perceptual studies along the lines of Schmidt 1986) that I have carried out in the area indicate that the size of the region might indeed come close to Wiesinger's assumptions. However, further studies are needed in order to verify these preliminary impressions.

The map at hand does not show that Rule A is split into two sub-areas, Rule A and Rule A2. This split is due to differences in the lexical distribution of the accents. Whereas Rule A is spoken in the majority of the area, Rule A2 is spoken in Limburgian dialects in the (north) west as well as in some dialects close to the northern border of the tone accent area. The map also indicates the presence of a Rule B/A area (or Rule A/B). This area constitutes an intermediate distributional stage between Rule A and Rule B (see e.g. Reitz 1985, Schmidt 1986, 2002, footnote 29 of this thesis).

Lexical distribution. The synchronic distribution of the tone accents correlates with diachronic reference systems: disregarding lexical exceptions, it is possible to determine the accent of a certain lexeme by making reference to groups of sounds (henceforth: *phoneme groups*) within a diachronic reference system. Often, Middle High German (MHG) has been used as an idealized reference system (see e.g. Bach 1921, Wiesinger 1970, Schmidt 2002, Boersma 2006).[2] I follow this tradition.

In a nutshell, we can say that with respect to the distribution, two aspects are of relevance: first of all, the *vowel quality* of long vowels plays an important role – MHG long mid and low vowels (henceforth: *originally* long mid and low vowels) always receive Accent 1 (*spontaneous accentuation*), whereas the other relevant phoneme groups (lengthened vowels, originally long high vowels, originally closing diphthongs) can receive both accents (*combinatory accentuation*). Furthermore, sequences of short vowels plus sonorants can have both accents as well.[3] Which accent the members of these phoneme groups receive is dependent on the *voicing quality* of originally intervocalic consonants. In the majority of the area, words with originally voiced intervocalic consonants receive Accent 1, all other forms receive Accent 2. A more detailed discussion of the lexical distribution for the relevant dialect groups can be found in section 7.4.

[2] Using other reference systems such as Germanic (see e.g. Nörrenberg 1884) or West Germanic (see e.g. Goossens 2006) is equally possible.

[3] In some parts of the area, phoneme combinations of short vowels and obstruents have been said to show accent contrasts as well; e.g., for the Moresnet dialect, Jongen (1972) has provided evidence for such a contrast from lexical decision tasks. However, Jongen's methods have been subject to criticism (see Schmidt 1986 for further discussion).

1.2.2 A terminological issue

In this thesis, I make use of a terminology that is related to that used in descriptions of Scandinavian: i.e., words are grouped into accent classes based on lexical categories and morphological classes (which I will call 'Class 1' vs. 'Class 2'). Note that this differs from the 'traditional' Franconian terminology where the accents are defined from a phonetic perspective: there has been a variety of terms characterizing the opposition, the most widespread ones being *Schärfung* (bumping tone, Accent 1) versus *Schleifton* (dragging tone, Accent 2). Schmidt (1986) unified the terminology and introduced the terms Accent 1 and Accent 2,[4] thereby adapting the Scandinavian accent terminology. However, the phonetic origin of the definition was kept, i.e., Accent 1 refers to items that have a falling tone in declaration and an early rise in interrogation. Note that this differs from the Scandinavian terminology where the terms Accent 1 and Accent 2 refer to lexical categories *across* dialects rather than phonetic events in single dialects (see Kristoffersen 2000): in Scandinavian, situations can arise where words with the same tonal melody across dialects belong to different accent groups in these dialects – still, that does not change their accent.[5]

With respect to the data gathered in this thesis, this difference could easily lead to confusion: since there is considerable dialectal variation in the realization of the accents, as we find in the case of Rule A and Rule B, this terminological difference becomes crucial. Here, due to the phonetics-based Franconian terminology, the assumed opposite tonal melodies lead to opposite accent markings: words that receive Accent 1 in Rule A receive Accent 2 in Rule B, and vice versa (see e.g. Schmidt 1986, 2002, 2006, de Vaan 1999). In the Scandinavian tradition, however, such phonetic differences do *not* influence the terminology – as I mentioned above, words receive their accents with respect to their morphological or lexical class. As a consequence, readers who know the Scandinavian literature but do not have a background in Franconian could easily get confused.[6]

However, this is not the only problem related to the recent terminology – the data from my thesis indicate another, more problematic issue: as I show in the course of this thesis, the tonal melodies in Arzbach only show the reversal of Rule A in declarative sentences but *not* under interrogation: here, the tonal melodies of the accents are rather similar to those in Rule A. How should this be captured in a phonetically driven definition? We would have to say that the word [man] 'man', which receives Accent 2 in Rule A throughout, receives Accent 1 in Rule B declaratives but Accent 2 in Rule B interrogatives. For [man] 'basket', the opposite would be true. It would always receive Accent 1 in Rule A but sometimes Accent 2

[4] "Tonakzent 1" and "Tonakzent 2" (Schmidt 1986, 1).
[5] See e.g. the overviews in Meyer (1937, 1954), Bye (2004), and Perridon (2006).
[6] I have experienced this problem myself, for instance after a talk I gave at a workshop on the interaction of segments and tone (Workshop on segments and tone, Amsterdam 2007): Larry Hyman admitted during the question period that he was not able to fully follow my talk because of my "strange use" of the terms Accent 1 and Accent 2. Having a background in Scandinavian but not in Franconian, he did not understand how one word could have Accent 1 in one area and Accent 2 in another area.

(declaration) and sometimes Accent 1 (interrogation) in Rule B. Obviously, this would run counter to the idea that the accent marking is supposed to group lexical items and morphological units into different accent classes. As a consequence, I do not make use of the traditional phonetic definition of the accents and rather define them from a morphological / lexical perspective, as we find it in Scandinavian.

Crucially, it would not be a sufficient solution to simply 'switch' the terms within Rule B – i.e., change all former Accent-1 words to Accent 2, and vice versa. This would lead to opposite terms with respect to earlier work on Rule B. Therefore, in order to avoid confusion as much as possible, I use a slightly different terminology that groups the words with respect to their *lexical class*. From a cross-dialectal perspective, however, this grouping is not unproblematic either: for the majority of phoneme groups, we find distributional differences between different areas. For instance, in Rule A, all high vowels followed by a voiced consonant and an original schwa display similar tonal melodies, no matter whether this schwa has been apocopated or not; this is different in Rule A2: here, high vowels followed by originally voiced consonants can have different tonal melodies, depending on whether the original schwa has been apocopated or not (see section 7.3 for further discussion).

Still, it is possible to determine a cross-dialectal reference group for class membership: originally long mid and low vowels are the only phoneme group whose members always display similar tonal melodies dialect-internally within all dialect groups; therefore, I use this group as a reference: words deriving from long mid and low vowels always belong to *Class 1*. As has been stated above, lexical items from other phoneme groups can belong to both accent classes: therefore, they can either be members of *Class 1* or of *Class 2*. Their class membership is determined by the tonal melodies associated with the particular items: if these melodies are similar to those of items deriving from originally long mid and low vowels, they belong to Class 1; if the melodies differ, the items belong to Class 2. Class-1 membership will be indicated with a 'c1' superscript, Class-2 membership with a 'c2' superscript. How this terminological innovation relates to the traditional Franconian terms is shown in Table 1.1 by means of the minimal pair [man^{c1}] 'basket' versus [man^{c2}] 'man' for the Mayen and the Arzbach dialect.

Dialect (area)	**'Traditional' terminology**		**My terminology**	
	'basket'	'man'	'basket'	'man'
Mayen (Rule A)	[man^{1}]	[man^{2}]	[man^{c1}]	[man^{c2}]
Arzbach (Rule B)	[man^{2}]	[man^{1}]		

Table 1.1: Revised terminology for the Franconian tone accents

1.3 Introduction of theoretical frameworks

The analytical parts of this thesis make use of two theoretical frameworks: while *autosegmental metrical theory* forms the basis of my analyses, I formalize the results in the framework of *optimality theory*. The basic tenets of both theories are introduced below; I also motivate why I chose these theories.

1.3.1 Autosegmental metrical theory

As the name indicates, autosegmental metrical theory (term from Ladd 1996) combines aspects from *autosegmental phonology* and *metrical theory*.

The theory of *autosegmental phonology* (AP) was introduced by Goldsmith (1976), building on work by Leben (1973). AP is a theory of phonological representations, starting from the assumption that these representations are not strictly linear: Goldsmith shows that tones often behave independently from segments. In AP, tones are organized on a separate *tier* from the rest of the representation, which gives them an autosegmental status. Elements on different tiers can be associated with each other via association lines. During computation, lines can be added (*insertion*, *spreading*) or removed (*deletion*). With respect to tone, the notion of *spreading* (to be discussed below) indicates that a particular tone can be associated with more than one tone-bearing unit (TBU). Elements that are not associated with a root node get deleted or remain *floating*.

Metrical theory (see e.g. Hayes 1985, 1987, 1995, McCarthy & Prince 1996, Prince 1990) analyzes rhythmic structure at the word level and groups the relevant constituents into moras, syllables, feet, and prosodic words (for further discussion, see section 4.2). Autosegmental metrical theory (based on Liberman 1975, Bruce 1977 and Pierrehumbert 1980) combines aspects from autosegmental as well as from metrical theory and incorporates phrases (phonological phrase, focus phrase, intonational phrase (IP, ι), utterance (UP, υ)) in the model.

The relevant constituents are organized in a hierarchical order. The order of those constituents that are relevant for this thesis is given in (4), starting from the lowest level constituent (the mora) to the highest-level constituent (the utterance). The order of these constituents is based on Pierrehumbert (1980):

(4) Hierarchical organization of prosodic constituents[7]

mora (μ) << syllable (σ) << foot (FT) << phonological word (ω) << intonational phrase (ι) << utterance phrase (υ)

[7] Based on Hyman (1985), I include the mora as the lowest-level constitutent – in Pierrehumbert (1980), the lowest-level constituent is the syllable.

One crucial element that is not included in the overview given in (4) is the notion of *focus* (recall that the realization of the accents strongly interacts with information structure, as has been pointed out in subsection 1.2.1). This is due to the fact that the actual 'position' of focus is difficult to express in this strictly hierarchical model. First of all, we have to differentiate between at least two different kinds of foci: *narrow focus* versus *broad focus*, broad focus covering a higher-level prosodic unit than narrow focus (for overviews on the subject, see for instance Ladd 1996, Gussenhoven 2004, and Kahnemuyipour 2009). Broad focus is disregarded in this study. The relevant unit for this thesis is the *focus syllable,* sometimes briefly referred to as *focus*. My working definition of the term is given in (5):

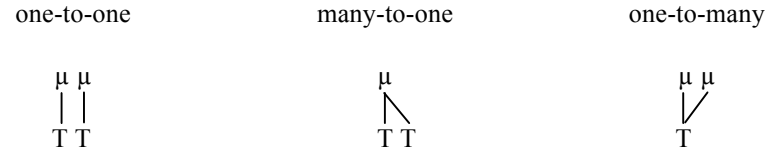
(5) *Focus syllable* (working definition): the focus syllable is that syllable within an intonational phrase that attracts the starred tone of an intonational melody (T*).

This working definition leads us to the autosegmental nature of tone, which I have not discussed to this point: most importantly, it needs to be addressed how (intonational) tones are represented. Tones can be high (H), low (L), or mid (M); for the purpose of this thesis, only H and L are relevant – therefore, I ignore M from this point onwards. These tones represent separate tonal targets; H is phonetically realized with relatively high pitch and L with relatively low pitch. Tonal movements (rising or falling pitch) are assumed to be due to interpolation between these discrete units.

In order to be realized as a tonal target on the surface, tones have to be associated with tone-bearing units (TBUs). Over time, different TBUs have been proposed, including segments (see e.g. Goldsmith 1976), moras (see e.g. Odden 1995, 1996, Pulleyblank 1994), and syllables (see e.g. Clements and Ford 1979). In this thesis, the proposed TBU for all relevant dialects is the *mora* (see subsection 5.2.2 for further discussion).

The universally preferred association of tones to TBUs is *one-to-one*. However, it is also possible that more than one tone is linked to one TBU: this is called a *contour* (many-to-one). Furthermore, it is possible that one tone is associated with more than one TBU. This is called *spreading* (one-to-many). The possible association types are displayed in (6):

(6) Tonal associations in AP



Note that tones cannot spread ‘through’ another tone – association lines may never cross (the *no-crossing principle*, see e.g. Goldsmith 1976, Coleman 1998). Therefore, a tone can maximally spread to the nearest TBU linked to the following or preceding tone but not any further. This is demonstrated in (7):

(7) Spreading in AP: association lines may not cross

Intonational tones in AP are organized within so-called *intonational morphemes.* I refer to these intonational tones also as *intonational melodies* or *focus tones*. Different pragmatic conditions can be expressed with different intonational melodies. For instance, a particular language might use H*L as the declaration melody, whereas the interrogation morpheme might be L*H. Within this thesis, three different morphemes are of relevance: declaration (turn-ending), interrogation (yes-no-question) and continuation (turn-holding).

When tonal morphemes consist of more than one tone, one of these tones is the so-called *starred tone* of the intonational melody. This tone is represented as T* – the star indicates that this tone is aligned with the focus syllable. The non-starred tones of a particular intonational melody are referred to as *leading tones* (when they precede the starred tone) or *trailing tones* (when they follow the starred tone).

Focus positions are not the only positions in the phrase that can be marked tonally: first of all, leading and trailing tones from intonational morphemes can occur pre- or post-focally. Moreover, prosodic boundaries, i.e. the edges of phrases, can be represented tonally as well: for instance, the edges of intonational phrases are usually marked with boundary tones.

A criticism that I have regularly encountered with respect to analyses of intonational systems within AP – especially when discussing my analyses with scholars working in non-generative frameworks – is the limitation to two (intonational) tones. The small number of tones is often regarded as showing too much simplification to express the phonetic properties of the relevant tonal contours. It might well be the case that an autosegmental model restricted to two level tones is not sufficient to fully capture the all-encompassing ‘truth’ about the phonological behavior of pitch. This might also be the case with respect to the other basic assumptions: for instance,

it might not be appropriate to use the same tone symbols for lexical tones and intonational tones since their behavior seems to differ in several respects.[8]

Despite these possible downsides, I still opt for working with this model: for the facts at hand, it offers a sufficient descriptive tool to model the different pitch contours. Generally, working with a model that might sometimes be too restrictive strikes me as being preferable over working with a model that is rather unrestrictive and e.g. allows for a variety of possible contours that are not contrastive (for further discussion of the latter issue, see subsection 5.5.4). If future research should provide conclusive evidence that assuming only H and L is too restrictive, I am certain that my results could (relatively) easily be translated into any less restrictive model.

1.3.2 Optimality theory

The autosegmental analyses carried out in this thesis are formalized within the framework of *optimality theory* (OT). The original OT model was developed by Prince & Smolensk (1993); I make use of the currently most widespread version of OT, *correspondence theory*, going back to McCarthy & Prince (1995). From now on, when using the term OT, I refer to correspondence theory.

OT is an output-based theory: inputs (underlying forms taken from the lexicon) and possible outputs (phonological surface forms generated by the grammar) are compared against a universal set of constraints. In its original version, the theory is thus non-derivational: there are no intermediate steps between input and output.

The constraint set is divided into two basic types: *markedness constraints* and *faithfulness constraints*. Whereas markedness constraints penalize the occurrence of marked structures in the surface form (such as, for instance, complex onsets or codas), faithfulness constraints protect the underlying structure (for instance against deletion, insertion or changes within a segment): the language-specific *constraint ranking* determines, which possible output form (*candidate*) is optimal in a given language; the best candidate *surfaces*, i.e. is interpreted phonetically. A particular constraint ranking reflects a hierarchical order in the 'importance' of constraints. This becomes important during the evaluation process (EVAL): when determining the optimal output candidate, EVAL compares an infinite set of possible outputs (created by the generator GEN) against the constraint set (CON). A candidate can either *satisfy* or *violate* a constraint.

The comparison starts with the most important, highest-ranked constraint. Every candidate that violates this constraint more often than other candidates is 'out': such

[8] Whereas for instance, tone spreading has repeatedly been reported to interact with segmental structure (see Bradshaw 2000 for an overview), such interactions are as yet unattested for purely intonational languages, i.e. languages where pitch does not distinguish lexical items. However, it might be the case that lexical and intonational tones are associated with different units (e.g., lexical tones to segments, intonational tones to moras). This would explain why intonational tones seem not to interact with segmental structure. However, since it is not of immediate relevance for this thesis, I disregard this issue.

a violation is referred to as *fatal*. The remaining candidates are compared against the next constraint in the hierarchy, and so on. This process continues until one candidate is left, which then is the *winner*.

Note that a winner can violate some constraint more often than a losing candidate – such a constraint must then be lower-ranked than the relevant constraints determining the winner. This aspect is what the notion of *optimality* refers to: a winner is not necessarily perfect – however, it is *optimal* within the relevant constraint hierarchy.

The outcome of the evaluation process is expressed in an OT tableau. An illustrative tableau is given in (8):

(8)

X		C1	C2
→	a. A		*
	b. B	*!	

In the left upper corner, we find the input (here: X). Below the input, an illustrative selection of candidates (here: A, B) is listed. To the right of the input, we find the constraints in their specific ranking hierarchy – starting with the highest-ranked constraint on the left. In the example at hand, C1 is higher-ranked than C2. In text, this is given as 'C1 >> C2', where '>>' indicates a dominance relation. Violations of constraints are indicated with asterisks. When a candidate loses due to too many violations of a high-ranked constraint, this is marked with an exclamation mark.

Sometimes, it is not possible to determine the ranking between constraints: either they do not conflict with each other, or there is insufficient empirical evidence to determine the ranking. Within a tableau, unranked constraints are separated by a dashed line (instead of a solid line, which indicates a hierarchical order), as is shown in (9):

(9)

X		C1	C2	C3
→	a. A			*
	b. B	*!		
	c. C		*!	

In text, two unranked constraints are given as '{C1, C2}'. For the example in (9), this would thus result in '{C1, C2} >> C3'.

Since constraints in OT are assumed to be universal, each OT analysis predicts that a constraint reranking constitutes a possible grammar. This is captured with a *factorial*

typology: e.g., a constraint ranking C1 >> C2 >> C3 predicts five other possible grammars: C1 >> C3 >> C2, C2 >> C1 >> C3, C2 >> C3 >> C1, C3 >> C1 >> C2, and C3 >> C2 >> C1. Due to these predictions, we can call OT a "theory of variation" (Van Oostendorp 2008). Since the synchronic typological relation between Rule B and other dialect areas plays an important role in my thesis, I regard OT as the most suitable framework in which to discuss these issues.

1.4 Outline

Chapters 2 and 3 of this thesis provide new empirical data from the Arzbach dialect and serve to offer an accurate description of the Arzbach tone accents. Chapter 2 deals with the perception of the tone accents in Arzbach. To empirically test whether there (still) is a tone accent opposition in Arzbach, I performed a lexical decision task with twelve listeners where these listeners had to discriminate potential minimal pairs. The results of these experiments show that there is a tone accent opposition which is always present in focus positions. However, in some non-focus positions, the opposition can be neutralized.

Chapter 3 treats the production of the opposition: in an in-depth acoustic analysis, I show how the tone accents are realized in different prosodic contexts. Subsequently, I compare the Arzbach contours to those from the Rule-A dialect of Cologne (Peters 2006a). The comparison of tonal contours in Rule B and Rule A yields the surprising result that the tonal contours in Rule B are *not* always a reversal of those in Rule A, as has traditionally been assumed: we find a reversal only in declaration. In interrogation, on the other hand, the contours are *not reversed* but phonetically similar to those we find in Rule A. Therefore, instead of a full tonal reversal, we rather find a *semi-reversal* of tonal contours.

Chapters 4 to 6 are dedicated to the synchronic analysis of the phenomenon within the frameworks of autosegmental phonology and OT. I argue that the nature of the contrast is a 'metrical' one: the two accents differ with respect to foot structure. Chapter 4 focuses on the basic principles regarding the tone accents: the chapter introduces my analytical concept (two prosodically 'strong' moras for Class 1 versus one 'strong' and one 'weak' mora for Class 2). Subsequently, I apply this concept to the basic tonal mapping for Rule A and Rule B (declaration and interrogation, focus, non-final position). It will become evident that the reason for the tonal semi-reversal is located in the grammar of both dialect groups: the fundamental differences and similarities in the tonal mapping in both areas can be regarded as the result of the interaction of two constraints that are ranked differently with respect to each other in Rule A and Rule B.

Chapter 5 discusses the details of the analysis, with respect to the tonal mapping as well as with respect to the surface structure and underlying representation of the opposition. First, the chapter introduces the surface structures for both accents: the head of a Class-1 foot is a syllable whereas the head of a Class-2 foot is a mora. As a consequence of this representational difference, the two types of feet interact with tone in different ways: to model this difference, I introduce a notion of headedness that is based on the assumption that every foot head constitutes a *head domain*. Since the location of the foot head (mora, syllable) determines the size of the head domain, Class 1 and Class 2 differ from each other. Tones interact with these domains; this leads to differences in the tonal mapping. To show that my analytical concept is able to capture the detailed tonal mapping within different Franconian dialects, I carry out detailed comparative case studies of four selected dialects:

Arzbach (my data), Hasselt (data from Peters 2008), Cologne (data from Peters 2006a), and Roermond (data from Gussenhoven 2000a). Whereas the Arzbach dialect constitutes the basis for this thesis, the other three dialects serve to represent the main varieties within the tone accent area. In a last step, the chapter discusses the underlying representation of both accents: whereas Class 2 is assumed to be lexically unmarked, Class 1 is stored as an underlying foot.

Chapter 6 discusses alternative approaches to the phenomenon: first of all, I indicate why my analytical concept is to be preferred over other prosodic analyses from an empirical perspective. Furthermore, the chapter provides a comparison of my approach with the traditional autosegmental approach to the phenomenon – an analysis that is based on the assumption that one of the two accents is marked with a lexical tone.

Chapter 7 shifts the discussion towards a crucial diachronic development in Franconian and provides an account for the diachronic typological relation between Rule A and Rule B. I propose a diachronic analysis that regards the semi-reversed tonal contours in Rule B and Rule A as independent developments out of one common predecessor. I argue that synchronic reflexes of this predecessor can still be found in West Limburgian dialects (for instance in Hasselt). I suggest that Rule-A dialects as well as Rule-B dialects adapted to declaration contours from neighboring non-accent dialects, yet in different ways. These different adaptation strategies then led to reversed declaration contours. The interrogative intonation, on the other hand, basically remained unchanged in both relevant dialect groups.

Furthermore, I show how the synchronic representation I propose might have come into existence diachronically. I argue that the differences in foot structure between the two accents might go back to the origins of the contrast, when the difference between the two accent classes was fully predictable from vowel quality (mid and low vowels belonging to Class 1, the rest belonging to Class 2). My analysis suggests that this difference is related to sonority and originated from the interaction of head domains and vowel quality.

Subsequently, I discuss the lexical distribution of the accents in Arzbach: I revise the distribution proposed by Bach (1921) with respect to the behavior of MHG short vowels that underwent vowel lengthening. This revision sheds new light on the typological distributional relation between Rule B and other dialect areas: whereas to date, only a relation between Rule B and Rule A has been assumed, the revised distribution shows that Rule B displays similarities with Rule A as well as with Rule A2.

Chapter 8 briefly sums up the main findings, discusses the implications of the results of my phonetic and phonological studies and formulates some concluding remarks concerning the importance of Rule B for our understanding of the tone accent opposition. Furthermore, it presents an outlook on future research that will be carried out to extend and deepen the insights presented in this thesis.

2. Perception of the tone accents in Arzbach: a lexical decision task

2.1 Introduction

In Franconian dialects, the opposition between the two tone accents can be neutralized: this is true in particular for non-focus positions (see e.g. Fournier 2008 for perception tests that show a partial neutralization of the contrast in Roermond); furthermore, full neutralizations of a former opposition are possible (see e.g. Cajot 2006). As the history of tone accent research shows, it can sometimes be difficult for a researcher to decide (based on auditory and / or acoustic analyses) if a dialect still shows a recent opposition in certain contexts: examples of insecure researchers can be given starting from the very beginnings of tone accent research (Diederichs 1886) and can still be found in modern studies: although, over time, the possibilities of investigating the phonetic properties of the tone accents have improved significantly (especially with the possibility of conducting phonetic measurements), the sketched problems have still been arising repeatedly.

Starting with Heike (1962), who was the first researcher to conduct elaborated acoustic measurements of the tone accents, researchers can experience problems when making statements about the functional relevance of the opposition.[9] Recent papers by Gilles (2002) and Schmidt & Künzel (2006) exemplify this problem: Gilles (2002) studies potential tone accent minimal pairs and quasi-minimal pairs in Luxembourgian using acoustic measurements. Since he only finds marginal differences between the contours of both accents, Gilles concludes that the opposition at least underwent reduction. However, he admits his incapability of deciding if the opposition is neutralized or not. Only perception tests, Gilles concludes, could shed light on this issue (Gilles 2002, 272).

A related situation arises during Schmidt & Künzel's study of the Morbach dialect. The f0 measurements show high pitch-variability in potential minimal pairs (Schmidt & Künzel 2006, 142). Only on the basis of results from subsequently conducted perception tests are Schmidt & Künzel able to prove the existence of a tone accent opposition in Morbach for declarative intonation.

Thus, to exclude misjudgments at this fundamental level, I decided to leave the decision about whether the tone accents are still distinctive to the speakers of the dialect: a series of perception tests in the form of lexical decision tasks was conducted, including all relevant prosodic environments. For the test, spoken data from natural utterances were used.

[9] Heike speaks e.g. of a neutralization of the contrast in final focus position of interrogative sentences in Cologne, which is contradicted by the results of more recent studies by Gussenhoven & Peters (2004) and Peters (2006a).

Section 2.2 introduces the method I made use of when carrying out the perception tests. This method builds on Schmidt (1986) and was used for all perception tests.

Section 2.3 describes the lexical decision task for focus positions. The results indicate that there is a clear opposition in all focus positions (declaration, interrogation, continuation). Section 2.4 reports the results for non-focal positions (declaration, interrogation). As will become evident, the contrast is present in post-focal interrogatives but neutralized in post-focal declaratives as well as generally in pre-focal position.

Section 2.5 concludes the discussion of the tone accent perception in Arzbach.

2.2 Test tool

In order to test the functional relevance of the tone accents empirically, informants were asked to recognize (possible) accent differences in segmentally identical minimal pairs, varying pragmatic environment (declaration, interrogation, continuation), sentence position (final, non-final), and focal condition (focus, pre-focus, post-focus).

The test serves two basic goals:

a) to find out whether there is (still) a tone accent opposition in Arzbach
b) to find reliable speakers for the production studies

In order to examine goal a), it needs to be checked whether there are informants that can detect a systematic contrast between different minimal pairs in at least one of the different test conditions. With respect to goal b), the results of the perception tests can be used to find competent speakers for the phonetic studies: informants with (relatively) low scores in perception can be excluded from the production study.

The test procedure used in this thesis builds on a method developed in Schmidt (1986): Schmidt created a technique in order to test the functional relevance of the tone accent opposition in Franconian, which he refers to as *distinctiveness test* (Schmidt 1986, 151, translation: B.K.).[10] The goal of Schmidt's test, which he conducted with speakers from the Mayen dialect, is to evaluate the distinctiveness of prosodic oppositions on an empirical basis. The test is conducted as a forced decision task: potential minimal pairs are presented to judges in identical carrier sentences. Each time, the listeners have to choose which item they have heard.

Schmidt defines the following basic criteria that have to be fulfilled in order to execute the test accurately:

(1)

1. Only naïve speakers and naïve listeners are allowed to participate in the test.

2. The judgments of the listeners may only be based on tone accent differences. Therefore, the carrier sentences have to be segmentally and suprasegmentally identical (see Schmidt 1986, 150 f.).

[10] "Distinktivitätstest"; Schmidt's test procedure is based on earlier experiments by Kloster-Jensen (1961, Norwegian) and Jongen (1972, Franconian); however, Schmidt exclusively makes use of natural stimuli and complete utterances and is not involved in the tests, neither as a speaker nor as a listener.

These two criteria are included as a guarantee for the empirical validity of the test. In order to fulfill criterion 2, Schmidt recorded nine realizations of each test sentence, all of them pronounced by the same speaker. Then the nine realizations of one set of sentences (including an Accent-1 item) are compared to the corresponding sentences with an Accent-2 item (auditory transcription and acoustic measurements of f0 and intensity). Out of this corpus, those two realizations are chosen that fulfill Schmidt's criterion of maximal identity (Schmidt 1986, 161f.).

Schmidt's test evaluates different pragmatic conditions as well as a possible influence of different emotions on the distinctiveness of the opposition. In total, he uses 66 test items in the experiment – each item has to be identified six times. The listeners identify the tone accent words by naming synonyms or compounds. These judgments are then listed by the test conductor (see Schmidt 1986, 161 f.).

The experiments lead to clear results: 65 of the 66 test items are identified correctly with rates between 92 and 100 percent (Schmidt 1986, 165-177), which shows that in the Mayen dialect, the tone accent opposition is preserved in different prosodic contexts. Since Schmidt's method constitutes a precise test procedure and has proven its validity, I adopted it for my own perception experiment.

2.3 Focus positions

2.3.1 Procedure

Subjects. Twelve speakers of the Arzbach dialect, eight men and four women, participated in the test. They were aged between 30 and 72 and had grown up in Arzbach. Apart from speaker 11, who moved away half a year before the study began, all speakers had spent their whole lives in Arzbach.

Recordings. I tested the distinctiveness of the tone accents under six different conditions: I varied the pragmatic condition (declaration, interrogation, continuation) and the position in the sentence (non-final vs. final). For every condition, two minimal pairs were chosen. The procedure of determining appropriate test sentences was conducted along the lines of Schmidt (1986). Four naïve speakers produced nine realizations of each possible test sentence, which were recorded with a Sony TCD-1000 DAT-recorder and a Sony ECM/MS 957 microphone.

The test sentences were placed on a card in Standard German orthography. Since, during the pretests, it occasionally occurred that speakers translated the sentences with some influence from Standard German, orthographic dialect transcriptions of the test sentences were included for the main test as well. To avoid possible confusion with respect to the segmentally identical minimal pairs, a picture was included that showed the item itself or a semantically related object.

The nine sentences recorded for each item were compared with the items for the corresponding minimal pair to find those two sentences that are most similar contextually, following the criteria of Schmidt (1986).

Minimal pairs. I used test items from all four speakers during the test. The minimal pairs used in the test, as well as phonetic transcriptions of the test sentences, are displayed in Table 2.1:

Condition	Test item	Carrier sentence	Speaker
Declaration, final	[man^{c2}] ‘man’	[ðɔt ɪzn man] ‘This is a man’	1
	[man^{c1}] ‘basket’	[ðɔt ɪzn man] ‘This is a basket’	
Declaration, final	[ðaʊf^{c2}] ‘baptism’	[ðɔt ɪzn ʃeːn ðaʊf] ‘This is a beautiful baptism’	7
	[ðaʊf^{c1}] ‘pigeon’	[ðɔt ɪzn ʃeːn ðaʊf] ‘This is a beautiful pigeon’	
Declaration, non-final	[hɛl^{c2}] ‘bright’	[ə hɔt hɛl ɡəzɔːt] ‘He said bright’	2
	[hɛl^{c1}] ‘hell’	[ə hɔt hɛl ɡəzɔːt] ‘He said hell’	
Declaration, non-final	[ðiːɐ^{c2}] ‘door’	[ɛː hɔt diːɐ ɡəzɔːt] ‘He said door’	6
	[ðiːɐ^{c1}] ‘animal’	[ɛː hɔt diːɐ ɡəzɔːt] ‘He said animal’	
Interrogation, final	[man^{c2}] ‘man’	[ɪs ðɔt n man] ‘Is this a man?’	2
	[man^{c1}] ‘basket’	[ɪs ðɔt n man] ‘Is this a basket?’	
Interrogation, final	[ðaʊf^{c2}] ‘baptism’	[ɪs ðɔt n ðaʊf] ‘Is this a baptism?’	2
	[ðaʊf^{c1}] ‘pigeon’	[ɪs ðɔt n ðaʊf] ‘Is this a pigeon?’	
Interrogation, non-final	[man^{c2}] ‘man’	[hɔs ðaʊ ən man ɡəzɛːn] ‘Did you see a man?’	1
	[man^{c1}] ‘basket’	[hɔs ðaʊ ən man ɡəzɛːn] ‘Did you see a basket?’	
interrogation, non-final	[ðaʊf^{c2}] ‘baptism’	[hɔs ðaʊ ən ðaʊf ɡəzɛːn] ‘Did you see a baptism?’	1
	[ðaʊf^{c1}] ‘pigeon’	[hɔs ðaʊ ən ðaʊf ɡəzɛːn] ‘Did you see a pigeon?’	
continuation, final	[man^{c1}] ‘basket’	[ɪʃ zɛːn ən man] ‘I see a man, ...’	1
	[man^{c2}] ‘man’	[ɪʃ zɛːn ən man] ‘I see a basket, ...’	

continuation, final	[ðaʊf^{c2}] ‘baptism’ [ðaʊf^{c1}] ‘pigeon’	‘I see a baptism, ...’ [ɪʃ zɛːn ən ðaʊf] ‘I see a pigeon, ...’ [ɪʃ zɛːn ən ðaʊf]	2
continuation, non-final	[man^{c2}] ‘man’ [man^{c1}] ‘basket’	[vɛn ɪʃ n man bətʁaxtə] ‘When I look at a man, ...’ [vɛn ɪʃ n man bətʁaxtə] ‘When I see a basket, ...’	1
continuation, non-final	[ðaʊf^{c2}] ‘baptism’ [ðaʊf^{c1}] ‘pigeon’	[vɛn ɪʃ n ðaʊf bətʁaxtə] ‘When I see a baptism, ’ [vɛn ɪʃ n ðaʊf bətʁaxtə] ‘When I see a pigeon, ...’	2

Table 2.1: Conditions, test items, carrier sentences and speakers of the test sentences for the perception test in Arzbach

Procedure. In total, three experiments were conducted. Experiment 1 has been reported in my MA thesis (2005): the main goal of this test was to examine whether there (still) is a tone accent opposition in Arzbach. I tested the distinctiveness of the opposition under declaration in final and non-final position. Later, two additional tests were performed along the same lines as experiment 1. In experiment 2, I focused on interrogative contours in final position. In experiment 3, the speakers had to judge the test items in interrogative non-final focus position as well as in final and non-final position in continuation. For reasons of convenience, I will not discuss the different experiments separately but will treat all of them at once.

Each item was tested six times; these six repetitions of all relevant items were placed in a randomized order on a CD. Experiment 1 consisted of 48 items, experiment 2 of 24 items, experiment 3 of 72 items. Altogether, every participant had to judge 144 items. An overview over the number of judgments per condition is given in Table 2.2:

Conditions	Test items	Repetitions	Judges	Judgments
Continuation non-final	4	6	12	288
Continuation final	4			288
Declaration non-final	4			288
Declaration final	4			288
Interrogation non-final	4			288
Interrogation final	4			288
Total	24	6	12	1728

Table 2.2: Conditions, number of test items, number of repetitions per item, judges and number of judgments for the perception test in Arzbach.

In the questionnaire that was developed for the perception tests, the two available options were represented graphically. These pictures either displayed the general meaning of the test item – e.g. the item 'man' was represented with the picture of a man – or were semantically related to it – e.g. the item 'bright' was represented with a light bulb. The judges had to decide, which of the two stimuli they had heard and mark their decision in the questionnaire. For the test, they were placed in a quiet room and listened to the test items via headphones.

2.3.2 Results

General overview. The results of the perception tests show clearly that there is a tone accent opposition in Arzbach; the vast majority of the judges were able to distinguish between the accents with highest accuracy in every of the six conditions. Below, I report the main results. Furthermore, I add some observations about variation with respect to the scores in different pragmatic conditions, sentence-positions, speakers and items. However, these results have to be handled with care: since the goal of this test was solely to test the ability of the speakers in performing a lexical decision task, some factors have not been not controlled for systematically between the different conditions – e.g., the sentences were pronounced by more than one speaker.

Overall results. In total, 1728 decisions were made (twelve speakers, six conditions with four test items each, six judgments per item) of which 1678 decisions were correct. This is an overall score of 97.11% correct answers. Obviously, this score is

well above chance level – the probability of scoring at least 1678 times right by chance is practically zero.

Table 2.3 gives an overview over all judgments that were made.

		Correct answers						
		Dec fin	**Dec nonf**	**Int fin**	**Int nonf**	**Con fin**	**Con nonf**	**Mean**
Informant	**1**	24	24	24	24	24	24	24
	2	24	24	24	24	23	24	23.83
	3	24	24	24	24	24	24	24
	4	24	24	24	23	23	24	23.67
	5	24	24	24	24	24	24	24
	6	24	24	23	24	23	24	23.67
	7	24	24	24	24	24	24	24
	8	24	24	21	22	20	22	22.17
	9	24	24	24	23	24	24	23.83
	10	24	24	24	23	19	24	23
	11	23	18	20	17	22	19	19.83
	12	24	24	23	24	19	23	22.83
	Total	23.92	23.5	23.25	23	22.42	23.33	23.24

Table 2.3: Scores of the twelve Arzbach judges per condition and mean score. In total, 1728 judgments had to be made. Since there were four items per condition with six repetitions each, '24' is the optimal score per condition.

Judges. 10 out of the 12 participants scored correctly in at least 95 percent of all cases (mean score of 22.8 correct judgments out of 24 judgments per condition), four of them (1, 3, 5, 7) did not make a single mistake. Only participants 8 (92.36%) and 11 (82.64%) stayed below the 95%-level.

Judge 11 in particular experienced problems in various conditions. For instance, he was the only participant to make wrong judgments in declaration, where he only scored 75% right answers (18 out of 24) in non-final position. In other non-final contexts, his results are often far below most of the other judges as well. Table 2.4 shows that not only does judge 11 differ from the rest of the group but also judges 8, 10 and 12 had lower means per condition than the majority of the judges:

Judge	Mean
1	24
3	24
5	24
7	24
2	23.83
9	23.83
4	23.67
6	23.67
10	23
12	22.83
8	22.17
11	19.83
Total	23.24

Table 2.4: Mean scores of the twelve judges.

However, when we look at the results of the different informants per condition, we can observe that only judges 8 and 11 displayed problems in making the right judgments in various conditions, whereas the relatively lower results of judges 10 and 12 basically originate from more or less categorical misjudgments for one particular item (see Table 2.5).

	Correct answers per test item							
		1	**2**	**3**	**4**	**5**	**6**	**Total**
Informant number	**1**	0	0	0	0	0	24	24
	2	0	0	0	0	1	23	24
	3	0	0	0	0	0	24	24
	4	0	0	0	0	2	22	24
	5	0	0	0	0	0	24	24
	6	0	0	0	0	2	22	24
	7	0	0	0	0	0	24	24
	8	0	1	0	2	3	18	24
	9	0	0	0	0	1	23	24
	10	0	1	0	0	2	21	24
	11	0	1	2	4	7	10	24
	12	1	0	0	0	2	21	24
	Total	1	3	2	6	20	256	288

Table 2.5: Number of correct scores of the twelve judges for the 24 test items (six repetitions per item).

Pragmatic conditions. The accent opposition was most salient in declaration, where all but one participant (judge 8) scored perfectly for final as well as for non-final focus position. The results for the two remaining pragmatic conditions are slightly

worse (see Table 2.6). In total, though, the results for each of the three pragmatic conditions are far above chance level.[11]

Pragmatic Condition	Mean	Minimum per item	Maximum per item
Continuation	22.88	1	6
Declaration	23.71	4	6
Interrogation	23.13	2	6
Total	23.24	1	6

Table 2.6: Judgments under the different pragmatic conditions, including mean score per condition (24 repetitions), minimum score per item and maximum score per item (six repetitions).

Sentence position. With respect to sentence position, no difference in the recognition scores between post-focal final position and post-focal non-final position could be observed: the means for the two groups are almost identical (23.19 for final, 23.28 for non-final position).

Items. There is variation in the recognition scores for the minimal pairs [man^{c1}] / [man^{c2}] and [ðaʊf^{c1}] / [ðaʊf^{c2}]. As Table 2.7 shows, the judges gained better results for the former than for the latter item pair. Note that I do not discuss the minimal pairs [ðiːɐ^{c1}] / [ðiːɐ^{c2}] and [hɛl^{c1}] / [hɛl^{c2}] since the samples are rather small.

Item	N	Mean	Minimum	Maximum
[man^{c1}]	60	5.97	5	6
[man^{c2}]	60	5.93	4	6
[ðaʊf^{c1}]	60	5.63	1	6
[ðaʊf^{c2}]	60	5.65	2	6
[ðiːɐ^{c1}]	12	5.92	5	6
[ðiːɐ^{c2}]	12	5.83	4	6
[hɛl^{c1}]	12	5.83	4	6
[hɛl^{c2}]	12	5.92	5	6
Total	288	5.81	1	6

Table 2.7: Judgments per item, including number of sentences produced with the item, mean score per item (six repetitions), minimum score and maximum score.

[11] According to the binonimal division, the probability for judging a mean of 5.72 under continuative intonation by chance is zero.

2.4 Non-focus positions

2.4.1 Procedure

Subjects. Ten speakers participated in the test. These were the same participants as for the perception test in focus positions minus speakers 8 and 11.

Recordings. Six conditions were tested. Since phonetic measurements show that the contours for continuation and interrogation resemble each other in all contexts, I tested the opposition in declaration and interrogation in different sentence positions (final, non-final post-focal, and non-final pre-focal). Two minimal pairs per condition were selected. The recordings for the perception tests had started at a stage where the speakers had already been recorded for my MA thesis – accordingly, they were well aware of the object of investigation. Therefore, it turned out to be severely problematic to elicit the test items in an 'unstressed' way. Being motivated participants who want to perform 'well', the speakers displayed the tendency to always put some extra effort and secondary stress into the target word. In a second step, in order to get as close as possible to a non-focus pronunciation, I placed the test items in the second position of compounds. Since compounds have initial stress in German, this seemed the best possibility to elicit the desired pronunciations. These compounds were placed in identical carrier sentences.

The recordings were conducted in the same way as those for the focus positions. However, in order to keep the conditions as natural as possible, I abstained from the multiple repetitions per item and focused only on segmentally identical test items.

Minimal pairs. Test items from two speakers were used. The head of each compound was either [aː^{c1}jɐ] 'eggs' or [haʊs^{c2}] 'house'; Table 2.8 displays the minimal pairs that were tested as well as phonetic transcriptions of the test sentences; focused words are underlined:

Condition	Test item	Carrier sentence	S
Declaration, post-focal, final	[man^{c2}] ‘man’	[ðɔt ɪzn a:jɐman] ‘This is a man selling eggs’	7
	[man^{c1}] ‘basket’	[ðɔt ɪzn a:jɐman] ‘This is a basket for eggs’	
Declaration, post-focal, final	[ðaʊf^{c2}] ‘baptism’	[ðɔt ɪzn a:jɐðaʊf] ‘This is a baptism with eggs’	7
	[ðaʊf^{c1}] ‘pigeon’	[ðɔt ɪzn a:jɐðaʊf] ‘This is a pigeon carrying eggs’	
Declaration post-focal, non-final	[man^{c2}] ‘man’	[ðɔt ɪzn a:jɐman gəvɛ:zə] ‘This has been a man selling eggs’	7
	[man^{c1}] ‘basket’	[ðɔt ɪzn a:jɐman gəvɛ:zə] ‘This has been a basket for eggs’	
Declaration, post-focal, non-final	[ðaʊf^{c2}] ‘baptism’	[ðɔt ɪzn a:jɐðaʊf gəvɛ:zə] ‘This has been a baptism with eggs’	7
	[ðaʊf^{c1}] ‘pigeon’	[ðɔt ɪzn a:jɐðaʊf gəvɛ:zə] ‘This has been a pigeon carrying eggs’	
Declaration, pre-focal	[man^{c2}] ‘man’	[n a:jɐman kan gans ʃe:n gʁɔʊs saɪn] ‘A man selling eggs can be quite tall’	2
	[man^{c1}] ‘basket’	[n a:jɐman kan gans ʃe:n gʁɔʊs saɪn] ‘A basket for eggs can be quite big’	
Declaration, pre-focal	[ðaʊf^{c2}] ‘baptism’	[n haʊsðaʊf ɪs dɔx vɔt ʃʁɛklɪʒəs] ‘A baptism at home is horrible’	2
	[ðaʊf^{c1}] ‘pigeon’	[n haʊsðaʊf ɪs dɔx vɔt ʃʁɛklɪʒəs] ‘A domestic pigeon is horrible’	
Interrogation, post-focal, final	[man^{c2}] ‘man’	[ɪs ðɔt n a:jɐman] ‘Is this a man selling eggs?’	7
	[man^{c1}] ‘basket’	[ɪs ðɔt n a:jɐman] ‘Is this a basket for eggs?’	
Interrogation, post-focal, final	[ðaʊf^{c2}] ‘baptism’	[ɪs ðɔt n a:jɐðaʊf] ‘Is this a baptism with eggs?’	7
	[ðaʊf^{c1}] ‘pigeon’	[ɪs ðɔt n a:jɐðaʊf] ‘Is this a pigeon carrying eggs?’	
Interrogation, post-focal, non-final	[man^{c2}] ‘man’	[ɪs ðɔt n a:jɐman gəvɛ:zə] ‘Has this been a man selling eggs?’	7
	[man^{c1}] ‘basket’	[ɪs ðɔt n a:jɐman gəvɛ:zə] ‘Has this been a basket for eggs?	

Interrogation, post-focal, non-final	[ðauf^{c2}] ‘baptism’ [ðauf^{c1}] ‘pigeon’	[ɪs ðɔt n a:jɐðauf gəvɛ:zə] ‘Has this been a baptism with eggs?’ [ɪs ðɔt n a:jɐðauf gəvɛ:zə] ‘Has this been a pigeon carrying eggs?’	7
Interrogation, pre-focal	[man^{c2}] ‘man’ [man^{c1}] ‘basket’	[ɪzn a:jɐman aɪgəntlɪʃ ɪmɛ so gʁɔʊs] ‘Is a man selling eggs always that tall? [ɪzn a:jɐman aɪgəntlɪʃ ɪmɛ so gʁɔʊs] ‘Is a basket for eggs always that tall?	2
Interrogation, pre-focal	[ðauf^{c2}] ‘baptism’ [ðauf^{c1}] ‘pigeon’	[ði: haʊsðauf ɪs ʃe:n gəvɛ:zə] ‘The baptism at home has been nice?’ [ði: haʊsðauf ɪs ʃe:n gəvɛ:zə] ‘The domestic pigeon has been nice?’	2

Table 2.8: Conditions, test items, carrier sentences and speakers of the test sentences for the perception test in Arzbach (non-focal positions)

Procedure. Six repetitions of each test sentence were placed on CD in a randomized order. In total, the informants had to judge 144 test sentences – the design of the questionnaires did not differ from that for focus positions. Consider Table 2.9 for an overview of the test material:

Conditions	Test items	Repetitions	Judges	Judgments
Declaration non-final, post-focal	4	6	10	240
Declaration, final, post-focal	4			240
Declaration, pre-focal	4			240
Interrogation, non-final, post-focal	4			240
Interrogation, final, post-focal	4			240
Interrogation, non-final, pre-focal	4			240
Total	24			1440

Table 2.9: Conditions, number of test items, number of repetitions per item, judges and number of judgments for the perception test in Arzbach (non-focal positions).

2.4.2 Results

Overall results. In non-focus position, the recognition scores are partially much lower than in focus positions. This is not too surprising since a tendency towards neutralization of the opposition in non-focus position has been reported repeatedly (consider for instance the results of Fournier 2008 for the Roermond dialect: in Roermond, the opposition is neutralized in non-focus, non-final position).

In total, the ten judges made 1440 decisions, 922 of these answers were correct (64%). However, these 64% are not equally distributed – the contrast proved to be much more salient in interrogative sentences than in the corresponding declaratives. Table 2.10 provides information on the overall scores as well as the means for each speaker in the different pragmatic conditions.

		Correct answers						
		Dec, fin, post	**Dec, nonf, post**	**Dec, nonf, pre**	**Int, fin, post**	**Int, nonf, post**	**Int, nonf, pre**	**Total**
Informant number	**1**	11	17	13	22	15	12	15
	2	11	19	13	24	21	10	16.33
	3	10	13	12	24	21	13	15.50
	4	5	13	13	22	19	14	14.33
	5	10	14	12	24	21	13	15.67
	6	8	16	12	23	21	13	15.50
	7	12	18	15	21	18	15	16.50
	9	15	14	12	17	16	13	14.50
	10	12	15	11	24	20	14	16
	12	12	15	10	20	18	10	14.16
	Total	10.60	15.40	12.30	22.10	19	12.70	15.35

Table 2.10: Scores of the ten Arzbach judges for the six different pragmatic conditions and mean score. In total, 1440 judgments had to be made. Since there were four items per condition with six repetitions each, 24 is the optimal score.

As Table 2.10 shows, in non-focal position, the differences between the different pragmatic conditions and sentence positions turned out to be larger than the differences between the different judges.[12] Therefore, I start by discussing the effects of the test conditions.

Pragmatic conditions. Whereas in focus positions, the contrast was slightly more salient in declaration than in the other pragmatic conditions, we find a different result in non-focus positions: here, in post-focal position, the average scores are much higher in interrogation (20.55) than in declaration (13). This suggests that there is a systematic contrast in interrogation but not in declaration.

Sentence position. In interrogation, there is a contrast in non-final as well as in final position. However, the judges had fewer problems detecting it in final than in non-final position. As Table 2.10 shows, the mean score in final position was 22.10, whereas in non-final position, it was merely 19. Despite the relatively low score in non-final position, I argue that there is a systematic contrast: when hearing both sentences of a minimal pair in direct contrast (I presented the sentences to some of the participants again after the experiment was finished), the informants can distinguish between the accents without doubt. The reason why the judges have lower scores in non-final interrogatives is most likely to be attributed to their

[12] Recall that the opposite is true for focus positions: there, we found some variation between the different judges but almost none for the different test conditions.

difficulties in detecting Class-2 syllables correctly in that position (see also Table 2.11). This again is probably related to the phonetics of the accents in this position: whereas a Class-2 syllable has a high pitch target, Class 1 has an even higher, extra-high target. Apparently, the extra-high target is perceptually marked for the judges and relatively easy to detect, whereas the 'normal' high target seems to be more ambiguous.[13]

Whereas the recognition scores are generally rather weak in declaration, the contrast seems to be more salient in non-final position (mean of 15.40) than in final position (mean of 10.60). This seemingly suggests an opposite effect to what we find in interrogation, where the contrast is more salient in final than in non-final position. However, I argue that this is not a systematic difference between the two conditions: instead, it derives from the fact that most speakers scored high means for one of the four minimal pairs – since this particular minimal pair occurred in non-final position, this explains the higher average scores (see below for further discussion).

Items. Consider Table 2.11 for the mean scores per item:

Condition	Items	Mean	Minimum	Maximum
Declaration, non-final, post-focal	[man^{c1}]	2.80	0	6
	[man^{c2}]	2.60	0	5
	[ðaʊf^{c1}]	4.90	3	6
	[ðaʊf^{c2}]	5.10	3	6
Declaration, final, post-focal	[man^{c1}]	2.70	1	5
	[man^{c2}]	2.60	0	5
	[ðaʊf^{c1}]	1.30	0	4
	[ðaʊf^{c2}]	4.00	2	6
Declaration, pre-focal	[man^{c1}]	3.90	1	5
	[man^{c2}]	2.30	1	5
	[ðaʊf^{c1}]	1.60	0	6
	[ðaʊf^{c2}]	4.50	2	6
Interrogation, non-final, post-focal	[man^{c1}]	5.40	4	6
	[man^{c2}]	4.00	1	6
	[ðaʊf^{c1}]	5.60	3	6
	[ðaʊf^{c2}]	4.00	2	6
Interrogation, final,	[man^{c1}]	5.40	3	6
	[man^{c2}]	5.90	5	6

[13] For a discussion of the pitch contours and exemplary sentences, see below, subsection 3.4.3 and section 3.5.

post-focal	[ðaʊf^{c1}]	5.50	3	6
	[ðaʊf^{c2}]	5.30	3	6
Interrogation, pre-focal	[man^{c1}]	3.10	1	6
	[man^{c2}]	3.30	1	6
	[ðaʊf^{c1}]	1.20	0	4
	[ðaʊf^{c2}]	5.10	3	6

Table 2.11: Scores of the twelve Arzbach judges each test item, including mean, minimum and maximum.

In this respect, the distribution of the results in declaration is of particular interest: note that all items from the minimal pair [man^{c1}] / [man^{c2}] show scores around a mean of '3'; these scores can easily be attributed to chance. Furthermore, the wide range of answers supports the idea that there is no systematic contrast in post-focal declarative contours. For instance, consider the minima and maxima for this minimal pair in the three different declarative conditions: they all show recognition scores between at least 1 and 5, in selected cases even 0 versus 6. If there were a systematic contrast, we would not expect such a wide range of answers for both items of a minimal pair.[14]

However, particularly the scores for [ðaʊf^{c1}] (4.9) and [ðaʊf^{c2}] (5.1) in non-final, post-focal position are clearly higher than the mean value '3' – this is the only minimal pair in declaration where the judges scored higher than on average. It is difficult to state conclusively why the scores for this item are higher than for the other items in declaration; it might e.g. be the case that the speaker assigned some kind of secondary stress to these items. Still, since the other relevant items clearly show that the opposition can be neutralized, I argue that there is no *systematic* contrast in non-focal declaratives.

Judges. As has been displayed in Table 2.10, judge 7 had the highest mean score for all items (4.13), whereas judge 12 had the lowest overall mean score (3.54). However, interestingly, judge 7 did not have the best recognition results for the post-focal interrogatives, although she had produced the test sentences herself: In final position, she only achieved the eighth best score (mean of 5.25); in non-final position, she placed seventh (mean of 4.5). This might be a slight indication that there does not always necessarily have to be a clear correlation between production and perception of a contrast: i.e., it might be the case that informants who are able to

[14] Note that on the basis of this experiment, it cannot be decided whether the wide range of answers in these contexts is due to a chance-based distribution, or whether different judges systematically *heard* different accents, and to which degree extralinguistic factors can play a role in the decision. In other words: it is not clear how the interaction between phonology and semantics – strictly speaking, this is what this kind of perception tests evaluates – works in this specific case. An innumerable number of factors might be involved when a judge has to make such a decision – aside from the linguistic factors, she might for instance have a general preference for baskets over men, or vice versa, etc.

produce a contrast systematically do not necessarily have to be able to perceive it perfectly (see e.g. Schouten 1981 and Steenwijk 1992 for comparable observations with respect to vowel distinctions; see Boersma 1998 for further discussion of this issue).

2.5 Conclusion

The goal of this chapter was to determine the functional relevance of the contrast in Arzbach in a variety of different contexts. The outcome is clear: there is a tone accent opposition in Arzbach. The results show that almost all informants judged correctly in the large majority of cases. In focus positions, this is the case for all contexts. In non-focus positions, a systematic contrast can only be found in interrogation, post-focal position. However, as I have mentioned, this does not imply that in declaration, speakers are per se incapable of making a contrast in non-focus positions by assigning secondary stress. But, crucially, a neutralization is possible, as has been shown for five of the six minimal pairs in declaration (as well as for both minimal pairs in interrogatives, pre-focal position) – for this reason, I assume that there is no systematic accent opposition in non-focal declarative contours. Table 2.12 provides an overview of the different pragmatic contexts that have been tested, indicating whether there is a systematic contrast between the accents.

Focus position	Condition	Systematic contrast
Focus	Declaration, final	Yes
	Declaration, non-final	Yes
	Interrogation, final	Yes
	Interrogation, non-final	Yes
Non-focus	Declaration, final, post-focal	No
	Declaration, non-final, post-focal	No
	Declaration, pre-focal	No
	Interrogation, final, post-focal	Yes
	Interrogation, non-final, post-focal	Yes
	Interrogation, pre-focal	No

Table 2.12: Summarized results for the different test conditions, indicating for each position whether there is a systematic accent contrast or not. Conditions where there is no systematic contrast are grey-shaded.

Due to the test settings, more complex interactions regarding for instance the salience of the contrast in different positions could only be discussed cautiously. To provide a deeper discussion of these facts, possible confounding factors would have to be controlled in a more precise way. E.g., there should not be more than one speaker. Since, however, I was mainly concerned with the segmental and suprasegmental identity of the carrier sentences, I did not restrict the test sentences to one speaker – taking several speakers into account obviously raised the chance of finding perceptually similar carrier sentences.

Generally, in order to perform a 'perfect' test for the salience of the contrast in different sentence positions and pragmatic conditions, several aspects would have to be controlled for. First of all, it has to be tested in which conditions there is a phonological contrast – as has been done in the test here. Then, for a subsequent test

that aims at finding out more about the salience of the contrast in different positions, we should first determine a prototypical pronunciation for each accent in every condition where it is contrastive. Ideally, this would involve different parameters (besides pitch, we might think of duration, intensity, and vowel quality).[15] With the help of PSOLA (for instance in Praat), a variety of artificial test items might be constructed, varying the different parameters involved. Native listeners then would determine a *perceptual prototype.* Such a test could be executed along the lines of Benders and Boersma (2009): they recently developed a method that aims at finding the best exemplar when several phonetic parameters are involved.[16] Once we have found our exemplars, we can perform a variety of tests where the validity of the results is controlled for in the best possible way.

[15] Although these parameters do not seem to be involved in the distinction, they might still have an effect for determining the perfect exemplar.
[16] For an alternative approach see also Iverson and Evans (2003).

3. Production of the tone accents in Arzbach: a phonetic study

3.1 Introduction

In this chapter, the phonetic properties of the tone accents in different prosodic contexts are analyzed. This study constitutes the first phonetic in-depth acoustic analysis of a Rule-B dialect.[17] I include the two arguably most important factors in the realization of the opposition: F0 and duration. For Arzbach, perception tests with signal-manipulated stimuli (Werth to appear, with my data) have shown that the sole carrier of the distinction is F0. Duration, on the other hand, can most likely be regarded as a secondary factor in most of the dialects. Still, it has repeatedly been reported as an important factor – both from a synchronic as well as from a diachronic point of view.[18]

Since, as I have mentioned above, speakers tend to put secondary stress on accents in non-focus positions (see subsection 2.4.1), I only give average overall contours for focus positions. However, based on the minimal pairs recorded for the perception tests, I give examples for each relevant condition. Additionally, I briefly discuss the pitch contours of disyllabic words.

All relevant minimal pairs contain long vowels, diphthongs, or short vowels plus sonorants. In some dialects, sequences of short vowels plus obstruents were reported to carry tone accents as well (see e.g. Jongen 1972, Peters 2007a, 2008). For Arzbach, Bach (1921) indicated that there is no such contrast. Since my own recordings of some possibly contrastive items did not give any reason to doubt Bach's description, I ignore such sequences from now on.

Section 3.2 reports the recording process and the method of analysis whereas section 3.3 provides the results for the different prosodic positions. Section 3.4 discusses the results.

Section 3.5 then compares the results of my phonetic measurements for the basic facts (declaration, interrogation, focus, final and non-final position) to those from the Rule-A dialect of Cologne (data from Peters 2006a). As this comparison shows,

[17] Up to now, reliable phonetic data have only been provided for the so-called 'Rule A/B'-dialect of Morbach (Schmidt & Künzel 2006), and then only for phrase-final declaratives.

[18] Synchronically, duration is claimed to be the decisive factor for the distinction at least in the Franconian dialect of Weert (Heijmans and Gussenhoven 1998, Prehn 2009). Furthermore, according to Gussenhoven and Peters (2004) as well as Peters (2006a), duration is a key factor in distinguishing the accents in non-focus positions in Cologne (see also subsection 5.5.4 for discussion). Furthermore, in several theories on the genesis of the Franconian tone accents, duration is assigned a key role (at least at the early stages of the opposition: see Bach 1921, Schmidt 2002, 2006, Boersma 2006).

the tonal contours of Arzbach display a reversal of the Rule-A contours in declaration. In interrogation, on the other hand, the contours are not reversed.

Section 3.6 concludes the chapter.

3.2 Procedure

Subjects. The subjects were those ten speakers that had scored a rate of at least 95% during the perception test for the focus positions; speakers 8 and 11, whose rates were lower, were excluded (see subsection 2.3.2). The group consisted of five men and five women.

Minimal pairs. Eight monosyllabic minimal pairs were included in the study. They are listed in Table 3.1:

Class 1	Class 2	Phoneme group	Following consonant
[man^{c1}] 'basket'	[man^{c2}] 'man'	Vowel + Sonorant	–
[sʊn^{c1}] 'sun'	[sʊn^{c2}] 'son'	Vowel + Sonorant	–
[fal^{c1}] 'trap'	[fal^{c2}] 'case'	Vowel + Sonorant	–
[hɛl^{c1}] 'hell'	[hɛl^{c2}] 'bright'	Vowel + Sonorant	–
[ʃtaɪn^{c1}] 'stone-pl'	[ʃtaɪn^{c2}] 'stone-sg'	Diphthong	Sonorant
[baɪn^{c1}] 'leg-pl'	[baɪn^{c2}] 'leg-sg'	Diphthong	Sonorant
[ðaʊf^{c1}] 'pigeon'	[ðaʊf^{c2}] 'baptism'	Diphthong	Obstruent
[ðiːɐ^{c1}] 'animal'	[ðiːɐ^{c2}] 'door'	Monophthong	Vocalized /ʁ/

Table 3.1: Minimal pairs for the phonetic study, including Class 1, Class 2, phoneme group and an optional following consonant

Conditions and recordings. Each of these items was recorded in several contexts and varying pragmatic conditions and sentence positions. The pragmatic conditions were declaration, interrogation, and continuation; the sentence position varied between final and non-final position. Since the phonetic realization of the accents is similar in interrogation and continuation, only the interrogation contours will be reported. In total, every speaker had to pronounce 16 sentences per condition, which resulted in a total number of 64 sentences per speaker. Due to a technical failure, the data of two female speakers (speaker 3 and speaker 4) for declaration, final position, got lost – thus, for this condition, eight speakers were included.

In general, I decided to keep the carrier sentences as simple as possible. Furthermore, to control for coarticulation, I tried to keep the sentences identical across the different items. Due to reasons of grammaticality, however (differences in gender, nouns vs. adjectives, singular forms versus plural forms), that was not always achievable. In these cases, the carrier sentences should be as similar as possible.

Table 3.2 shows one exemplary test sentence per condition for the minimal pair [man^{c1}] / [man^{c2}]. An overview of all test sentences is provided in Appendix B.

Pragmatic condition	Sentence position	Exemplary test sentence: [man^{c1}] 'basket'	Exemplary test sentence: [man^{c2}] 'man'
Declaration	Non-final	Sie hat einen *Korb* gesehen. 'She has seen a *basket*'	Sie hat einen *Mann* gesehen. 'She has seen a *man*'
Declaration	Final	Das ist ein Korb. 'This is a *basket'*	Das ist ein Mann. 'This is a *man'*
Interrogation	Non-final	Hat sie einen *Korb* gesehen? 'Did she see a *basket*?'	Hat sie einen *Mann* gesehen? 'Did she see a *man*?'
Interrogation	Final	Sieht sie einen *Korb*? 'did she see a *basket*?'	Sieht sie einen *Mann*? 'Did she see a *man*?'
Continuation	Non-final	Wenn ich einen *Korb* betrachte, dann sage ich dir Bescheid. 'When I look at a *basket*, I will let you know'	Wenn ich einen *Mann* betrachte, dann sage ich dir Bescheid. 'When I look at a *man*, I will let you know'
Continuation	Final	Ich sehe einen *Korb*, und dann gehe ich weg. 'I see a *basket*, and then I go away'	Ich sehe einen *Mann*, und dann gehe ich weg. 'I see a *man*, and then I go away'

Table 3.2: Examples for the test sentences used in the experiment. In all contexts, the target words are in focus position.

Method of analysis. For each item, I measured the relevant parameters within the different phoneme groups that are usually assumed to be the carriers of the distinction (see also the discussion of the lexical distribution of the tone accents in section 4.3). That is, in items with a long vowel, I measured the long vowel, as I did with diphthongs. In short vowels plus sonorants, both the vowel and the sonorant were measured. An exception is the minimal pair [ðiːɐ^{c1}] / [ðiːɐ^{c2}]. Here, the vocalized /ʁ/ is not part of the relevant phoneme (the long vowel). Since, however, a precise segmentation between the [iː] and the vocalized [ɐ] is problematic, I decided to include the vocalized /ʁ/ in the measurements.

The phonetic measurements were executed in *Praat* (Boersma and Weenink 1992-2010) by means of a script that automatically extracted fifteen equally distributed pitch points and the duration of each item. All the results were checked manually for possible errors in the extraction of the pitch points. Whereas duration was measured in ms, the pitch contours are displayed in semitones (*re* 100 Hz) instead of the commonly used hertz scale. Since I work with a mixed group of speakers with different fundamental frequency levels (most importantly the difference between men and women), using the linear hertz scale might lead to distorted pitch contours: a fall from 200 Hz to 100 Hz is comparable to a fall from 100 Hz to 50 Hz; both have an extent of one octave. By using a logarithmic semitone-scale, however, these differences do not affect the outcome: here, both a fall from 200 Hz to 100 Hz and a fall from 100 Hz to 50 Hz are encoded as a fall of 12 semitones (st).

On the basis of these measurements, average contours have been computed - they include the arithmetic means of the 15 extracted pitch points as well as the average duration values. With the help of a Praat script, these values were transferred to graphs that display the average pitch contours of the accents against the average duration.

As regards the phonetic transcription of segments, note that there is only one alveolar fricative in Arzbach; it shows high realizational variation: sometimes it is realized as [s], sometimes as [z]. Usually, we find [z] when the fricative occurs in between two sonorant segments; in other contexts, it is rather realized as [s]. However, in some cases where the phonetic signal deviates from these tendencies, I adapt to the actual phonetic realization.

3.3 Results

3.3.1 Focus positions: monosyllabic words

The overall contours display the average pitch contours against the average duration for the different pragmatic conditions and sentence positions. They are computed over all speakers and over all items. As could be expected with respect to the results of the perception tests, the contours of Class 1 and Class 2 clearly differ from each other. In the following, the results for each relevant condition are provided separately. In each case, I start by giving the average contours and describe the realization of the items briefly with respect to tonality, duration and (in non-final positions) post-focal pitch. Subsequently, I provide selected examples from the corpus. If not indicated otherwise, all data are taken from speaker 2. Since these examples display utterances from a particular speaker instead of average contours, the problem of having different fundamental frequencies (see above, section 3.2) is not relevant. Therefore, I give these contours with a standard (logarithmic) hertz scale; transparent grey shading highlights the accent syllables.

a) declaration, focus, non-final position

The average contours for Class 1 and Class 2 are displayed in Figure 3.1:

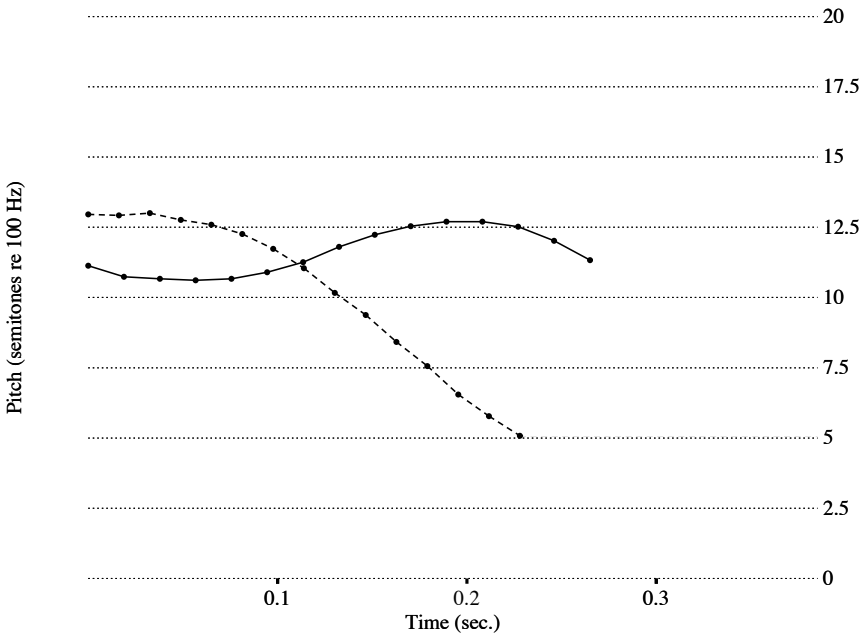


Figure 3.1: Average contours for Class 1 and Class 2 against the average duration in declaration, focus, non-final position. Class 1 is represented with a solid curve, Class 2 with a dashed curve. Every dot represents one of 15 pitch points per contour.

Tonality: Class 1 starts with a very slight fall, levels out and then slightly rises around two semitones to its peak. After having reached this peak, there is a slight fall towards the end. Class 2 starts with a short high-level plateau and then descends into a continuous fall of about seven semitones.

Duration: Class 1 (267 ms) is 16.7 percent longer than Class 2, whose average duration is 230 ms. A *t* test for independent samples was highly significant: $t_{134}=5.243$, $p<0.001$.

Post-focal pitch: After Class-1 syllables, the pitch contour is falling. The pitch minimum is reached in the next syllable carrying word stress. After Class-2 syllables, the pitch stays more or less on the same (low) level.

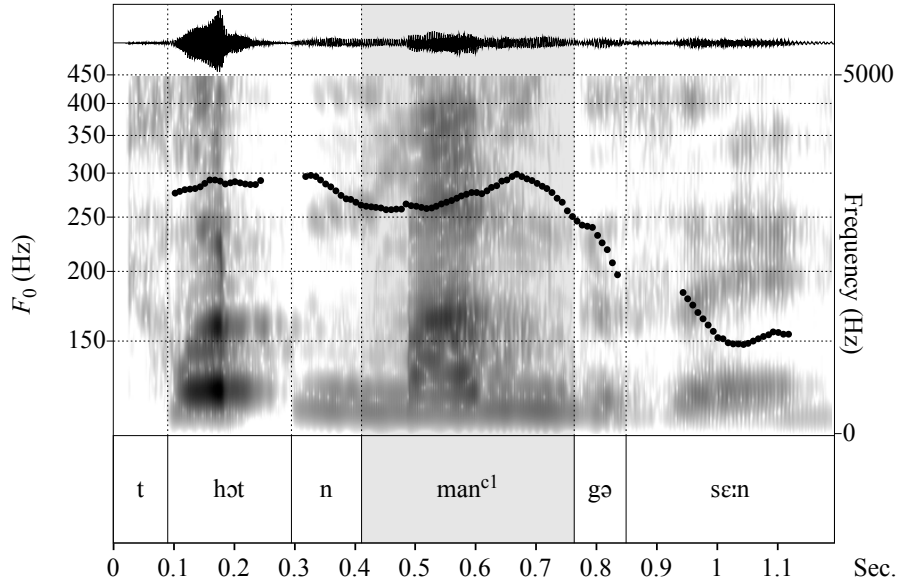


Figure 3.2: Speech waveform, spectrogram and F0 track for declaration, focus, non-final position, Class 1: [man^{c1}], 'She has seen a basket'

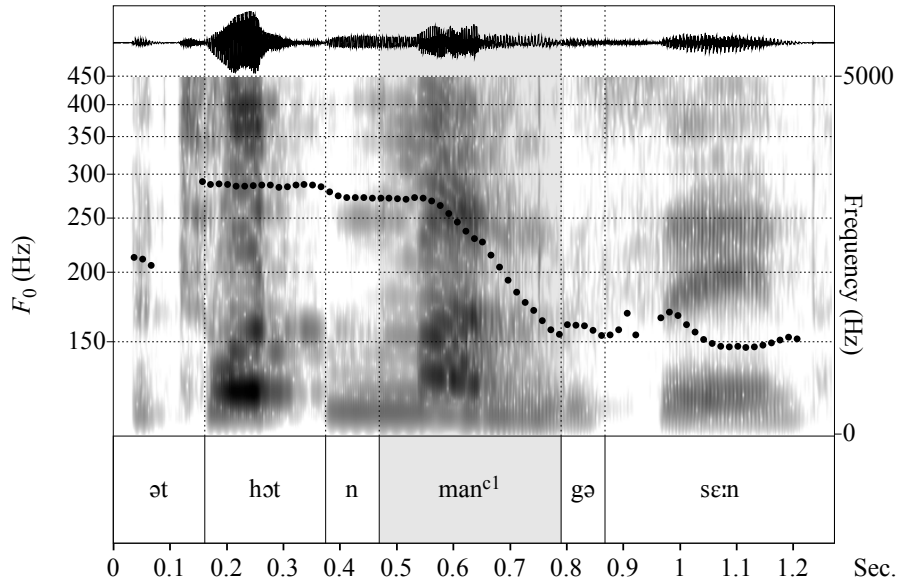


Figure 3.3: Speech waveform, spectrogram and F0 track for declaration, focus, non-final position, Class 2: [man^{c2}], 'She has seen a man'

b) declaration, focus, final position

The average contours for Class 1 and Class 2 are displayed in Figure 3.4:

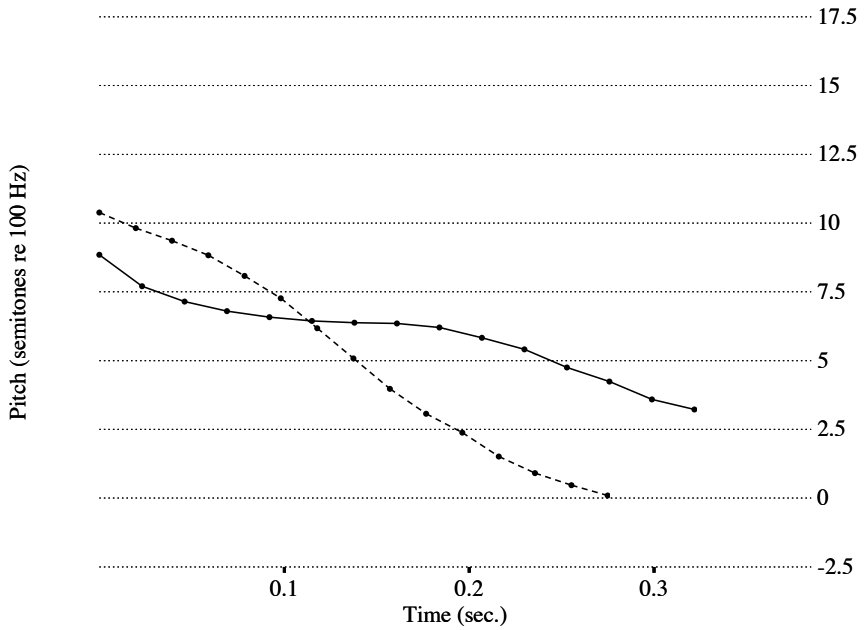


Figure 3.4: Average contours for Class 1 and Class 2 against the average duration in declaration, focus, final position. Class 1 is represented with a solid curve, Class 2 with a dashed curve. Every dot represents one of 15 pitch points per contour.

Tonality: Class 1 starts with a slight initial fall and then turns into a level tone. Towards the end of the contour, there can be a (sometimes steep) late fall: however, this fall is not obligatory, it can vary per item and also within speakers. Examples of both possible realizations are given in Figure 3.5 and 3.7. Class 2 is realized as a continuous, steep fall that often ends in creaky voice and can have an extent of more than one octave.

Duration: Class 1 (322 ms) is 17.1 percent longer than Class 2, whose average duration is 275 ms. A *t* test showed significant differences between the two classes: t_{104}=7.093, p<0.001.

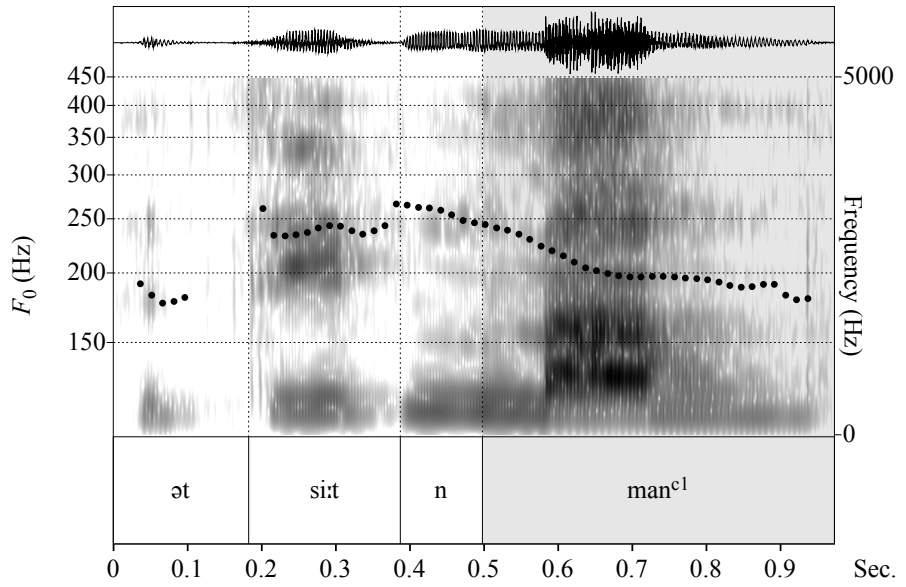


Figure 3.5: Speech waveform, spectrogram and F0 track for declaration, focus, final position, Class 1: [man^{c1}], 'She sees a basket'. Here, the item is realized without a steep final fall (speaker 2).

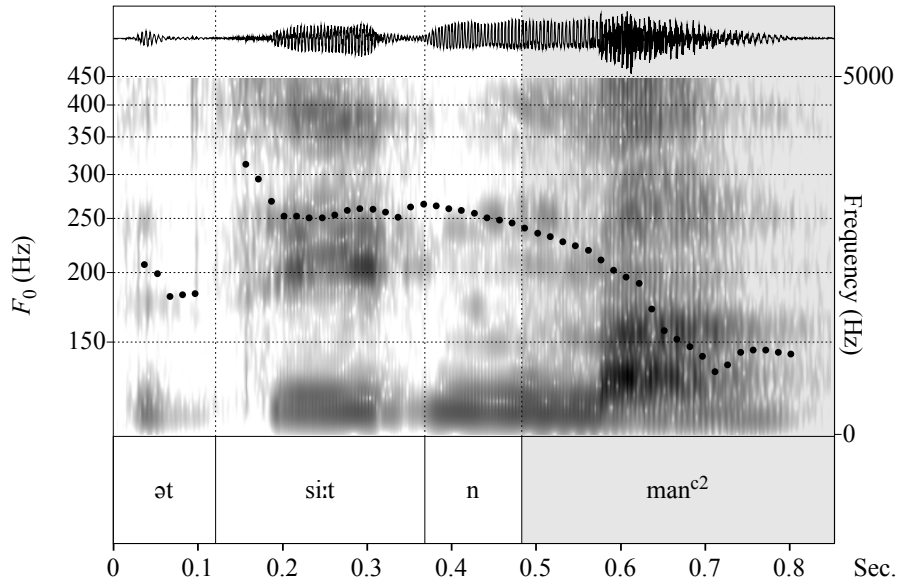


Figure 3.6: Speech waveform, spectrogram and F0 track for declaration, focus, final position, Class 2: [man^{c2}], 'She sees a man' (speaker 2).

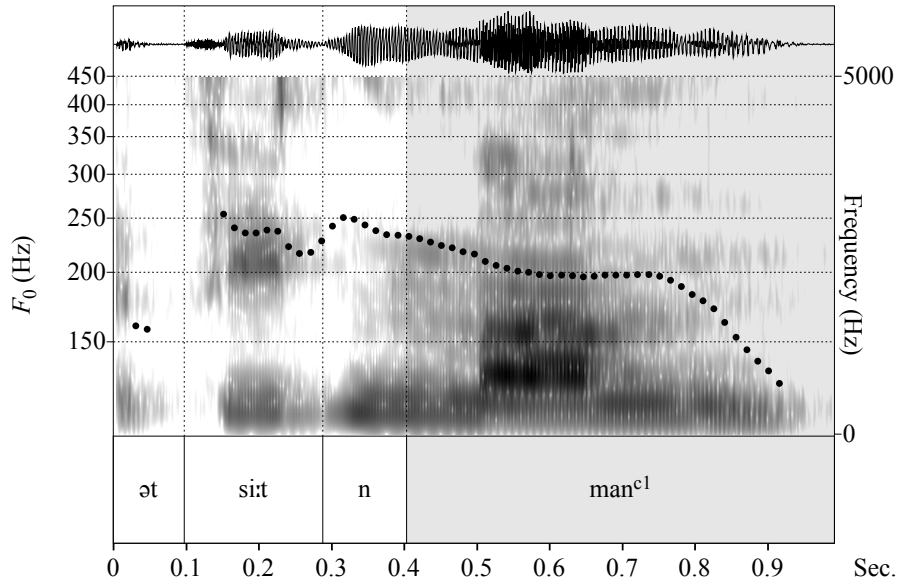


Figure 3.7: Speech waveform, spectrogram and F0 track for declaration, focus, final position, Class 1: [man^{c1}], 'She sees a basket'. Here, the item is realized with a steep a final fall (speaker 5).

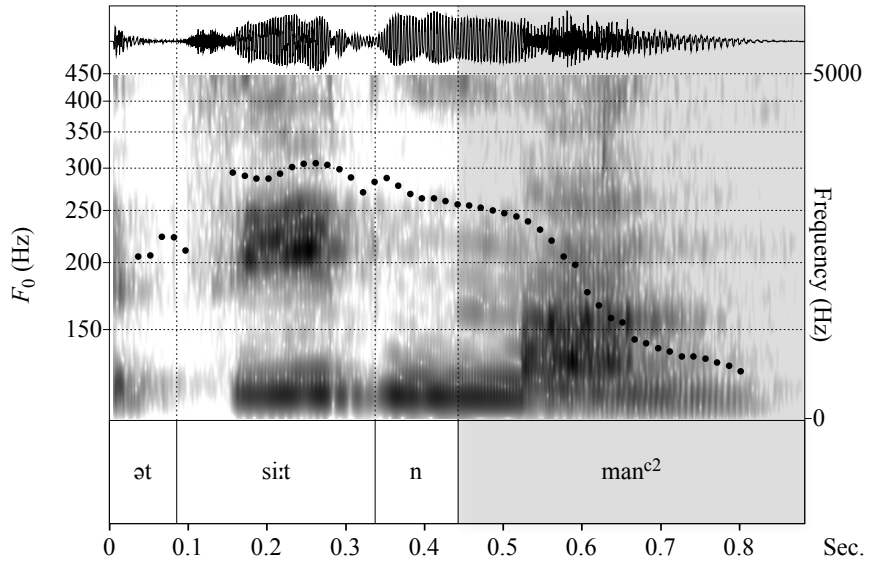


Figure 3.8: Speech waveform, spectrogram and F0 track for declaration, focus, final position, Class 2: [man^{c2}], 'She sees a man' (speaker 5).

c) interrogation, focus, non-final position
The average contours for Class 1 and Class 2 are displayed in Figure 3.9:

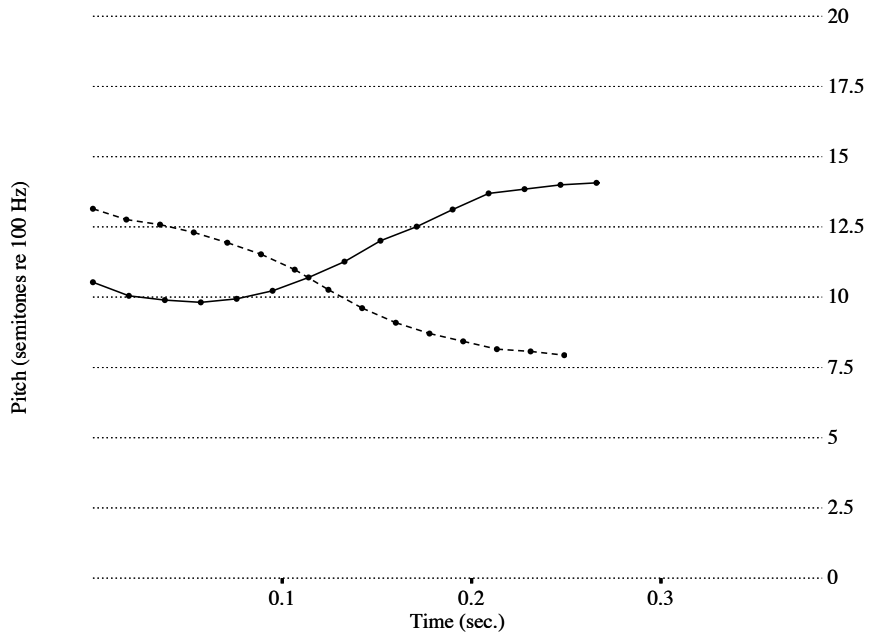


Figure 3.9: Average contours for Class 1 and Class 2 against the average duration in interrogation, focus, non-final position. Class 1 is represented with a solid curve, Class 2 with a dashed curve. Every dot represents one of 15 pitch points per contour.

Tonality: Class 1 starts with a very slight fall before it rises around 4.5 semitones until the end of the contour. The starting point of the rise is early in the syllable. Class 2 is realized as a continuous fall that levels out towards the end. With five semitones, the fall in this position is less strong than in declaratives.

Duration: Class 1 (266 ms) is 6.8 percent longer than Class 2 (249 ms). A *t* test showed significant differences between the two classes at the five percent level: $t_{105}=2.537$, $p<0.05$.

Post-focal pitch: Both contours reach their highest peak post-focally. For Class 1, the rise continues until the next syllable carrying word stress. From there, it is falling towards the end of the phrase. After Class-2 items, we find a strong post-focal rise. As in Class 1, the highest peak is reached on the next syllable with word stress.

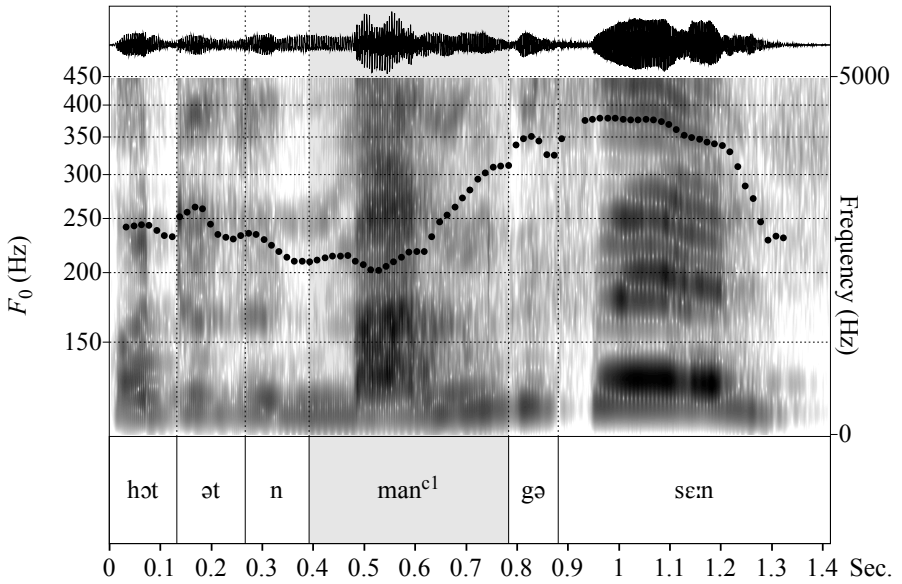


Figure 3.10: Speech waveform, spectrogram and F0 track for interrogation, focus, non-final position, Class 1: [man^{c1}], 'Did she see a basket?'

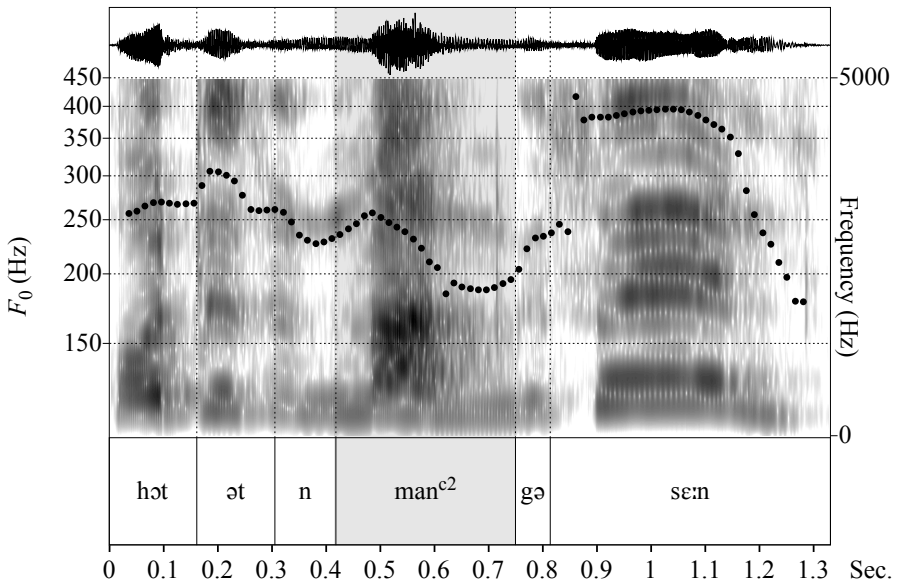


Figure 3.11: Speech waveform, spectrogram and F0 track for interrogation, focus, non-final position, Class 2: [man^{c2}], 'Did she see a man?'

d) interrogation, focus, final

The average contours for Class 1 and Class 2 are displayed in Figure 2.12:

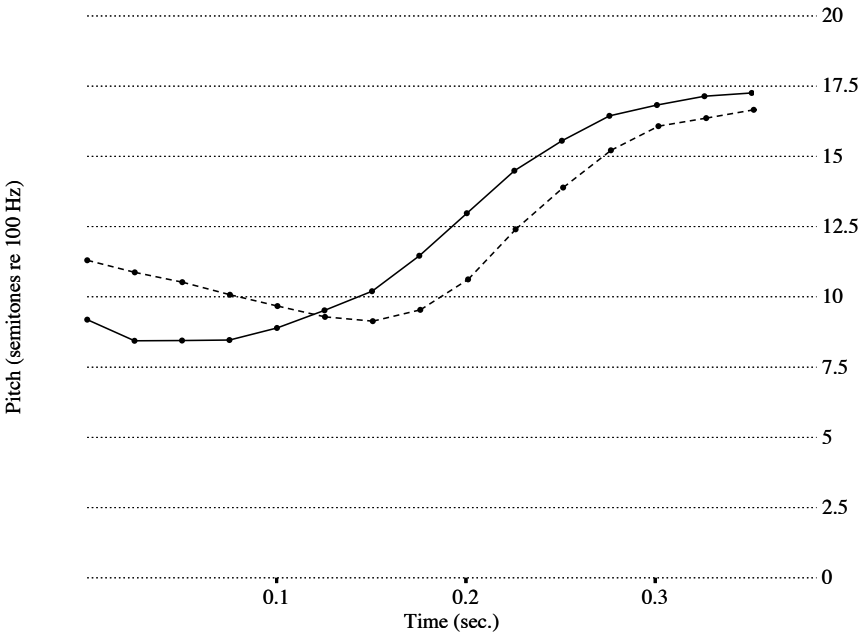


Figure 3.12: Average contours for Class 1 and Class 2 against the average duration in interrogation, focus, final position. Class 1 is represented with a solid curve, Class 2 with a dashed curve. Every dot represents one of 15 pitch points per contour.

Tonality: Class 1 is realized as a relatively early rise of about nine semitones that turns into a high plateau at the end of the pitch contour. Initially, we find a slight fall. Class 2 rises later than Class 1, the amount of the rise being about eight semitones. Towards the end, the contours of Class 1 and Class 2 resemble each other closely.

Duration: Class 1 and Class 2 are almost equally long. On average, Class 1 is 350 ms long, and Class 2 is 354 ms long. This is a difference of only 0.1 percent. A *t* test carried out on the data was not significant at the five percent level: t_{128}=-0.484, p=0.629.

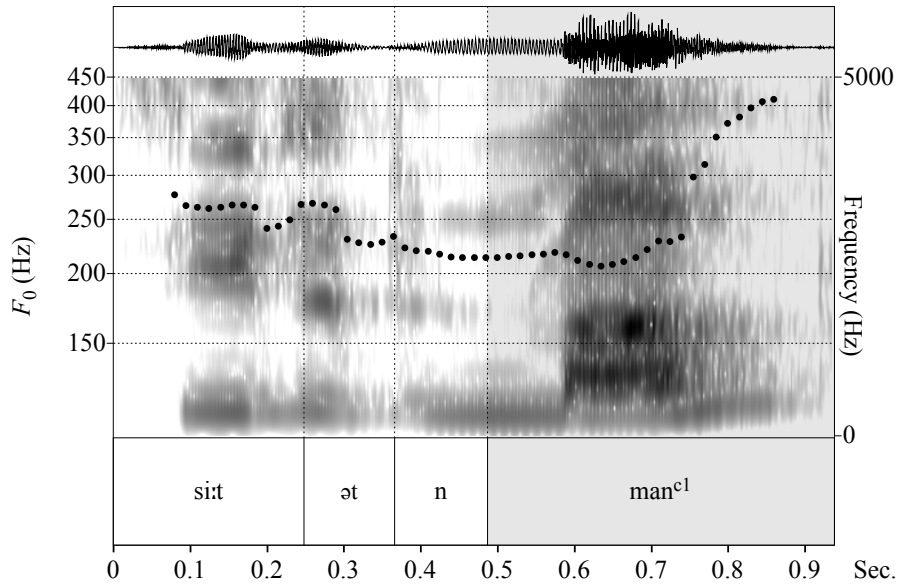


Figure 3.13: Speech waveform, spectrogram and F0 track for interrogation, focus, final position, Class 1: [man^{c1}], 'Does she see a basket?'

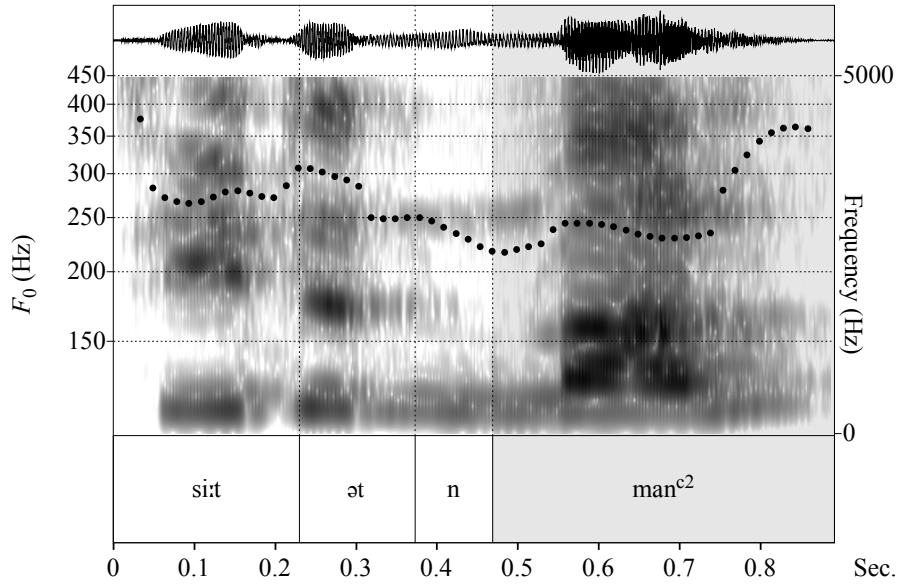


Figure 3.14: Speech waveform, spectrogram and F0 track for interrogation, focus, final position, Class 2: [man^{c2}], 'Does she see a man?'

Idealized contours. Based on the average contours discussed above, Figure 3.15 shows the idealized contours of the Arzbach accents in monosyllabic words. As has been shown in chapter 2, the tone accents are contrastive in all of these conditions:

Condition	Class 1	Class 2
declaration non-final		
declaration final		
interrogation non-final		
interrogation final		

Figure 3.15: Idealized contours for the Arzbach accents in focus positions. The idealization is based on the results of the phonetic measurements.

Durational effects. As the experiments in Werth (to appear) show, duration is irrelevant for the perception of the accents in Arzbach. Still, next to the durational effects for Class 1 and Class 2 in the four different conditions (reported above), there are some more general durational effects worth mentioning.

Initially, the homogeneity of the speakers was tested, since the independent variable 'Speakers' turned out to have a significant effect (F=20.465, df=9, p<0.001). A Student-Newman-Keuls test as well as a Scheffe test showed that speaker 4 differed from the rest of the group. Since, however, this was only the case with respect to the overall duration (her items were phonetically longer than those of the other speakers) but not what regards the relative differences between Class 1 and Class 2, her results were included in the tests. In the analyses, duration (in ms) was the dependent variable. There were three independent variables, all of them were treated as fixed factors: the two accent classes, two positions (non-final, final), and two pragmatic conditions (declaration, interrogation).

A Univariate Analysis showed that all three have significant main effects in the expected directions. Class 1 is significantly longer than Class 2 (301 ms and 277 ms, respectively; F=36.498, df=1, p<0.001). The accents are significantly longer in interrogation (309 ms) than in declaration (270 ms) at the five percent level (F=62.424, df=1, p<0.001), and in non-final position, the accents are shorter than in final position (253 ms and 326 ms, respectively; F=337.104, df=1, p<0.001).

More interesting, however, are the interactions between the three independent variables. There is no significant interaction between position (non-final versus final) and accent class. There *is* a significant interaction between accent class and pragmatic condition (F=20.094, df=1, p<0.001): the durational differences between the two accents are bigger in declaration (291 ms for Class 1 vs. 250 ms for Class 2) than in interrogation (312 ms vs. 306 ms). And as to the three-way interaction: whereas in declarative phrases, the increase in duration of both accent classes from non-final to final is almost parallel, in interrogative phrases in final position, the durational differences between the accent classes (Class 1 350 ms, Class 354 ms) are the opposite of the non-final position (Class 1 266 ms, Class 2 248 ms; F=3.988, df=1, p<0.001).

3.3.2 Focus positions: disyllabic words

In general, the contours in the stressed syllable of disyllabic words resemble those for monosyllabic items in non-final position. Therefore, I do not provide separate graphs. However, in non-final Class-1 declaratives, we can observe a phonetic difference that seems to be related to the distance between the relevant accent syllable and the right edge of the phrase. Consider the realizations of speaker 2: when the accent syllable occurs in the penultimate position of the phrase (see Figure 3.17), the pitch contour resembles that of monosyllabic Class-1 words in final position (see Figure 3.7). When the accent syllable is 'further away' from the right edge (see Figure 3.16), the phonetic realization resembles that of non-final monosyllabic Class-1 syllables (see Figure 3.2). Thus, the pitch contour of the Class-1 syllable can probably be dependent on the distance to the next low pitch target (*here*: the right edge of the phrase): when the target is closer, pitch will be less high than in a context where the distance to the next low pitch target is greater.

Furthermore, in a few instances, two of the younger speakers realized Class 1 in interrogation in disyllabic words with low-level pitch as opposed to the standard rise we usually find in this condition. Since the number of those realizations is very low, I disregard it in the discussion. However, it might well be the case that these realizations indicate the beginning of a possible diachronic change.

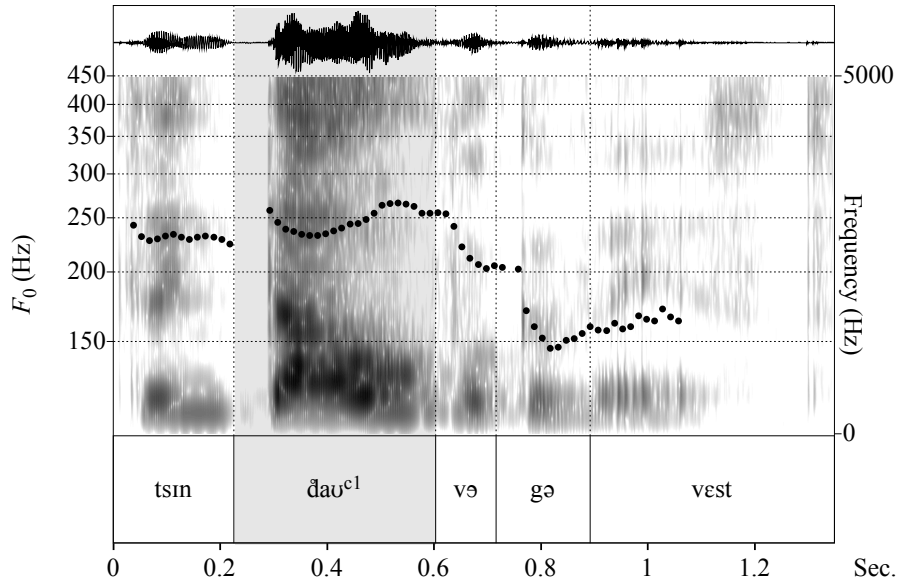


Figure 3.16: Speech waveform, spectrogram and F0 track for interrogation, focus, pre-antepenultimate position, Class 1: [ðaʊ^{c1}və], 'These are pigeons'.

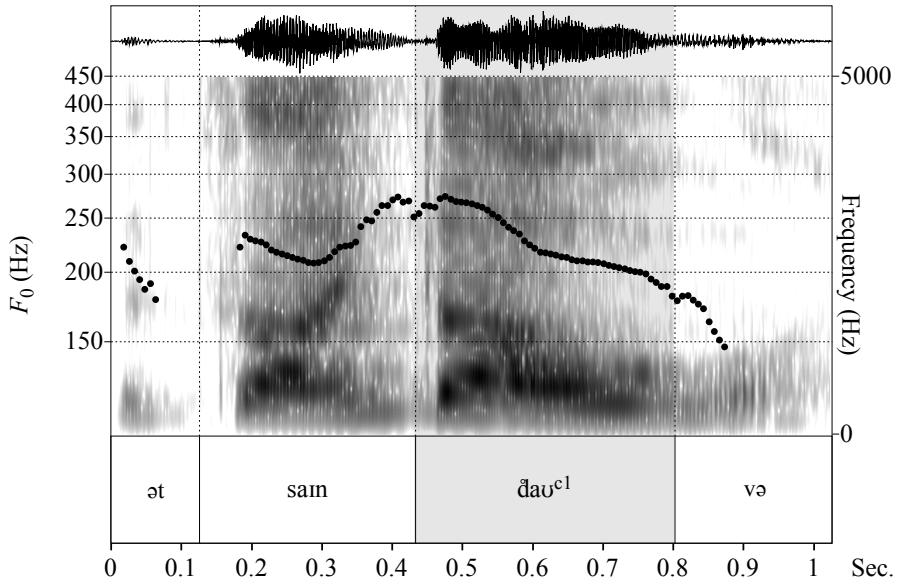


Figure 3.17: Speech waveform, spectrogram and F0 track for interrogation, focus, penultimate position, Class 1: [ðaʊ^{c1}və], 'These have been pigeons'

3.3.3 Non-focus positions

As has been shown by means of perception tests, the Arzbach dialect shows a systematic contrast only in post-focal interrogatives, whereas in declaration as well as in all pre-focal positions, the contrast is neutralized (see section 2.4). Below, I provide a selection of test sentences for all relevant conditions. Again, the accent syllables are emphasized with light grey shading; since in non-focus positions, the position of the focus syllable does not coincide with the accent syllables, I marked the text boxes of the relevant focus syllables with a darker shade of grey.

a) Declaration, post-focus, non-final position. The opposition is neutralized; both accents are realized with low pitch throughout and have a comparable duration. Consider the examples given in Figure 3.18 and Figure 3.19.

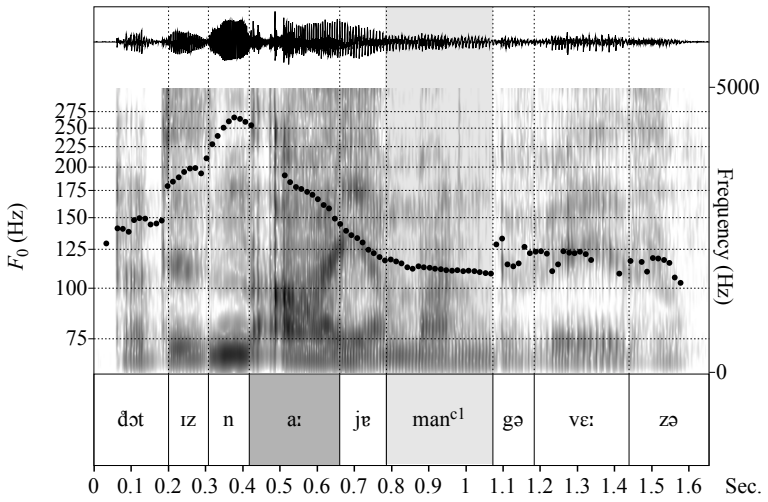


Figure 3.18: Speech waveform, spectrogram and F0 track for declaration, post-focus, non-final position, Class 1: [man^{c1}], 'This has been a basket for eggs'.

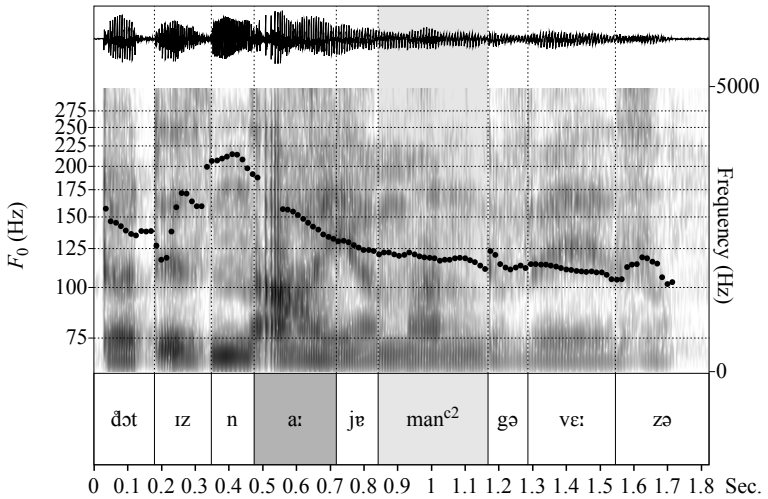


Figure 3.19: Speech waveform, spectrogram and F0 track for declaration, post-focus, non-final position, Class 2: [man^{c2}], 'This has been a man selling eggs'.

b) Declaration, post-focus, final position. As in non-final positions, the neutralized accents are realized with low pitch and show no considerable durational differences. Examples are given in Figures 3.20 and 3.21.

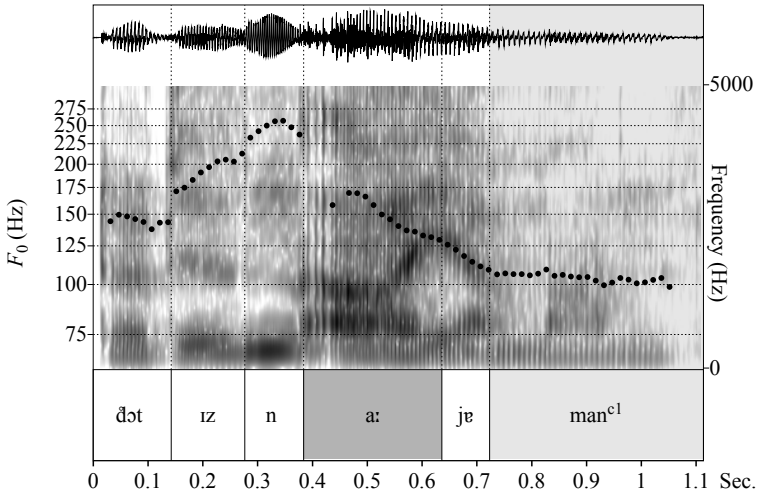


Figure 3.20: Speech waveform, spectrogram and F0 track for declaration, post-focus, final position, Class 1: [man^{c1}], 'This is a basket for eggs'.

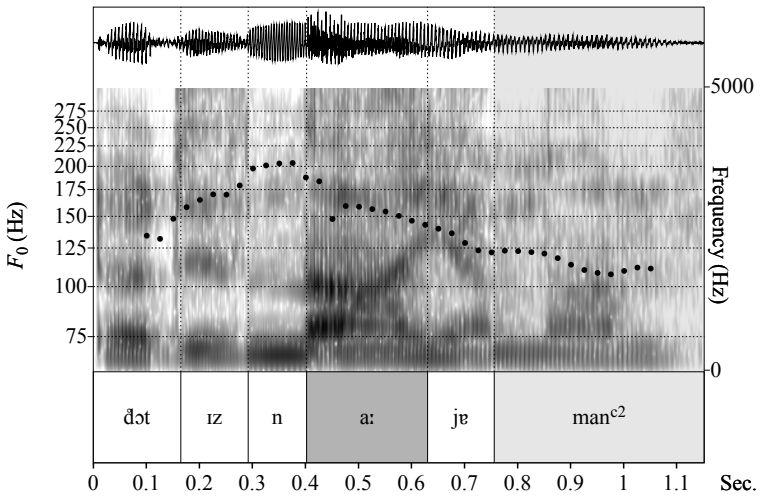


Figure 3.21: Speech waveform, spectrogram and F0 track for declaration, post-focus, final position, Class 2: [man^{c2}], 'This is a man selling eggs'.

c) Declaration, pre-focal position. As in all pre-focal positions, the opposition is neutralized. Phonetically, the accents are realized with slightly falling pitch and have a similar duration. Examples are provided in Figures 3.22 and 3.23.

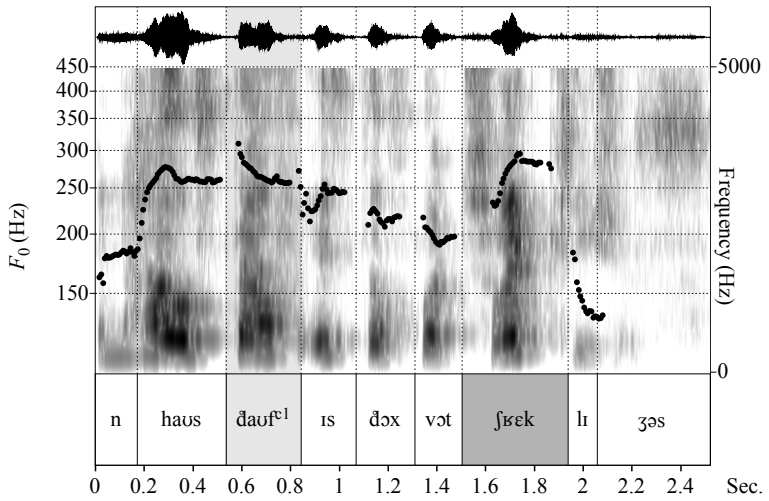


Figure 3.22: Speech waveform, spectrogram and F0 track for declaration, pre-focal position, Class 1: [ðaʊfᶜ¹], 'A domestic pigeon is something horrible'.

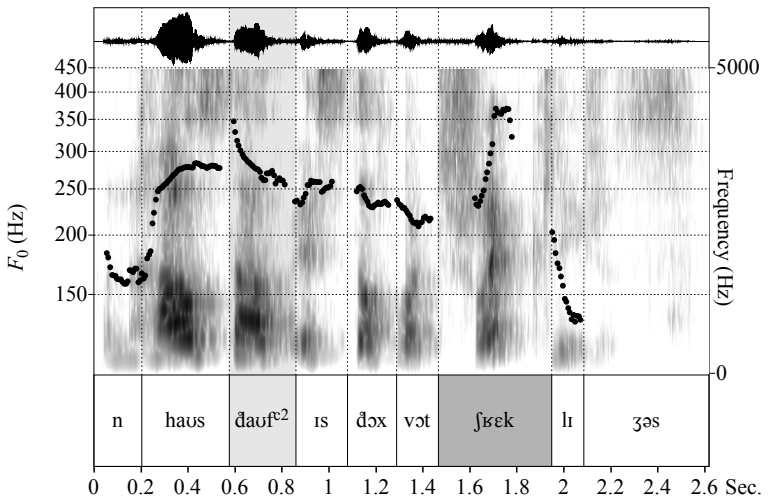


Figure 3.23: Speech waveform, spectrogram and F0 track for declaration, pre-focal position, Class 2: [ðaʊfᶜ²], 'A baptism at home is something horrible'.

d) Interrogation, post-focus, non-final position. In this condition, there is a contrast between the two accents. Whereas the contours and the duration of the accents are similar, the high pitch target in Class 1 (284 Hz) is realized higher than that in Class 2 (240 Hz). This is shown in Figures 3.24 and 3.25:

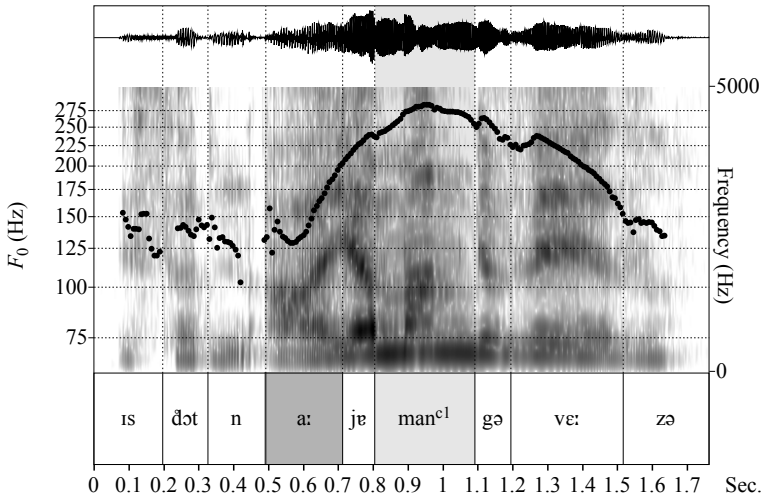


Figure 3.24: Speech waveform, spectrogram and F0 track for interrogation, post-focus, non-final position, Class 1: [man^{c1}], 'Has this been a basket for eggs?'

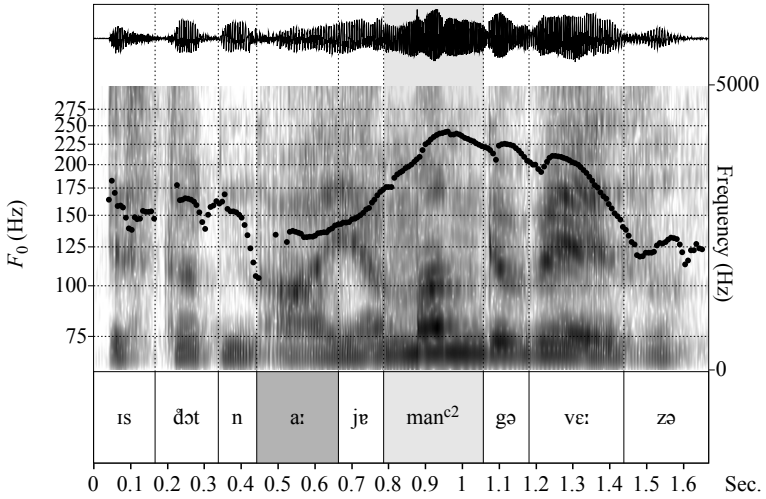


Figure 3.25: Speech waveform, spectrogram and F0 track for interrogation, post-focus, non-final position, Class 2: [man^{c2}], 'Has this been a man selling eggs?'

e) Interrogation, post-focus, final position. Here, we find a contrast: whereas the pitch of Class 1 remains high, the pitch of Class 2 is falling. Additionally, Class 1 is longer than Class 2. Consider the examples in 3.26 and 3.27.

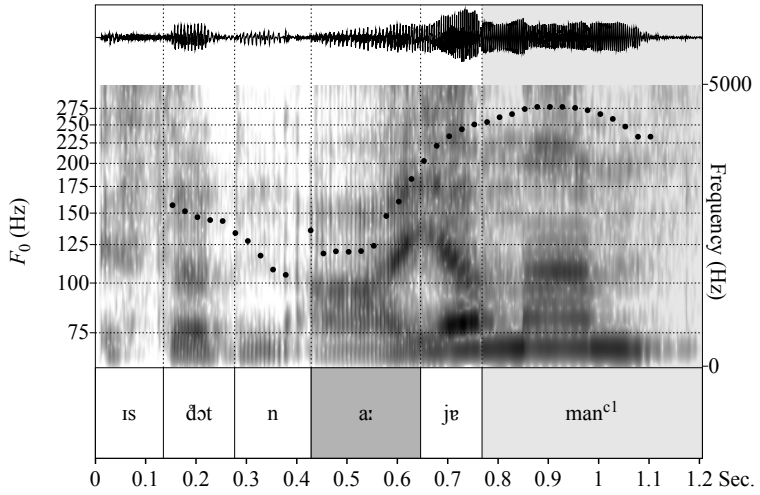


Figure 3.26: Speech waveform, spectrogram and F0 track for interrogation, post-focus, final position, Class 1: [man^{c1}], 'Is this a basket for eggs?'

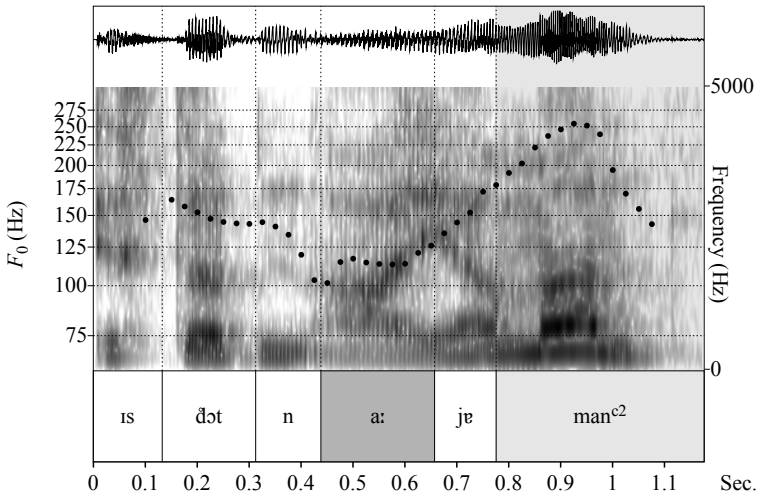


Figure 3.27: Speech waveform, spectrogram and F0 track for interrogation, post-focus, final position, Class 2: [man^{c2}], 'Is this a man selling eggs?'

f) Interrogation, pre-focal position. The contrast is neutralized. Both accents are realized with slightly falling pitch; durational differences are negligible. Examples are given in Figures 3.28 and 3.29.

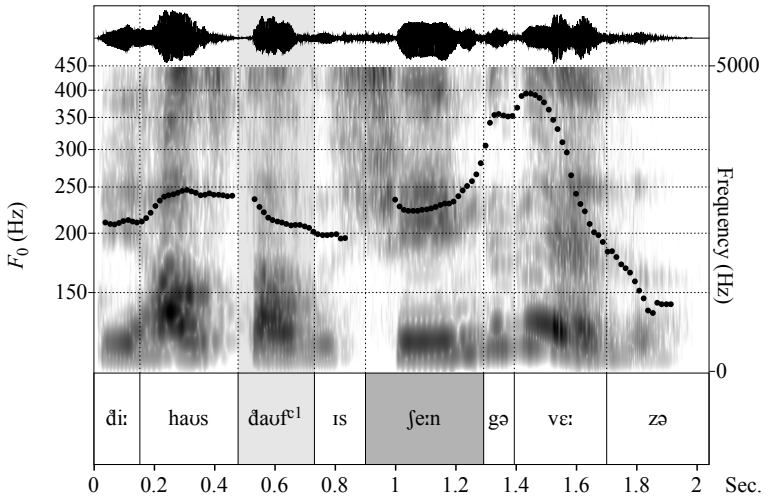


Figure 3.28: Speech waveform, spectrogram and F0 track for interrogation, pre-focal position, Class 1: [ðaʊfᶜ¹], 'The baptism at home has been nice?'

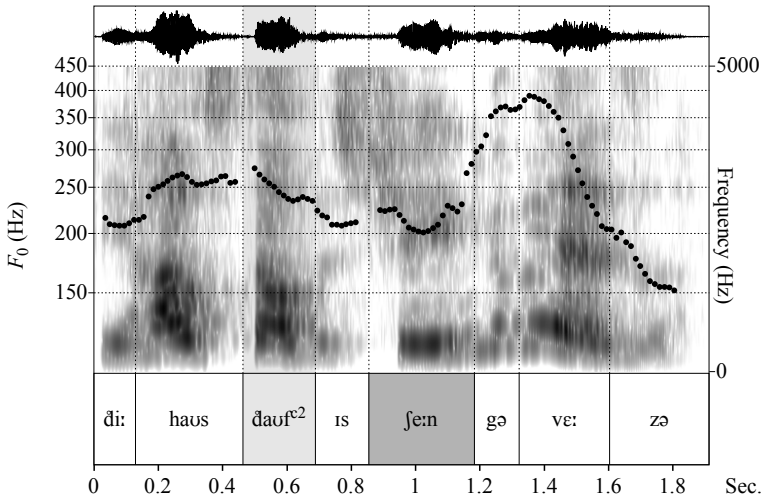


Figure 3.29: Speech waveform, spectrogram and F0 track for interrogation, pre-focal position, Class 2: [ðaʊfᶜ²], 'The domestic pigeon has been beautiful?'

Idealized contours. Based on the items from the perception test, Figure 3.40 shows idealized contours for items in non-focal position:

Condition	Class 1	Class 2
declaration, non-final, post-focal		
declaration, final		
declaration, non-final, pre-focal		
interrogation, non-final, post-focal		
interrogation, final		
interrogation, non-final, pre-focal		

Figure 3.30: Idealized contours for the Arzbach accents in non-focus positions. The idealization is based on test items from the perception tests. Grey shading indicates that the contrast is neutralized.

3.4 Discussion

3.4.1 Pitch

Average contours in focus positions. In focus positions, the average pitch contours are clearly distinct from each other. This is unsurprising, given the high recognition rates from the perception tests.

Disyllabic words. The phonetic data indicate that the accent contrast is present in disyllabic words as well, which is in line with the descriptions in Bach (1921). The observed variation in the realization of Class 1 in declaration might be related to the phonological representation of Class 1 (see section 4.2, 4.3, and subsection 5.3.3 for further discussion).

Non-focus positions. For non-focus positions, no average contours were given due to elicitation problems (see above, subsection 2.4.1, section 3.1). Still, the test sentences from the perception tests (provided in Figures 3.18 to 3.29) give an impression of how the accents are realized in non-focus positions. Interestingly, the nature of the contrast in non-final interrogatives seems to differ from that in other prosodic contexts: the data suggest that in this context, the contrast between the accents is manifested in the height of the high pitch target; Class 2 is realized with high pitch and Class 1 with extra-high pitch.[19] In other conditions, pitch movement rather than pitch height leads to the contrast (see Werth to appear for perception tests with manipulated stimuli).

3.4.2 Duration

Average duration in focus positions. Whereas with respect to pitch, there are clear differences between Class 1 and Class 2 in each relevant condition, durational differences are not always present: we find clear durational differences only in declaration, where Class 1 is significantly longer than Class 2. In interrogation, however, the difference between the Accents is rather small (Class 1 is 6.8 percent longer than Class 2 in non-final position) or non-existent (final position). Furthermore, in final positions, both accents are longer than in non-final position. This widely reported effect (see e.g. Gussenhoven & Peters 2004, Peters 2006a and 2008 for further data from Franconian dialects) is confirmed by this study.

[19] In order to get an indication whether the contrast is really related to pitch height, I manipulated the pitch height of the stimuli in Praat using PSOLA: I sent a variety of sentences to two speakers via e-mail and asked them for their judgments. For both speakers, the decisions were sensitive to the pitch height of the manipulated items: low pitch correlated with Class 2, high pitch with Class 1. Although this cannot be regarded as an empirically valid test, it supports the view that only pitch height is important for the contrast in this context.

Since there are no stable durational differences, they are probably not an enhancing factor, as it has been reported for other Franconian dialects (see e.g. Gussenhoven & Peters 2004, Peters 2006a). This is in line with the findings in Werth (to appear) where duration did not affect the accent perception in Arzbach at all. Still, we can draw the following conclusions about the interaction of pitch and duration in Arzbach (Table 3.3):

	Durational effect	**Reference condition**
a)	A level tone is longer than a falling tone	Declaration, focus, final Declaration, focus, non-final
b)	A rising tone is longer than a falling tone	Interrogation, focus, non-final
c)	Late and early rises do not differ in duration	Interrogation, focus, final

Table 3.3: Durational effects for different pitch contours on basis of the Arzbach accents

The durational effects in a) and b) can be observed in a variety of Franconian dialects. However, it is rather surprising that a late rise is *not* phonetically longer than an early rise in Arzbach. Since pitch stays level for a longer time in Class-2 cases, we might expect this to lead to a longer duration. Furthermore, in other Franconian dialects, comparable tonal contours display a durational contrast, the late rise being longer than the early rise (see e.g. Peters 2006a for Cologne, where we find comparable contours in interrogation; see also section 3.5). I do not have an explanation why Arzbach behaves differently in this respect.

Disyllabic words and non-focus positions. Since there are no exceptional durational differences in these conditions, I do not discuss these independently. The effects displayed in Table 3.3 are equally valid for the contexts at hand.

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3.5 Rule B vs. Rule A: semi-reversed tonal contours

The empirical set of tonal contours that has been gathered for this thesis contains a huge surprise that involves the necessity to reset - or at least adjust - the possibly most basic assumption with respect to the Arzbach facts and Rule B: there is *no* full reversal of tonal contours in Arzbach, as could be concluded on the basis of Bach (1921); instead, we find reversed tonal contours only in declaration, whereas in interrogation, the contours resemble those of Rule A. Consequently, the traditional assumption that Arzbach displays a full reversal of corresponding Rule-A contours cannot be sustained.

To illustrate this observation, let us compare the average Arzbach focus contours to those from the Cologne Rule-A dialect (idealizations based on data from Peters 2006a):

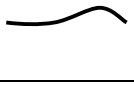
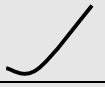
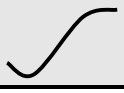
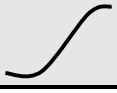
Condition	**Arzbach**		**Cologne**	
	Class 1	Class 2	Class 1	Class 2
Declaration, non-final position				
Declaration, final position				
Interrogation, non-final position				
Interrogation, final position				

Figure 3.31: Comparison of pitch contours between Arzbach (Rule B) and Cologne (Rule A). Corresponding tonal melodies are indicated by (non-)shading.

In declaration, we find the expected reversal - early falls in Arzbach correspond to late falls in Cologne (Class 2), and vice versa (Class 1). In interrogation, however, the picture is different: here, we find early rises for Class 1 throughout in both dialects, whereas in Class 2, the low targets are located late in the syllable in both dialects. The only important difference between the two dialects seems to be the initial fall in Arzbach Class-2 interrogatives in non-final positions that is absent in Cologne. However, as I argue in subsection 5.3.2, this difference might be negligible from a phonological point of view. In any case, even if one regards this as an important difference between the two dialects, the data still clearly indicate that in general, the interrogative contours in the two areas resemble each other closely. This becomes particularly clear when we look at the final positions in these dialects: in both dialects, early rises in Class 1 correspond to late rises in Class 2.

Note that these new insights do not indicate a misjudgment by Bach; they are rather the result of his limited data set: whereas Bach only took declarative intonation into account, the data collection for this thesis also includes relevant data from interrogation. Since, due to these new data, the assumption of fully reversed tonal contours cannot be maintained, I propose to refer to the Arzbach contours as *semi-reversed tonal contours*.

3.6 Conclusion

This chapter focused on the description of the pitch contours for both accents in Arzbach. The most important insight we can derive from the results concerns the observation that the tonal contours in Arzbach do *not* display a full reversal of corresponding Rule-A contours, as has been assumed to date: we only find a reversal in declaration, whereas in interrogation, the contours are rather similar to those in Rule A. I have shown this by contrasting the newly gathered Arzbach data with data from Cologne (Peters 2006a). The impact of my findings for a phonological analysis of the phenomenon is discussed subsequently: chapters 4 to 6 explore this impact from a synchronic point of view, whereas chapter 7 approaches the issue from a diachronic angle.

4. Synchronic analysis I: fundamentals

4.1 Introduction

Since the Franconian tone accents found their way into autosegmental phonology (beginning with Hermans 1985, 1992, 1994, Gussenhoven & van der Vliet 1999, Gussenhoven 2000a), analyses with lexical tones (from now: *tonal analyses*) have been the only way of treating the phenomenon for several years. These approaches have proven able to account for the tonal mapping in various Franconian dialects. Thus, with respect to Franconian tone, we can regard analyses based on the assumption of lexical tones as the standard analytical tool within autosegmental phonology.

However, a different kind of approach has been proposed recently: here, the opposition is not regarded as one based on lexical tone; instead, the accents are supposed to differ in their prosodic structure (see Boersma 2006 as the initial stage in the development of the opposition, Kehrein 2007, to appear, Hermans 2009, to appear for synchronic approaches). Within prosodic analyses, the assumed structural differences lead to different tonal mappings of intonational tones for the two accents, resulting in different surface melodies for Class 1 and Class 2. We might summarize the idea behind these approaches as follows: the opposition may sound tonal but in fact it is only the outcome of an alignment difference concerning the association of phonological tones with prosodic units.[20]

In my analysis, I elaborate on the idea that the synchronic tone accent opposition in Franconian isof prosodic nature. In order to capture the tonal mapping within the different dialect groups, I propose a novel analytical concept. At its base, this concept relies on the idea that the moras of both accents differ in their prosodic strength (Class 1 has two 'strong' moras, Class 2 has one 'strong' and one 'weak' mora).

These differences in prosodic strength then lead to different tonal mappings. I argue that this contrast derives from differences in the foot structure of the accents (see Kehrein to appear for another proposal that traces the opposition between Class 1 and Class 2 in Franconian back to differences in foot structure).

[20] Note that the rise of non-tonal approaches cannot only be observed for Franconian: for instance, in recent years, standard tonal analyses for Scandinavian tone accents (e.g. Bruce 1977, Riad 1996, 1998a, 1998b, 2003, Kristoffersen 2000, 2004, 2006, 2007, Gussenhoven 2004, Lahiri, Wetterlin, and Jönsson-Steiner 2005a, 2005b, 2006) have been challenged by authors who claim the source of the opposition to be prosodic (Bye 2004, Morén 2007).

The Rule-B data that I have gathered for this thesis are crucial for my proposal: having a different tonal mapping from the large majority of Franconian dialects, these data allow us to look at the phenomenon from a new angle. As I demonstrate in the following chapters, the approach proposed in this thesis is to be preferred over a tonal analysis as well as over alternative prosodic analyses since it is the only one that can sufficiently account for the tonal melodies of Arzbach.

Thus, in its fundamentals, my approach is based on new data that former approaches cannot capture. Crucially, however, it should also be able to capture facts that have already been analyzed in other frameworks – at (at least) the same level of explicitness. Here, Gussenhoven's analysis of the Roermond dialect (Gussenhoven 2000a) sets a standard that competing analyses should attain: the tonal mapping for both accents is analyzed for declaration and interrogation, varying sentence position (final vs. non-final) and information structure (focus versus non-focus). All results are formalized in OT. In order to live up to these standards, I provide in-depth OT-analyses of four Franconian dialects (Arzbach, Hasselt, Cologne, Roermond).

However, considering all (often rather technical) details within a full-fledged analysis naturally comes at a cost: when we look at different Franconian dialects, we can see that synchronically, they display differences with respect to a) the tonal contours in different prosodic environments and b) the preservation of the contrast in non-focal positions. Incorporating these details sometimes tends to obscure the bigger picture, i.e. the essential similarities and differences between the different dialects. This is especially true with respect to one of the major topics of this thesis: the synchronic typological relation between Rule A and Rule B.

The fundamental insights about the nature of the opposition and the relation between Rule A and Rule B become most evident when we focus on the most basic contexts (from the point of view of tonal mapping): the non-final focus positions in declaration and interrogation.[21] To provide a clear picture of these basic insights, the chapter at hand only focuses on these aspects and abstracts away from the details of tonal mapping. These details are discussed and formalized within OT in chapter 5, where I give detailed analyses of the opposition in four selected dialects.[22] With respect to the representation of the accents, I follow a similar line of argument: in this chapter, I focus on the representational basics only as far as they are necessary to understand my analysis; that is, I only introduce my analytical concept and do not discuss the formal representation of the contrast. Once again, all relevant details (surface structure, underlying representations, and synchronic alternations) are discussed in chapter 5.

In section 4.2, I introduce my analytical concept and discuss the basic facts (tone accents in non-final focus positions) of the tonal mapping for Rule A (represented

[21] In these contexts, there is no interference with boundary tones; furthermore, we do not have to deal with interdialectally varying strategies concerning the post-focal tonal mapping.
[22] Note that with respect to the basic analysis provided in this chapter, this will inevitably lead to some redundancy, which I try to keep to a minimum.

by Cologne) and Rule B (represented by Arzbach). I provide basic analyses for both dialect groups and discuss their synchronic typological relation. As will become evident, the basic differences (and similarities) derive from minimal differences in the grammars of Rule A and Rule B.

4.2 Rule A vs. Rule B: synchronic typology

The newly gathered data from the Arzbach dialect demand that the discussion of the synchronic typological relation between Rule A and Rule B begin by restating a crucial empirical observation: as has been demonstrated in section 3.5, only the basic declaration contours are the reversal of those in Rule A and *not* the interrogation contours; these are similar to the Rule-A ones.

Crucially, these findings are not in line with Bach (1921) who assumes that the tonal melodies in Arzbach are *always* reversed (see also subsection 1.1). However, Bach's descriptions are based on the phonetics in declarative intonation only; i.e., he disregards interrogative intonation.[23] As a consequence, Rule B has always been regarded as showing fully reversed tonal contours. Analytically, this has been described as a *reversed lexical distribution* (see Wiesinger 1970, Schmidt 1986, 2002 and 2006, de Vaan 1999, Boersma 2006, Kortlandt 2007).

Obviously, given the *semi*-reversal that the full data set shows, this assumption cannot be maintained. In order to integrate these new empirical findings into the picture, I present an account that traces the tonal mapping in both dialect groups back to small differences in their grammar, whereas the representation of the two accents is similar in Rule A and Rule B: for now, let us assume that in both dialect areas, the contrastive tonal melodies derive from differences in the relative prosodic strength of tonal positions. The difference between Class 1 and Class 2 is captured at the level of the tone-bearing unit (TBU), the mora: I claim that whereas a Class-1 syllable consists of *two prosodically strong* moras, Class 2 has *one strong* and *one weak* mora. I represent this analytical concept in the following way: a mora with a prime (μ') refers to a 'strong' mora, whereas a mora without a prime (μ) indicates a 'weak' mora. This analytical concept is visualized in (1). Formally, the notions 'strong' and 'weak' are not meant to indicate headedness itself (that is, Class 1 does not have two heads) but relate to different head dependent relations for Class 1 and Class 2 at the foot level (see section 5.2 for an elaborate discussion of the concept). Note that these differences can also be reflected in segmental differences between the two accents (see Köhnlein to appear for the discussion of synchronic segmental alternations in Franconian as well as section 7.3 of this thesis, where the original opposition between Class 1 and Class 2 is linked to differences in sonority between the members of each class).

(1)

Class 1		Class 2	
μ'	μ'	μ'	μ

[23] Note that at that time, as well as in following generations, focusing on declarative patterns was the standard way of treating the phenomenon.

I propose that the *basic* tonal mapping in Rule A and Rule B can be attributed to the work of two constraints: *μ' / L (introduced in (4)) and T → μ' (8). As I show, T → μ' captures the basics of Rule A, whereas the influence of *μ' / L leads to the Rule-B mapping.

In subsection 4.3.1, I analyze the basics of the Arzbach dialect (Rule B), whereas Rule A (represented by Cologne, Peters 2006a) is treated in 4.3.2. In 4.3.3, I give a brief typological overview and discuss the relation between Rule A and Rule B.

4.2.1 Basics of the Rule B grammar

For Arzbach, I assume the following intonational melodies:

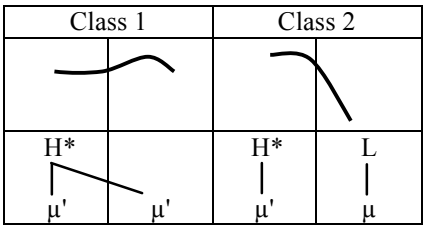
(2)

Declaration	H*L
Interrogation	L*H

a) Declaration, focus, non-final position

The tonal mapping for both accent classes is given in (3):

(3) Tonal mapping in the focus syllable: declaration, non-final position



In Class 1, I regard the high pitch with a slight peak towards the end of the contour as the phonetic realization of a phonological high level tone.[24] The falling contour we find in Class 2 results from the presence of H* and L in the focus syllable. The difference between the two accents thus lies in the tonal mapping on the second mora of both accents: whereas the low trailing tone is blocked from the strong second mora of Class 1, it *can* link to the weak second mora of Class 2.

[24] The peak in the second part of the contour is most likely to be regarded as a matter of phonetic implementation; it may serve to enhance the contrast between Class 1 and Class 2: since Class 2 is realized with falling pitch, having a slight rise in Class 1 increases the phonetic difference between both contours.

To explain this tonal behavior, we have to understand why a low tone can be blocked from prosodically strong positions. The avoidance of low tone in strong positions is the effect of a constraint regulating the relation between tones and prosodic structure: as de Lacy (2002a) shows, there is a mutual attraction between H and prosodically *strong* positions as well as between L and prosodically *weak* positions. For instance, according to de Lacy, the occurrence of low tone can be prohibited in prosodically strong positions; in the case at hand, the occurrence of L is avoided on prosodically strong moras (see section 5.2 for further discussion of my constraint set):

(4) *μ' / L: No low-toned strong moras

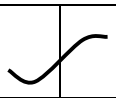
In Rule B, the work of this constraint largely determines the tonal mapping: since Class 1 contains two prosodically strong moras, the low tone cannot find a place to dock onto. As a consequence, we only find H* in the focus syllable. In Class 2, however, the low tone can link to the weak second mora: since tones from the same tonal morpheme prefer to be realized close to each other, the trailing L prefers the second mora of the focus syllable to post-focal moras.[25]

Furthermore, since there is a principle that requires every mora in a focus syllable to have a tone, *spreading* occurs in Class-1 cases; i.e., the H* occupies the second mora of the Class-1 syllable as well.[26]

b) Interrogation, focus, non-final position

Consider the tonal mapping in (5):[27]

(5) Tonal mapping in the focus syllable: interrogation, focus, non-final position

Class 1		Class 2	
			
L*	H		L*
μ'	μ'	μ'	μ

[25] The relevant constraint is CONCATMORPH (see subsection 5.2.4).
[26] Formally, this results in a violation of the constraint NOSPREAD (see below, subsection 5.2.4).
[27] Note that here, I slightly simplify the facts: the empirical data show that the high trailing tone in Class 1 is not realized on the second mora of the focus syllable but on a post-focal mora in a syllable with word stress. However, this is merely a technical detail and not crucial in order to understand the basic tonal mapping of Rule B. Therefore, I postpone the discussion of this issue to subsection 5.3.2.

In Class 1, we find both L* and H in the focus syllable, which corresponds to a rising contour. Class 2 contains only one phonological tone, L*, which is aligned with the weak mora of the focus syllable. This is realized as a fall towards the low target.

The late alignment of L* in Class 2 is due to the influence of *μ' / L, which has been introduced in (4): since there is a weak mora available, the low tone avoids the strong first mora and docks onto the second one. Since L* occupies the second mora, there is no space for the high trailing tone within the focus syllable – it has to be realized post-focally. Note that the first mora remains toneless in this context, since spreading of the low tone would violate *μ' / L; furthermore, I do not analyze the relatively high initial pitch within Class 2 as a high phonological tone but regard it as a matter of phonetic implementation instead (for further discussion of this issue, see subsection 5.3.2).

In Class 1, both the low and the high tone are realized within the focus syllable. In order to explain this mapping, I need to make a remark on the nature of starred tones: as has been stated in subsection 1.3.1 in (5), their function consists of marking the most stressed syllable within an intonational phrase. Therefore, these tones always have to be realized within the focus syllable (see also subsection 5.2.3). Since in Class 1, we find two strong moras, a violation of *μ' / L is inevitable. Hence, due to a default mapping, the low tone occupies the first mora, which leaves space for the high trailing tone on the second mora.

Summary: The basic tonal mapping in Arzbach is regulated by the constraint *μ' / L. This constraint leads to asymmetries within the tonal mapping: whereas in declaration, we find both H* and L within Class 2 and only H* within Class 1, the opposite holds within interrogation: here, Class 1 comprises both L* and H, and Class 2 only the starred tone.

4.2.2 Basics of the Rule A grammar

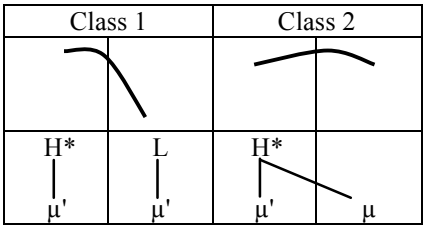
The focal melodies for Cologne, which are the same as in Arzbach, are displayed in (6). All data are taken from Peters (2006a):

(6)

Declaration	H*L
Interrogation	L*H

a) Declaration, focus, non-final position

(7) Tonal mapping in the focus syllable: declaration, focus, non-final position



The basic principle of the Rule-A mapping differs from the one we find in Arzbach: here, low tones are not avoided by strong moras. Instead, each tone (H *and* L) wants to be linked to a strong mora. This is expressed in the constraint given in (8):

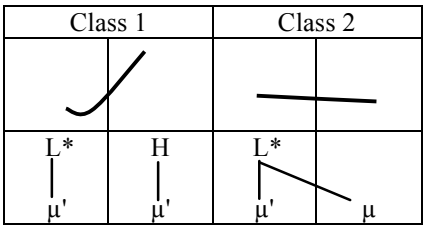
(8) T → μ': A tone is associated with a strong mora

A constraint family of this type (regulating the association conventions between tones and prosodic units) was originally motivated by Anttila and Bodomo (2000) and has been slightly modified by Gussenhoven (2004) (for further discussion of my constraint set, see subsection 5.2.4).

Since in Class 1, we find two strong positions, both tones can be realized within the focus syllable, which results in a falling tone. In Class 2, however, there is only one prosodically strong mora, and thus there is only space for the H* in focus. Since the second mora of the focus syllable 'wants' to be tonal as well, the high tone spreads rightwards. Phonetically, this is realized as a slight rise followed by a slight late fall; the latter is due to interpolation towards a post-focal low target.

b) Interrogation, focus, non-final position

(9) Tonal mapping in the focus syllable: interrogation, focus, non-final position



Here, the principles of tonal mapping follow exactly the same lines as have been described for declaration: two prosodically strong positions lead to the association of L* and H (Class 1, rising contour), one prosodically strong position leads to the

association of only the starred tone, which spreads to the second mora (Class 2, low level contour).

Summary: In Rule A, the basic tonal mapping follows from the constraint T → μ'. Since tonal quality does not play a role for this constraint and the general structure of the tonal morphemes is identical (H*L for declaration, L*H for interrogation), the tonal contours in declaration and interrogation are symmetrical.

4.2.3 The typological relation between Rule B and Rule A

As has been demonstrated above, the general differences between Rule B and Rule A, i.e. the semi-reversal of tonal contours, can be attributed to differences in the grammar of the two dialect groups: whereas in Rule B, the basic tonal mapping is regulated by *μ' / L, the mapping in Rule A is dominated by T → μ'. Within OT, we can derive the differences and similarities between the two dialect areas by reranking these two constraints. On the surface, this results in reversed tonal contours in declaration. In interrogation, on the other hand, T → μ' and *μ' / L lead to almost identical tonal mappings, which explains why there is no full tonal reversal.[28] Reranking these two constraints thus captures the basic differences and similarities in the tonal mapping in the two areas: T → μ' >> *μ' / L leads to a Rule-A mapping, whereas *μ' / L >> T → μ' accounts for the basic mapping within Rule B. These are not the only differences between the two dialect areas; as the case studies in section 5.3 to 5.6 will show, we also find other, smaller differences, with respect to grammar as well as with respect to the tonal melodies. Crucially, however, *only* the ranking of *μ' / L and T → μ' determines whether a tone accent dialect will have a mapping along the lines of Rule A or Rule B.

Since the basics of the tonal mapping in both areas are governed by two constraints, we get a restricted basic factorial typology with Rule A and Rule B as possible outcomes (given similar lexical representations). This again allows us to make relatively strong predictions. The factorial typology is given in Table 4.1.

[28] The only slight difference in interrogation is to be found in the mapping of Class 2: whereas in Rule A, L* occupies both moras, it is linked only to the second mora in Rule B.

Constraint ranking	Tonal mapping	Dialect area
T → μ' >> *μ' / L	Declaration non-reversed Interrogation non-reversed	Rule A
*μ' / L >> T → μ'	Declaration reversed Interrogation non-reversed	Rule B

Table 4.1: Factorial typology for the basic constraint interactions leading to the basic tonal mappings of Rule A and Rule B

Since T → μ' and *μ' / L are the relevant constraints for the tonal mapping within focus syllables, we do not expect to find more basic patterns than those presented here. That is, at least under the assumption that declaration and interrogation are equally marked intonational melodies, this analysis makes the strong prediction that we should only find dialects of the types Rule A and Rule B. Thus, we should not find a dialect with a full tonal reversal in declaration and interrogation for all relevant phoneme groups.[29] Furthermore, we should not find a dialect with non-reversed contours in declaration and reversed contours in interrogation. Indeed, these have not been attested.

[29] The only way I could imagine a full reversal to come into existence would be to start out from a standard Rule-B system, followed by a neutralization of the contrast in interrogatives. If then, at some point, a new generation were to reintroduce the contrast in interrogation, this might happen analogically to the declaration contours – a dialect with fully reversed tonal contours would be created. However, obviously, this is a rather complex scenario. Interestingly, there seem to be dialects with fully reversed tonal contours for *some* phoneme groups: data from the lexical distribution of different dialects in the Hunsrück (see Reitz 1985, Schmidt 1986, Peetz 1989 and 2006, Peetz / Pützer 1995 and 2000, Reuter 1989) indicate that the second area (besides Rule B) with reversed tonal contours, the so-called *Rule A/B*-area (term from Schmidt 1986), might indeed constitute such a case. However, recent phonetic data indicate that in the area, the contrast might be neutralized in interrogation (Schmidt / Künzel 2006).

4.3 Conclusion

The goal of this chapter was to provide a new perspective on the fundamental questions regarding the synchronic analysis of the Franconian tone accents: the analysis of the phenomenon itself and the typological relation between Rule A and Rule B.

In section 4.2, I have introduced my analytical concept and have applied it to the basic data of Rule B and Rule A. I have argued that the contrast between Class 1 and Class 2 can be captured with the notion of prosodic strength: Class 1 contains two prosodically strong moras, Class 2 one strong mora and one weak mora (for further discussion, see chapter 5). Subsequently, I have proposed an account that regards the basic synchronic typological relation between both dialect groups as the result of reranking two constraints. I have shown that the relation between Rule B and Rule A can be understood as the result of differences in the grammar of the dialect groups, whereas the underlying representation is identical: reranking the constraints T → μ' and *μ' / L leads to either Rule A (T → μ' >> *μ' / L) or Rule B (*μ' / L >> T → μ'). Restricting the basic typological relation to the influence of these two constraints implies that we do not expect to find other, as yet unattested, patterns: the factorial typology indicates that – given the same underlying representation – there should be no dialects with a full tonal reversal. Furthermore, it also excludes dialects with non-reversed declaration contours and reversed interrogation contours.

5. Synchronic analysis II: details

5.1 Introduction

In chapter 4, I have discussed the basic facts of the tonal mapping in Franconian, abstracting away from representational and computational details. Chapter 5 deals with these issues: on the one hand I show that my analytical concept is able to capture the more complex interactions within different Franconian dialect groups as well; I provide detailed analyses of four Franconian dialects. On the other hand, I introduce the formal surface structure of the accents and relate it to the lexical representation of the opposition.

In section 5.2, I introduce my theoretical equipment as far as it is necessary to understand my analysis: first of all, I discuss the surface structure of the tone accents. As I show, the difference between the two accents is one of foot structure: whereas Class 1 has a disyllabic foot, Class 2 is footed as a moraic trochee. I propose that this leads to different *head domains* for the two accent classes: i.e., the moras in both accent syllables differ with respect to their prosodic strength. Furthermore, I give further basic analytical assumptions and introduce the relevant constraint families for my analysis.

Section 5.3 presents an in-depth analysis of my own data from the Arzbach dialect. Subsequently, I show that the analytical concept I propose is able to capture the tonal mapping within other Franconian dialects as well. To demonstrate this, I analyze data from three selected Rule-A(2) dialects. To provide a representative overview over the area, I choose dialects that represent the three basic tonal varieties within the area (as far as is evident from the detailed studies that are available so far):[30] I begin by giving an analysis of the Hasselt dialect (section 5.4, data from Peters 2008), continue with Cologne (section 5.5, data from Peters 2006a) and then discuss Roermond (section 5.6, data from Gussenhoven 2000a). Cologne (Ripuarian, Rule A) and Roermond (East-Limburgian, Rule A2) represent the two main variants of the most widespread tonal system in the area. The West-Limburgian Hasselt system represents a group of dialects where we find some crucial differences in the realization of the opposition from other Rule-A(2) dialects.

Methodologically – as stated above (see section 4.1) – I follow Gussenhoven's Roermond study (Gussenhoven 2000a), which I regard as a standard procedure in conducting a detailed autosegmental analysis: the tonal mapping for both accents is formalized in OT, varying pragmatic conditions (declaration, interrogation), sentence position (final vs. non-final) and focus position (focus vs. non-focus). Furthermore, I start out from the assumption of a linear order among the relevant

[30] With the term 'detailed studies', I refer to studies where sufficient tonal descriptions (varying at least the pragmatic conditions declaration and interrogation and sentence position) are available.

tones. Whereas other solutions have been proposed (for instance tones from intonational morphemes and boundary tones on different tiers, see Kehrein to appear), I regard a strict linearization of tones as the minimal assumption. However, my analysis might certainly be translated into frameworks with fewer restrictions on linear order.

Section 5.7 serves to show how the surface structure of each accent relates to the underlying representations: I claim that Class 2 is prosodically unmarked underlyingly, whereas Class 1 is represented as a disyllabic foot. The section discusses the set of possible surface structures for Class-1 words as well as for Class-2 words. Furthermore, I formalize the prosodification process for both accent classes within OT. Subsequently, I discuss some relevant synchronic alternations and show how these can be incorporated into my account.

Section 5.8 summarizes the main results.

5.2 Theoretical background

5.2.1 The interaction of tone and prosodic head domains: surface structure of the tone accents

This subsection serves to introduce the fundamentals of my prosodic approach. The relevant prosodic constituents for my considerations are moras, syllables and feet (based on the theories of e.g. Hayes 1985, 1987, 1995, McCarthy & Prince 1986, Prince 1990).

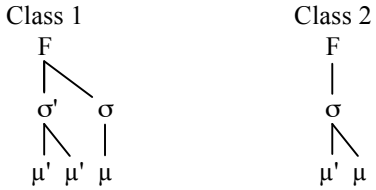
In section 4.2, I have proposed an analysis that traces the different tonal mappings between Class 1 and Class 2 back to the relative prosodic strength of the tonal positions, the moras: Class 1 consists of two strong moras, Class 2 of one strong and one weak mora. I repeat this schema in (1); strong moras are indicated with primes, weak moras are not marked:

(1)

Class 1		Class 2	
μ'	μ'	μ'	μ

As has been briefly mentioned above (see subsection 4.2), the notions 'strong' and 'weak' relate to head dependent relations at the foot level; these relations differ between Class 1 and Class 2 since the accents are footed in different ways: while the Class-1 foot branches at the *syllable* level, the Class-2 foot branches at the *mora* level. The resulting surface representations are sketched in (2):

(2) Prosodic surface representation of Class 1 and Class 2



As is shown in (2), Class-1 feet are obligatorily *disyllabic*; the second syllable can either be segmentally filled or empty-headed (for further discussion of this issue, consider subsection 5.2.5). Class-2 feet, on the other hand, are *bimoraic*.[31]

[31] Note that this proposal is not meant to imply that disyllabic words will always be footed as syllabic trochees (or: uneven trochees). As will be discussed in detail in section 5.7, I regard moraic trochees as the default feet in Franconian: disyllabic Class-2 words are footed as a moraic trochee with an unparsed second syllable. This follows from the avoidance of uneven trochees. Class-1 feet, on the other hand, always surface as disyllabic feet since this structure is underlyingly marked and protected by faithfulness

This difference between the foot structures of the two accent classes influences the prosodic strength of the relevant moras. In order to illustrate this concept, I need to introduce a set of assumptions that define my concept of prosodic headedness. The first of these assumptions is given in (3):

(3) The head of a foot can be either a syllable or a mora.

The level of branching determines which of those units (syllable or mora) is the head of a particular foot. Generally, every foot wants to be binary at some level: it wants to have a *head* and a *dependent*. Therefore, the foot looks for an adequate structure within the prosodic hierarchy. Within my approach, this search obeys the principle stated in (4):

(4) The head of a foot is determined at the highest prosodic level where it can have a dependent.

When a foot branches at the *syllable level* (as in Class 1 in (2)), the initial syllable will be the head of the foot, and the second syllable will be the dependent.[32] However, when a foot branches at the *mora level* (a moraic trochee, see Class 2 in (2)), the first mora will be the head, and the second mora will be the dependent.

The crucial aspect within my account concerns the consequences of this difference in headedness: I claim that the foot head has an impact on *all lower-level structure* that is associated with it. This is stated in (5):

(5) A foot head constitutes a *head domain* that comprises the foot head itself as well as all lower-level structure dominated by it.

Let us take another look at (2); consider the Class-2 foot first: as can be observed, the Class-2 foot branches at the moraic level. Therefore, the foot head is the first mora, and the foot dependent is the second mora. Class 1, on the other hand, shows binary structures at the syllable level *and* at the mora level. Consequently, both units are suitable foot heads. However, according to (4), the head of the foot is determined at the *highest* prosodic level possible (in case there are no constraints militating against a particular footing; see section 5.7 for further discussion). In the case at hand, the head of the foot is the initial syllable, whereas the second syllable is the dependent. By virtue of (5), this difference in footing leads to different head domains: in disyllabic Class-1 feet, the whole first syllable, comprising both moras, belongs to the head domain. In bimoraic Class-2 feet, only the first mora is part of

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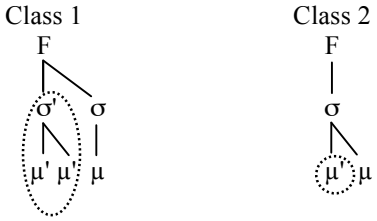
to prosodic heads. Furthermore, it may be possible to find Class-2 items with an empty second syllable as well. However, I have not found any empirical evidence that would support their existence in Franconian. This may indicate that in these dialects, an empty-headed syllable needs to be parsed by a foot and thus always follows a Class-1 syllable. Since this question is not of immediate relevance to the analysis, I do not dicuss this issue in further detail and leave it to future work.

[32] This is true for trochaic systems such as Franconian. In iambic systems, the direction of branching would be reversed.

that domain. The (non-)membership within the head domain influences the prosodic strength of the relevant prosodic units: elements belonging to the foot head domain are prosodically stronger than elements outside of that domain. We might say that – with respect to foot structure – all units within the head domain receive the label 'strong', whereas all non-head structure counts as 'weak'. The head domains for Class 1 and Class 2 are shown in (6) and indicated by dotted circles:

(6) Head domains at the foot level



As (6) shows, the two adjacent 'strong' moras in Class 1 are of equal prosodic strength at the foot level since they are both part of the head domain, constituted by the first syllable. The mora in the second syllable counts as 'weak' since it is does not belong to the head domain but is dominated by the foot dependent (the second syllable). In Class 2, where the foot branches at the mora level, it is only the first mora that counts as 'strong' at the foot level: it is the head of the foot and consequently constitutes the head domain. The second mora is the dependent of the foot. Therefore, it cannot be part of the head domain and thus counts as weak. This marks the difference between Class 1 and Class 2: at the foot level, both moras of Class 1 are strong, whereas in Class 2, one mora is strong and one mora is weak.

Crucially, this difference has an impact on the work of constraints that are related to foot structure. This is expressed in (7):

(7) Constraints referring to foot heads always refer to all elements within the head domain.

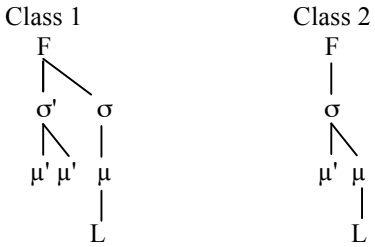
That is, when constraints restrict or favor the occurrence of a certain element in the head of a foot, then these constraints always look at all relevant units belonging to the head domain, and *not* only at the foot head itself. In order to exemplify the consequences of this proposal for foot-related constraints, let us explore the working range of a constraint governing the interaction of low tone and prosodic structure, proposed by de Lacy (2002a). I give this constraint in (8); for reasons of convenience, I reformulate it in a way that it is in line with my analytical concept.[33] A slightly simplified formulation has already been provided in subsection 4.2.1, (5):

[33] In de Lacy (2002a), the constraint is called *FT-HD/L: I replace 'FT-HD' with my notation for a mora within a foot head domain, a *strong* mora (μ').

(8): *μ' / L: Assign one violation mark for every strong mora that is associated with a low tone

To understand how this constraint influences the tonal mapping in Franconian, let us assume a low tone as an input and *μ' / L as the only relevant constraint. In (10), I show where L surfaces in Class 1 and in Class 2, respectively:

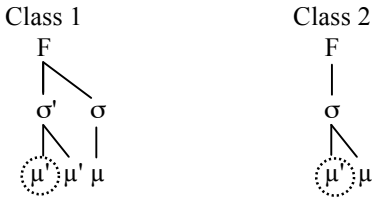
(9)



In Class 1, L is blocked from the entire first syllable and surfaces on the mora of the second syllable. In Class 2, it can dock onto the second mora of the initial syllable. This follows from what has been established above: if, in Class-1 cases, the low tone surfaced on one of the strong moras in the first syllable (indicated by μ'), *μ' / L would be violated. In order to avoid such a violation, L docks onto the prosodically weak mora of the second syllable: unlike both moras in the first syllable, it is not part of the head domain and thus it is a proper host for the low tone. In Class 2, on the other hand, only the first mora is part of the head domain (and therefore strong), whereas the second mora does not belong to that domain. Instead, it constitutes the dependent of the foot and is thus prosodically weak. Therefore, the low tone can link to this mora without causing a violation of *μ' / L.

Next to these differences with respect to footing, Class 1 and Class 2 also have similarities at the syllable level: the initial syllable of both accent classes is *bimoraic*. These syllables are always stress-attracting: both are heavy and obey the WEIGHT-TO-STRESS principle, which requires heavy syllables to be stressed (Prince 1990). As a consequence, Class 1 and Class 2 behave identically with respect to constraints that look at the syllable level. At least with respect to Franconian, I regard syllables as being left-headed; therefore, the first mora is the head of any bimoraic syllable. This is demonstrated in (10):

(10) Headedness at the syllable level



In Class 1, both moras are strong at the foot level (indicated by the primes); however, at the syllable level, only the first mora has head status (indicated by the dotted circle). With respect to Class 2, the head dependent relations are identical for the foot level and the syllable level: in both cases, only the first mora occurs within the head domain of the relevant constituent.

The given information is sufficient in order to understand my analysis of the phenomenon. Therefore, I postpone the treatment of remaining theoretical questions with respect to my proposal to section 5.7: there, I formalize the footing procedure for the two accents within OT, provide the underlying representations and discuss synchronic alternations between accent minimal pairs.

5.2.2 Tone-bearing unit

In Franconian, I regard the mora as the TBU.[34] Furthermore, tones prefer to be linked to moras within stressed syllables: at least with respect to the dialects discussed here, unstressed syllables are skipped as a primary tonal target. That is, when a tone from an intonational morpheme is realized post-focally (and does not spread across a syllable boundary), it will preferably be located in a syllable with word stress and skip intervening unstressed syllables between its primary target and that of the preceding tone. An association of tones with non-stressed syllables only occurs when high-ranked constraints enforce the association of a particular tone with an unstressed syllable. This can for instance be the case for tones that indicate phrase-final boundaries. As is stated below (subsection 5.2.3), boundary tones are aligned with the last syllable of a phrase, no matter if this syllable is stressed or not.

[34] Note that this is not a standard assumption within intonational phonology: going back to Pierrehumbert (1980), it is usually the syllable that is regarded as the TBU. However, for a cross-dialectal analysis of the tone accents, the literature indicates that the mora is a TBU in Franconian: this is reflected in several approaches to the phenomenon, be they prosodic approaches (Boersma 2006, Kehrein 2007, to appear, Hermans 2009, to appear) or tonal accounts (e.g. Gussenhoven 2000a, Gussenhoven & Peters 2004, Peters 2006a).

5.2.3 Status of the different intonational tones

Focus tones are underlying and are introduced as tonal morphemes. The tonal structure of these morphemes often varies with pragmatic meaning, declaration having a different tonal melody from interrogation (see also subsection 1.3.1). The starred tone (T*) of an intonational melody (e.g. H*L) is always aligned with the focus syllable, which I treat as a universal here.[35] Boundary tones, on the other hand, are *not* underlying but introduced by the grammar via alignment constraints (see Hyman 1990 and Yip 2002 for related proposals with respect to tonal languages). That is, a sentence melody L*HL$_{\iota}$ will be stored as L*H, whereas the boundary tone L$_{\iota}$ will be assigned by a relevant constraint.[36] However, this does not imply that boundary tones are necessarily epenthetic: as will be discussed below (see subsection 5.2.4), I argue that a tone from an intonational morpheme can also signal a phrasal boundary when it occurs in the last syllable of a phrase.

5.2.4 Constraint set

1. Constraints regulating the interaction of tones and TBUs

These basic constraints regulate the relation between tones and TBUs (henceforth: moras). They are given in (11) and (12):[37]

(11) T → μ: Assign one violation mark for every tone that is not associated with a mora

(12) μ → T: Assign one violation mark for every mora that is not associated with a tone

The constraint T → μ states the basic relation between tones and moras; it is satisfied when every tone is associated with a mora. Consider the overview in (13):

[35] Alternatively, one might also consider this to be the result of a high-ranked alignment constraint.
[36] Note that within my analysis, this assumption is supported by the predictability of the boundary tones: their quality is always identical across different pragmatic environments.
[37] As I have indicated in section 4.3, the formulation of these constraints is based on Anttila and Bodomo (2000) and Gussenhoven (2004).

(13) Violation marks assigned by T → μ

	T → μ
a. μ | T	
b. μ | T T	*
c. μ ⟍ T T	
d. μ μ | T	

When the number of tones is higher than the number of available moras, the work of this constraint can lead to tonal contours, as is demonstrated in (13c). Crucially, it is *not* violated by toneless moras in the output (13d).

The constraint μ → T, on the other hand, requires any mora to be tonal; when the number of available moras exceeds the number of tones, μ → T can enforce tonal spreading (or epenthesis), as is shown in (14c). It is not violated by unassociated tones; this is indicated in (14d):

(14) Violation marks assigned by μ → T

	μ → T
a. μ | T	
b. μ μ | T	*
c. μ μ ⟋ T	
d. μ | T T	

2. Interaction of tone and prosodic head domains[38]

The core of my OT-analysis consists of a variety of constraints regulating the interaction of tones and prosodic heads. I make use of negatively stated as well as implicational constraints. These constraints are discussed below.

a) Negatively stated constraints

These constraints are based on a constraint typology from de Lacy (2002a). They regulate the avoidance of tones in certain prosodic positions and are based on the observation that high tones are attracted to prosodically strong positions (i.e., they avoid weak positions), whereas low tones are attracted to prosodically weak positions (i.e., they avoid strong positions). For my analysis, one of these constraints is relevant: *μ' / L, which militates against the occurrence of low tone in foot heads; it has already been provided in subsection 5.2.1, (8) where I also give an example of the work of this constraint: [39]

(15) *μ' / L: Assign one violation mark for every low tone that is associated with a strong mora

Yip (2007) has provided evidence for the necessity of differentiating between negative 'general constraints' and negative 'focus constraints' (see also Kuo, Xu and Yip 2007).[40] My data confirm the view that constraints referring to prosodically strong positions can be restricted to the focus syllable (see subsection 5.3.4 for further discussion): therefore, in this analysis, *μ' / L is split up into *μ' / L and *μ' / L (FOCUS).

b) Implicational constraints

The empirical data used for this analysis suggest that next to negatively stated constraints, we also need implicational constraints in order to account for the interaction between tones and prosodic structure. Similar cases are reported by Yip (2002). The implicational constraints are divided into two related families: the first family regulates the association of tones with prosodic heads; the second family governs the association of prosodic heads with tones.

Constraints regulating the association of tones with prosodic head domains. These constraints require that every tone be associated with a mora within the domain of a prosodic head. Note that whereas, according to de Lacy (2002a), negative constraints can refer to both strong (head) and weak (dependent) positions,

[38] See section 5.2.1 for a discussion of the nature of head domains.

[39] See Pulleyblank (2004), Altshuler (2006), Weidman and Rose (2006), and Kristoffersen (2007) for further use of the constraint.

[40] These papers make use of the constraint *FOCUS/L. However, this interpretation slightly differs from mine: e.g., in Kuo, Xu and Yip (2007), *FOCUS/L only penalizes the sole occurrence of L within a focus syllable – i.e., combinations of L and H are allowed.

implicational constraints only refer to the interaction of tone with head domains but never to non-heads.[41]

The structure of this constraint set is given in (16):

(16) T → Hd: Assign one violation mark for every tone that is not associated with a mora within the domain of a prosodic head

This results in the two constraints given in (17) and (18), both of which play a role in my analysis. The violation marks assigned by these constraints resemble the ones given in (13), the only difference being that the constraints at hand only refer to moras within head domains.

(17) T → μ': Assign one violation mark for every tone that is not associated with a strong mora

(18) T → σ-HD: Assign one violation mark for every tone that is not associated with a syllable head[42]

Constraints regulating the association of prosodic head domains with tones. These constraints govern the association of the relevant prosodic units with tones. The general structure of these constraints is given in (19):

(19) HD → T: Assign one violation mark for every mora within the domain of a prosodic head that is not associated with a tone

My data show that some members of this constraint family regulate the association of strong prosodic units with *high* tones. This is line with de Lacy (2002a) who observes a mutual attraction between H and prosodically strong positions.[43] This leads to the four constraints in (20) to (23).[44] The violation marks they assign are similar to those provided in (14).

(20) μ' → T: Assign one violation mark for every strong mora that is not associated with a tone

(21) μ' → H**:** Assign one violation mark for every strong mora that is not associated with a high tone

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[41] In other words: prosodically weak positions never directly 'ask' to receive tones, and a tone never asks for an association with a weak unit.

[42] I regard the first mora of a syllable as the syllable head (also see above, subsection 5.2.1).

[43] I have no evidence for corresponding constraints of the type H → HD. This migh indicate that *each* tone (H or L) wants to end up in the best position available. The attraction of low tones to weak positions then follows from negatively stated constraints against L in strong positions.

[44] Note that the constraints in (10) and (11) are not attested in my data but follow from the constraint typology.

(22) σ-HD → T: Assign one violation mark for every syllable head that is not associated with a tone

(23) σ-HD → H: Assign one violation mark for every syllable head that is not associated with a high tone

3. Basic OT constraints

I make use of several basic OT constraints. These constraints are introduced below.

a) Markedness

Many to one (NOCONTOUR). This basic principle of autosegmental phonology has been introduced in subsection 1.3.1. I state the relevant basic constraint – based on Goldsmith (1976) – in (24):

(24) NOCONTOUR: Assign one violation mark for every prosodic unit that hosts two adjacent non-identical tones

Based on a typology from Gussenhoven (2004), I split the set of constraints against contours into two sub-families: NOCONTOUR (μ), which militates against contours at the mora level, and NOCONTOUR (σ), which forbids contours at the syllable level.[45] Next to these two general constraints, there are two constraints specifically banning rises, NORISE (μ) and NORISE (σ). These four constraints are given in (25) to (28); an overview of the violation marks they assign is provided in (29):[46]

(25) NOCONTOUR (μ): Assign one violation mark for every mora that hosts two adjacent non-identical tones

(26) NOCONTOUR (σ): Assign one violation mark for every syllable that hosts two adjacent non-identical tones[47]

(27) NORISE (μ): Assign one violation mark for every mora that hosts a LH-sequence

(28) NORISE (σ): Assign one violation mark for every syllable that hosts a LH-sequence

[45] Note that Gussenhoven (2004) does not explicitly introduce a general constraint against contours at the syllable level: he has two constraints NORISE and NOFALL, forbidding sequences of LH and HL within bimoraic syllables. I combine these two constraints to one constraint NOCONTOUR (σ).

[46] It may well be the case that the existence of these constraints implies that of a constraint against contours at the foot level. However, I am not aware that they have not been proposed yet. Since I cannot provide any evidence for their existence, I disregard the possibility here.

[47] NOCONTOUR (σ) is not attested in my data; however, its existence is to be predicted from NORISE (σ).

(29) Violation marks assigned by NOCONTOUR (μ), NOCONTOUR (σ), NORISE (μ), and NORISE (σ)

	NOCONTOUR (μ)	NOCONTOUR (σ)	NORISE (μ)	NORISE (σ)
a. σ / μ μ / H L		*		
b. σ / μ μ / H L	*	*		
c. σ / μ μ / L H		*		*
d. σ / μ μ / L H	*	*	*	*

One to many (NOSPREAD). Like NOCONTOUR, NOSPREAD is based on standard autosegmental principles (Goldsmith 1976, see also subsection 1.3.1). The basic OT-constraint is given in (30):

(30) NOSPREAD: Assign one violation mark for every second, third, etc. association of a tone with a TBU

It has been argued repeatedly that spreading can be sensitive to prosodic structure at the word level. Such effects are formalized for instance in Ito and Mester 1994 (see also Noske 1997, Ito and Mester 1999, Walker 2001, Pater 2001, Kawahara 2003). The data for my analysis show such restrictions as well – for instance, syllable boundaries can block spreading. My formulation of the relevant constraint is given in (31):

(31) NOSPREAD {σ}: Assign one violation mark for every second, third, etc. association of a tone with a TBU that crosses a syllable boundary[48]

[48] I use this formulation for reasons of simplicity – CRISPEDGE (σ) by Ito and Mester (1994) could be adopted as well.

Moreover, my data show that spreading cannot only be blocked by prosodic boundaries at the word level. Phrasal boundaries – here: those of the focus phrase (the focus syllable) – can block spreading as well (see subsection 5.6.4 for further discussion).[49]

I am not aware that the latter observation has been stated to date.[50] Therefore, this issue certainly deserves a detailed discussion. Since, however, in the context of this thesis, this might lead away from the main topic, I leave a more elaborate discussion of the phenomenon to future work. The corresponding constraint is formulated in (32):

(32) NOSPREAD {FOCUS}: Assign one violation mark for every second, third, etc. association of a tone with a TBU that crosses a focus phrase boundary

[49] Since I do not have any positive evidence that for instance IPs or UPs allow for spreading, I do not include them in the discussion. However, since these are 'strong' boundaries, we might consider the thought that spreading across these boundaries is universally excluded. Eventually, this might also be true for the focus phrase. I leave this issue to future work.

[50] *Tonal domains*, as being proposed by Hwangwo (2003a, 2003b), might be regarded as related phenomena. However, these domains do not necessarily coincide with phrases but are lexically prespecified.

An overview over the work of constraints against spreading is provided in (33). The focus syllable in (33c) is marked with an asterisk:

(33) Violation marks assigned by NOSPREAD, NOSPREAD {σ}, and NOSPREAD {FOCUS}

	NOSPREAD	NOSPREAD {σ}	NOSPREAD {FOCUS}
a.	*		
b.	**	*	
c.	**	*	*

b) Faithfulness

Deletion and insertion. Faithfulness to underlying tones can be expressed with T → μ (introduced in (11)): when a tone remains unassociated, this leads to a violation of the constraint. A standard constraints against insertion of tones is given in (34):

(34) DEP (T): Assign one violation mark for every tone in the output that does not have a correspondent in the input

DEP constraints are part of the basic OT architecture and were formulated in McCarthy & Prince (1995); see Yip (2002) for an overview of the use of DEP (T).

Linear order. In order to account for the preservation of linear order among tones from one tonal morpheme, I make use of CONTIGUITY. CONTIGUITY is a family of faithfulness constraints that enforces an underlying string of elements (*here*: tones) not to be broken up by epenthesis or deletion (see McCarthy & Prince 1995):

(35) CONTIGUITY-IO: Assign one violation mark for every string in the output that does not correspond to a contiguous string in the input

CONTIGUITY-IO punishes medial deletion or insertion of tones whereas initial / final deletion or insertion are tolerated:

(36) Violation marks assigned by CONTIGUITY-IO

	LHL	CONTIGUITY-IO
a.	LHHL	*
b.	LL	*
c.	LHLH	
d.	HL	

The candidates in (36a) and (36b) violate the constraint. In a., we find *medial* insertion of a high tone whereas in b., a *medial* H is deleted. The structures in (36c) and (36d), on the other hand, do not violate CONTIGUITY-IO: in c., we find *final* H-insertion; in d., we find *initial* deletion.

c) Alignment

Alignment of boundary tones. In my analysis, I make use of alignment constraints with respect to the introduction of boundary tones at the right edge of intonational phrases or utterances (for the nature of alignment constraints, see McCarthy & Prince 1993). In my approach, the right edges of intonational phrases and utterances are defined as the final syllable; the corresponding alignment constraints are given in (37) and (38):

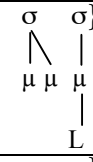
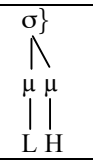
(37) ALIGN-$\}_{\iota}$-T: Assign one violation mark if the right edge (last syllable) of an IP is not associated with a tone

(38) ALIGN-$\}_{\upsilon}$-T: Assign one violation mark if the right edge (last syllable) of an UP is not associated with a tone

As the constraints in (37) and (38) indicate, I argue that a boundary tone does not necessarily have to be the last tone within the phrase-final syllable; it is only important that there *is* a low tone present in this syllable in order to satisfy the relevant constraint.[51] Consider the overview in (39) for the violation marks assigned by the constraint ALIGN-$\}_{\iota}$-L:

[51] Note that in Gussenhoven (2000a)'s analysis of the Franconian dialect of Roermond, we find a comparable assumption: in phrase-final Class-2 syllables, the low IP-final boundary tone is not the last tone within the phrase but followed by the lexical high tone.

(39) Violations marks assigned by ALIGN-}$_{\iota}$-L

	ALIGN-}$_{\iota}$-L
a. 	
b. 	*
c. 	

In (39a), the constraint is satisfied because the last syllable of the phrase contains a low boundary tone. In (39b), the constraint is violated because the boundary tone is not associated with the final syllable of the phrase but with the penultimate syllable. In (39c), we can observe that the constraint is satisfied when a tone of the desired quality is linked to the phrase-final syllable, although it is followed by another (high) tone.

Furthermore, as has been mentioned above, there are two types of tones that can satisfy these constraints. For a constraint ALIGN-}$_{\iota}$-L and a tonal melody H*L, this works as follows: when the trailing L from the tonal morpheme is associated with the last syllable of the IP, the constraint is satisfied. When the trailing L is not associated with that syllable, then the grammar can introduce a tone (at the cost of violating DEP-T).

In my analyses, the different origin of the boundary tones will be noted by indices: An epenthetic boundary tone will be indicated as T_{ι}; it only signals the prosodic boundary. When the boundary tone comes from an underlying tonal morpheme, this can be indicated in two ways – as 'T*, $_{\iota}$' in case the starred tone represents the prosodic boundary, or as '$T_{int, \iota}$': in the latter case, the subscript 'int' indicates that the tone is the trailing of an intonational morpheme and at the same serves to signal the prosodic boundary (indicated by 'ι').

Alignment of tones from the same tonal morpheme with each other. The Franconian data show that sometimes, trailing tones from tonal morphemes cannot be realized within the focus syllable (due to constraints prohibiting an association of the relevant tone with a mora in the focus syllable). As has been stated above

(subsection 5.2.2), in such cases, trailing tones prefer to be linked to a post-focal syllable with word stress. When there is more than one stressed post-focal syllable available, trailing tones will be linked to the leftmost one, in other words close to the preceding tone. I interpret this as an effect of a constraint that requires tones from the same tonal morpheme to be aligned with the same syllable: it is violated when these morpheme tones are separated by one or more intervening syllable boundaries. I give this constraint as CONCATMORPH:[52]

(40) CONCATMORPH: Assign one violation mark for every syllable boundary between two tones from the same tonal morpheme

Thus, when morpheme tones are not linked to the same syllable, CONCATMORPH is violated. The distance between the tones determines the number of violations. The work of this constraint is exemplified in (41) for a hypothetical tonal morpheme H*L:

(41) Violation marks assigned by CONCATMORPH

	H*L	CONCATMORPH
a.	σ σ σ | | | μ μ μ μ | | H*L	
b.	σ σ σ | | | μ μ μ μ | | H* L	*
c.	σ σ σ | | | μ μ μ μ | | H* L	*
d.	σ σ σ | | | μ μ μ μ | | H* L	**

When two tones from one morpheme occur in the same syllable, there is no violation of the constraint (41a). When they are linked to adjacent syllables (one intervening syllable boundary), this results in one violation (41b, 41c); when there is

[52] This constraint is based on CONCAT (Riad 1998); in Riad's analysis of the Scandinavian tone accent opposition, CONCAT serves to align the right edge of the lexical tone with the left edge of the following focus tone.

one toneless syllable between both tones (two intervening syllable boundaries), there will be two violations of the constraint (41d), etc.

5.2.5 Empty-headed syllables on the surface

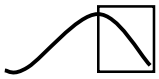
In subsection 5.2.1, I have introduced the surface structure of the tone accents. One crucial aspect of my proposal is the obligatory disyllabicity of Class-1 items. However, it is not always the case that Class-1 words contain two 'audible' syllables: in a variety of cases, the mora of the second syllable is empty, i.e. it does not have segmental content. I will briefly refer to these syllables as *empty-headed syllables* (see section 5.7 for the relevant representations).

As in the thesis at hand, empty-headed syllables (or empty beats) have been repeatedly assumed in analyses of stress (see e.g. Abercrombie 1967, Liberman 1975, Kiparsky 1991, Harris 1994, Burzio 1994, and Duanmu 2000). For further discussion of the concept and its theoretical backgrounds, see e.g. Anderson (1982), Spencer (1986) Kaye (1990), Van Oostendorp (1995), Harris & Gussmann (2002).

This subsection discusses how the presence of an empty-headed syllable in Class-1 items can be reflected in the phonetics. Let me begin with a remark on whether this empty mora can host tones: since tones from tonal morphemes are attracted to syllables with word stress (see above, subsection 5.2.2), the empty-headed syllable of a Class-1 item usually does not host tones from these morphemes. However, when a particular Class-1 word with an empty second syllable occurs in phrase-final position, then the mora of the empty second syllable will be the host of the boundary tone, since it is the phrase-final syllable.

In cases where the empty-headed syllable does not host a tone, it will have no phonetic effect on the pronunciation of the item within an utterance. However, when the empty-headed syllable hosts a (boundary) tone, we can find interpolation effects towards this tonal target, even though the tone is not connected with a segment. In cases where interpolation occurs, the degree to which this effect will be visible in the actual pronunciation can differ between different dialects. To illustrate this, let us compare two tonal contours from Roermond (Gussenhoven 2000a) and Mayen (Schmidt 1986, Künzel & Schmidt 2001, Werth 2007, to appear): as far as the available data indicate, the tonal grammars of these dialects are similar (at least with respect to the tonal mapping in focus position); here, the only phonetic difference worth mentioning seems to be a variation in the realization of phrase-final 'monosyllabic' Class-1 items in interrogation, focus position:

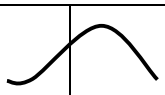
(42) Realization of phrase-final Class-1 items, interrogation

Roermond	Mayen
	

The crucial difference between the contours is the final part (indicated with a square): whereas we find a substantial pitch fall in Roermond, this fall is truncated and thus only very slight in Mayen. After the crucial contours had first been displayed in Schmidt (1986), this slight fall was first discussed in detail by Gussenhoven (2000b) and is also treated in Künzel & Schmidt (2001). Because of its subtlety, Künzel & Schmidt (2001) describe it as an *epitone*.

Within my approach, this phonetic difference between Mayen and Roermond can be understood as different degrees of interpolation towards a low boundary tone in the empty second syllable of Class 1 – Roermond displays strong interpolation effects, Mayen much less strong. The tonal mapping, however, is identical in the two dialects (which is no surprise given that all other focus contours resemble each other closely). This is demonstrated in (43):

(43)

Roermond			Mayen		
					
L*	H	Lι	L*	H	Lι
|	|	|	|	|	|
μ'	μ'	μ	μ'	μ'	μ
Focus-σ		Empty σ	Focus-σ		Empty σ

In Roermond, speakers strongly reflect the presence of the phrase-final low boundary tone in the empty-headed syllable. In Mayen, on the other hand, interpolation is much less strong; still, the presence of a low boundary tone is indicated by the slight pitch fall at the end of the contour (see also subsection 5.6.3 where I pick up this issue once more in the context of my Roermond analysis). A similar effect can be observed in the Hasselt dialect: here, the location of the low boundary tone can lead to a tonal contrast between Class 1 and Class 2 in phrase-final non-focus position (see subsection 5.4.4 for further discussion).

One phonetically based argument in favor of empty-headed syllables in Class-1 items might be deduced from the Arzbach dialect: as has been stated in subsection 3.4.4, the tonal contours of Class-1 items with segmental content in the second

syllable tend to resemble those of Class-1 items without empty second syllables: when a Class-1 item occurs in phrase-final position, the contours for the two types tend to look similar, independent of whether the second syllable has segmental content or not. The same holds for cases where the Class-1 item occurs in sentence-medial position: here, the contours for Class-1 items with or without a segmentally filled second syllable resemble each other as well. These similarities might be regarded as an indication that the two types are structurally identical at the prosodic level.

5.3 Case study I: semi-reversed tonal contours – the Arzbach dialect

In this section, I provide a detailed analysis of the Arzbach accents within my prosodic approach. After introducing the relevant intonational melodies (subsection 5.3.1), I start out by formalizing the basic facts (tonal mapping in non-final focus positions) in subsection 5.3.2. Subsequently, I discuss the phonologically more complex aspects of the tonal mapping (final focus positions in subsection 5.3.3 and non-focus positions in subsection 5.3.4). In section 5.3.5, I give the overall constraint ranking. The analyses of the other Franconian dialects (section 5.4 to 5.6) follow the same order.

5.3.1 Intonational melodies

For Arzbach, I assume the following intonational tones:

(44)

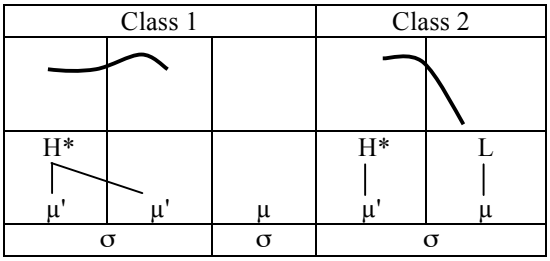
Declaration	H*L
Interrogation	L*H
Boundary tone	Lι

5.3.2 Focus positions I: non-final

a) Declaration

The tonal mapping for both accent classes is given in (45):

(45) Repetition from subsection 4.2.1, (3)



Class 1. The crucial aspects of the tonal mapping under this condition have been explained in subsection 4.2.1, where I have discussed the basic facts of the Arzbach dialect. Recall that I have introduced the constraint *μ' / L that militates against the occurrence of low tone in prosodically strong positions. I have shown that – since the Class-1 syllable consists of two *strong* moras – there is no space for the low tone

within the focus syllable. Therefore, *μ' / L must outrank CONCATMORPH that requires tones from the same tonal morpheme to be linked to the same syllable. This is demonstrated in (46):

(46) *μ' / L >> CONCATMORPH

	(μ'μ') HL	*μ' / L	CONCATMORPH
a. →	(μ' μ') \/ H		(n)*[53]
b.	(μ' μ') | | H L	*!	

Note that despite the non-occurrence of L on the second mora of Class 1, this mora does not remain tonally empty: the high starred tone of the intonational morpheme spreads to the second mora, thereby violating NOSPREAD. Since spreading adds structure to the representation, something must enforce it. In the case at hand, spreading emerges from the urge of the strong second mora to have a high tone. This is captured by the constraint μ' → H. Being higher-ranked than NOSPREAD, this constraint leads to rightward H-spreading to the second mora. Consider the tableau in (47):[54]

[53] I have assigned one violation mark for the low trailing tone of candidate a., since it is not linked to the same syllable as the preceding H. Note, that CONCATMORPH is always violated at least once since post-focal trailing tones are always linked to a TBU. However, the actual number of violations can vary and depends on the position of that post-focal syllable the tone associates with – this variability is indicated by (n): if it is realized in the syllable directly following the focus syllable, we would indeed have *one* violation of the constraint, since the two syllables are adjacent. However, if there is an intermediate unstressed, toneless syllable between the focus syllable and that with the trailing tone, there are *two* violations, and so on. That is, the number of violations can vary and depends on the structure of the actual phrase (see also subsection 5.2.4).

[54] I disregard the post-focal mapping of the tones. This will be discussed below, in subsection 5.3.4. There, I will also provide evidence that in the Arzbach grammar, μ' → H enforces spreading rather than the more general μ → T.

(47) μ' → H >> NoSpread

	(μ'μ') HL	μ' → H	NOSPREAD
a. →	(μ' μ') \/ H		*
b.	(μ' μ') | H	*!	

Class 2. In Class-2 cases, the low tone *can* be realized on the second mora of the focus syllable: since it is a weak mora, *μ' / L is not violated here. The alignment of the trailing L with the weak second mora of the focus syllable (instead of a post-focal mora) follows from the influence of CONCATMORPH. Consider the tableau in (48):

(48)

	(μ'μ) HL	*μ' / L	CONCATMORPH
a. →	(μ' μ) | | H L		
b.	(μ' μ) \/ H		(n)*!

b) Interrogation

Again, let me begin with the tonal mapping in this condition. This is shown in (49):

(49)

Class 1			Class 2	
				
L* | μ'	μ'	μ	μ'	L* | μ
σ		σ	σ	

Class 1. The mapping as it is shown here slightly differs from the one I have given in subsection 4.2.1, (5). There, for reasons of clarity, I had slightly simplified the tonal mapping: whereas before, I have treated the high trailing tone in Class 1 as if it were realized *within the focus syllable*, the high pitch target is actually realized *post-focally*, in the first available syllable carrying word stress.[55] Consequently, the rise we find within the focus syllable is due to interpolation from L* towards this high post-focal target.

In order to understand the tonal mapping, we have to keep in mind that L* always has to be aligned with the focus syllable (see subsection 5.2.3). One violation of *μ' / L is thus inevitable in Class-1 cases, since both possible tonal targets are strong moras; L* opts for the first and not for the second mora since that satisfies T → σ–HD. This is shown in (50):

(50) {*μ' / L, T → σ–Hd}

	(μ'μ') L*H	*μ' / L	T → σ–HD
a. →	(μ' μ') | L*	*	
b.	(μ' μ') | L*	*	*!

The high tone is blocked from the second mora because of the tendency to avoid rises within one syllable; the relevant constraint is NORISE (σ). In order to block the high tone from the strong second mora of the Class-1 syllable, NORISE (σ) must outrank all constraints that would prefer H to be associated with the second mora of the focus syllable: these constraints are μ' → H as well as CONCATMORPH. Consider the tableau in (51):

[55] See subsection 3.4.1 for relevant phonetic data. When no stressed syllable is available in post-focal position, the tone links to a weak mora.

(51) NoRise (σ) >> {ConcatMorph, μ' → H}

	(μ'μ') L*H	NoRise (σ)	ConcatMorph	μ' → H
a. →	(μ' μ') | L*		(n)*	**
b.	(μ' μ') | | L*H	*!		*

Class 2. In Class-2 cases, the low starred tone goes to its favored position, the weak second mora. This way, a violation of *μ' / L can be avoided. This allows us to incorporate a new ranking argument: since an association of L* with the second mora is preferred over the first one, we can conclude that *μ' / L must be higher-ranked than T → σ–Hd. This is formalized in (52):

(52) *μ' / L >> T → σ–Hd

	(μ'μ) L*H	*μ' / L	T → σ–Hd
a. →	(μ' μ) | L*		*
b.	(μ' μ) | L*	*!	

Furthermore, as is the case for Class 1 (see (51)), rises within the syllable are excluded by NoRise (σ), which outranks ConcatMorph. The relevant tableau is given in (53):

(53) NoRise (σ) >> {ConcatMorph, μ' → H}

	(μ'μ) L*H	NORISE (σ)	CONCATMORPH
a. →	(μ' μ) | L*		(n)*
b.	(μ' μ) \ L*H	*!	

As is the case for Class 1, the high trailing tone is associated with the first post-focal syllable with word stress. If no such syllable is available, it links to a post-focal mora in an unstressed syllable.

In this context, one more phenomenon can be observed that needs to be accounted for: phonetically, we often find a relatively strong fall towards the second mora where the low starred tone of the interrogation morpheme is located. I assume that this syllable-initial high pitch is not a part of the intonational melody but a phonetic enhancement of the late-aligned low tone.

This interpretation follows from the observation that L* is usually realized with a preceding pitch fall towards the low target – in both accent classes as well as in final and non-final position. However, the syllable-initial pitch height displays a high degree of variation: it is strongly dependent on the alignment of the low target within the syllable: the later L* is aligned phonetically, the more it is enhanced with high pitch. Therefore, initial pitch is relatively high in Class-2 syllables (late-aligned low tone) and relatively low in Class 1 (early-aligned low tone). An idealization of this observation for non-final positions is shown in Figure 5.1:

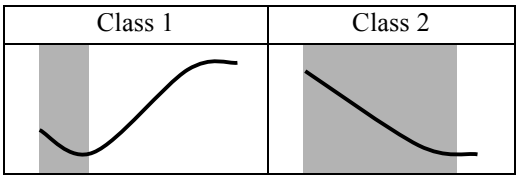


Figure 5.1: Relation between the alignment of the low target within the accent-syllable and the degree of the enhancing fall towards this target in interrogation, focus, non-final position: a relatively late alignment leads to higher initial pitch, and vice versa (indicated by the shaded area).

Furthermore, in phrase-final Class-2 syllables, where two tones (L* *and* H instead of only L*) are linked to the second mora of the Class-2 syllable and the low tone is thus aligned earlier phonetically than in non-final position, initial pitch is much less

high than in corresponding non-final positions (see subsection 3.4.1 for the relevant data and 5.3.3 for the phonological analysis). This suggests an interpretation along the lines of phonetic enhancement.

Further evidence for this interpretation can be found cross-linguistically: Gussenhoven (2004) points out that there are various cases where low tones are enhanced with a fall towards the low target and mentions for instance Tone 3 of Standard Chinese, where we find a fall towards the initial L. Another example that is more closely related to the Arzbach facts can be found in the Franconian dialect of Borgloon (Peters 2007). Here, initial low tones of tonal morphemes can be enhanced with a pitch fall, as in Arzbach. Kristoffersen (2007) describes another instance of such an enhancement of low tones for the East Norwegian North Gudbrandsdal variety.

With respect to the formal implementation, this implies that DEP-T has to outrank μ' → H. Consider (54):

(54) DEP-T >> μ' → H

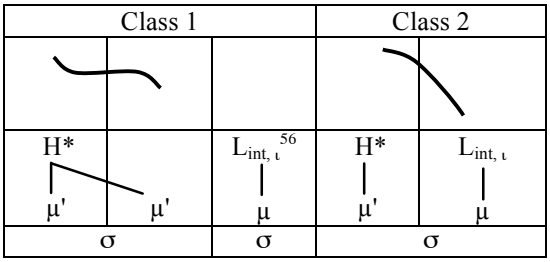
	(μ'μ) L*H	DEP-T	μ' → H
a. →	(μ' μ) | L*		*
b.	(μ' μ) | | H L*	*!	

Note that the initial high tone in candidate b. represents an inserted tone and not a metathesized trailing H from the tonal morpheme. As stated above, this trailing tone is realized post-focally.

5.3.3 Focus positions II: final

a) Declaration

(55)



Class 1. Basically, under this condition, the tonal assignment in the focus syllable resembles that in non-final position. However, the phonetic realization of the tonal melody slightly differs: in final position, the highest pitch target is lower than it is in non-final position (see subsection 3.4.1). I assume that this lower pitch is due to the influence of an immediately following post-focal low tone in the empty-headed syllable following the accented syllable in Class-1 cases: when a low tone is close to the focus syllable, the high tone in the focus syllable shows the tendency to be realized with relatively lower pitch, since there is less time to interpolate to the low target. When the low tone is further away, as is often the case when the Class-1 syllable is followed by an unstressed syllable plus a post-focal syllable with word stress, then pitch is relatively higher: there is more time to interpolate between the high and the low target. Evidence comes from disyllabic phrase-final Class-1 words with segmental content in the second syllable: in these cases, the pitch contours tend to resemble the contours of phrase-final Class-1 words with empty second syllables (see subsections 3.3.3 for further discussion). I regard this observation as support for my analysis: in both cases, the focus syllable is directly followed by a syllable with a low boundary tone, and therefore we find lowered pitch within the focus syllable in both cases.

Due to the obligatory disyllabicity of Class 1, the corresponding focus syllable can obviously never be final; the tonal mapping within the focus syllable is identical in final and non-final position. Therefore, I repeat the relevant OT tableaux, which have been provided in (46) and (47), but do not discuss them again:

[56] As discussed in subsection 5.2.5, the subscript 'int' indicates that the low tone is part of the tonal morpheme H*L. The subscript 'ι' indicates that in this context, the low tone from the intonational morpheme also functions as a boundary tone of the phrase.

(56) *μ' / L >> ConcatMorph (repetition of (46))

	(μ'μ') HL	*μ' / L	CONCATMORPH
a. →	(μ' μ') \/ H		(n)*
b.	(μ' μ') | | H L	*!	

(57) μ' → H >> NOSPREAD (repetition of (47))

	(μ'μ') HL	μ' → H	NOSPREAD
a. →	(μ' μ') \/ H		*
b.	(μ' μ') | H	*!	

Class 2. As in non-final position, Class 2 is realized with a pitch fall. Unlike Class-1 words, Class-2 words can be monosyllabic and can accordingly occur phrase-finally. In these cases, the low trailing tone in the focus syllable also functions as the low boundary tone of the IP: it satisfies the constraint ALIGN-}$_{\iota}$-L that requires the right edge of the IP to be aligned with a low tone. Since, as I have pointed out above (see subsection 5.2.4), boundary tones are not underlying but mandated by alignment constraints, the low trailing tone of the intonational morpheme can satisfy that constraint.

As in non-final position, the tonal mapping is a default mapping – apart from the fact that ALIGN-}$_{\iota}$-L needs to be satisfied in final positions as well. Since the low trailing tone satisfies ALIGN-}$_{\iota}$-L, this constraint is not in conflict with any other constraint (no tone needs to be introduced by the grammar). The relevant tableau is provided in (58):

(58)

	(μ'μ) HL	ALIGN-}ι-L	*μ' / L
a. →	(μ' μ) | | H L		
b.	(μ' μ) \/ H	*!	

b) Interrogation

In this condition, the tones are linked in the following way:

(59)

Class 1			Class 2	
L*		H[57]		L*,ι H
|		|		\/
μ'	μ'	μ	μ'	μ
σ		σ	σ	

Class 1. Due to its underlying disyllabicity, the phonology of the Class-1 focus syllable is the same as in non-final positions – in both conditions, the accents are realized with rising pitch. In the case at hand, the trailing H is realized in the (empty) second syllable of Class 1. An OT implementation of the tonal mapping within the focus syllable has been given in (50) and (51). I repeat these tableaux in (60) and (61):

[57] Data from disyllabic phrase-final Class-2 with a segmentally filled second syllable indicate that we do not find a low boundary tone in this position but only a high tonal target. Formally, this detail of the tonal mapping can be captured with the constraint ranking NOCONTOUR (μ) >> ALIGN-}ι-L.

(60) {*μ' / L, T → σ–Hd} (repetition of (50))

	(μ'μ') L*H	*μ' / L	T → σ–HD
a. →	(μ' μ') | L*	*	
b.	(μ' μ') | L*	*	*!

(61) NORISE (σ) >> {CONCATMORPH, μ' → H} (repetition of (51))

	(μ'μ') L*H	NORISE (σ)	CONCATMORPH	μ' → H
a. →	(μ' μ') | L*		(n)*	**
b.	(μ' μ') | | L*H	*!		*

Class 2. Both tones of the L*H interrogation morpheme align with the second mora, which results in a late rise. The alignment of L* with the second mora of the focus syllable follows from *μ' / L >> T → σ–HD, which has been motivated in (52); (62) shows the effects of this ranking for the context at hand:

(62) *μ' / L >> T → σ–HD

	(μ'μ) L*H	*μ' / L	T → σ–HD
a. →	(μ' μ) ⟍ L*H		*
b.	(μ' μ) | | L* H	*!	

Furthermore, linking L and H to the same syllable violates NORISE (σ). Thus, there must be a higher-ranked constraint causing the violation. In this case, this driving force is T → μ, expressing the desideration that every tone be associated with a mora.
T → μ outranks NORISE (σ) and thereby ensures that both tones are realized on the surface. Consider the tableau in (63):

(63) T → μ >> NORISE (σ)

	(μ'μ) L*H	T → μ	NORISE (σ)
a. →	(μ' μ) ⟍ L*H		*
b.	(μ' μ) | L*	*!	

The tonal mapping indicates that L* takes over the role of the phrase-final boundary tone (thereby satisfying ALIGN-}ι-L), even though it is followed by the trailing H. As discussed in subsection 5.2.5, boundary tones do not necessarily have to be the last tone to occur within the phrase-final syllable; it is only important that there *is* a low tone present in this syllable in order to satisfy the relevant constraint.[58] Since once more, ALIGN-}ι-L does not conflict with any other constraint (the grammar does not have to introduce a tone), I do not include a separate tableau for this context.

[58] Consider the Hasselt analysis (section 5.5) and the Cologne analysis (section 5.6) for further examples of this tonal behavior.

5.3.4 Post-focus positions

a) Basics

As indicated above, trailing tones of intonational morphemes are not always linked to the focus syllable but sometimes occur post-focally. Since post-focal tones prefer to be linked to syllables with word stress to an association with unstressed syllables (see subsection 5.2.2) – intervening unstressed syllables between the preceding tone (T*) and the trailing tone are skipped: in the minimal sentences that I used, the post-focal word usually was [gəˈzɛːn] ‘to see, perf.’ or [gəˈvɛːzə] ‘to be, perf.’. Here, all post-focal tones (L in declaration, H in interrogation) associate with the stressed second syllable. This is demonstrated in (64):

(64)

[ət hɔt n man^{c1}gəˈzɛːn]
H$_{ι}$ H* L$_{int,ι}$
‘She has seen a man’

In phrases where more than one post-focal stressed syllable is available, the trailing tones links to the stressed syllable that is closest to the starred tone. An example is given in (65):

(65)

[ə ðiːɐ^{c1} zɔl dɔt gəˈvɛːzə zaɪn]
H* L Lι
‘This has been supposed to be an animal’

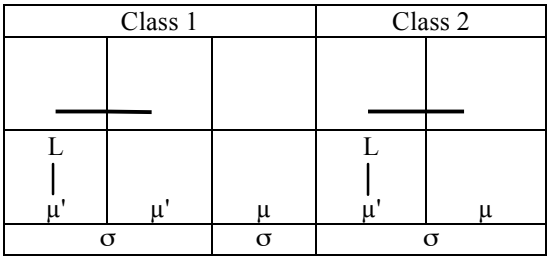
In (65), there are four possible candidates for the post-focal tone: [zɔl], [dɔt], [vɛː], and [zaɪn] are syllables with word stress. Still, it is [zɔl] – the syllable being closest to the starred tone – that receives the trailing L. This is the result of the work of CONCATMORPH: this constraint prefers an association of the trailing post-focal tone with a stressed syllable close to the preceding tone.

Crucially, *all* post-focal tones – no matter if they are H or L – always link to the first post-focal syllable carrying word-stress, independent of the class membership of this syllable. Consequently, post-focal low tones are *not* blocked from Class-1 syllables, as we find in focus, where *μ' / L blocks the association. The formal consequences of this observation are discussed in the following paragraphs.

b) Declaration, non-final and final position

In both of these environments, no systematic contrast is to be found – both accents are realized with low pitch. The tonal mapping of the trailing low tone – the H* is realized in the preceding focus syllable – is shown in (66):

(66)



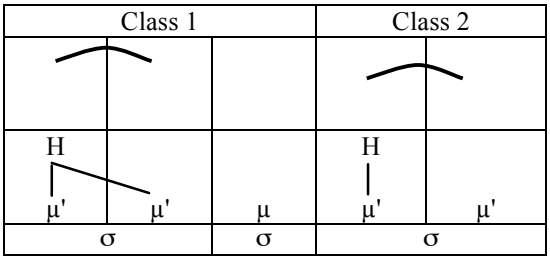
Although the contrast is neutralized in this context, the tonal mapping under this condition provides new evidence for the analysis, namely that *μ' / L is only active in the focus syllable: if it played a role in the context at hand as well, low tones would be blocked from Class-1 syllables throughout.[59] Therefore, *μ' / L has to be reformulated in such a way that it only applies within the focus syllable: this revised version is *μ' / L (FOCUS).

[59] In the Hasselt dialect, we find exactly this pattern (see subsection 5.4.4).

c) Interrogation, non-final position

Consider the tonal mapping of the trailing high tone in (67); recall that L* is linked to the preceding focus syllable:

(67)



The tonal mapping in this condition is the least apparent one since the phonetic implementation of the contrast differs from that of any other context: what we find is high pitch in Class 2 versus extra-high pitch in Class 1. In a dialect that – in all other contexts – only contrasts low and high targets, this behavior does not follow straightforwardly.

In my analysis, the representational difference must be related to the mapping of the high trailing tone. Furthermore, since the first moras of both accents are strong and thus formally equal, it must be due to the tonal mapping on the *second* mora. Since there is only one (high) tone to map, the representational difference must therefore be as is shown in (67): In Class 1, the high tone is doubly linked, whereas in Class 2, the tone is linked only to the second mora. The doubly linked tone is then interpreted with extra-high pitch. A related effect has been observed by Manfredi (1993, 147): he argues that a string of syllables linked to one H displays the tendency to rise in pitch.

In OT, this tonal behavior (doubly linked H vs. singly linked H) can be attributed to the influence of μ' → H: this constraint – also being active in Class-1 focus syllables, as has been demonstrated in (47) – leads to spreading only in Class-1 cases, where the syllable contains two strong moras. In Class-2 cases, on the other hand, μ' → H is satisfied when the first mora is high-toned – the second mora is prosodically weak.

The implementation for Class 1 is given in (68):

(68) μ' → H >> NOSPREAD

	(μ'μ') H	μ' → H	NOSPREAD
a. →	(μ' μ') \/ H*		*
c.	(μ' μ') | H*	*!	

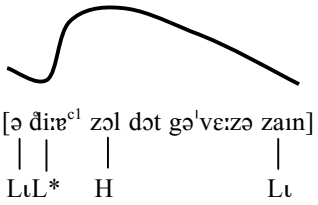
For Class 2, the tableau looks as follows:

(69) μ' → H >> NOSPREAD

	(μ'μ) H	μ' → H	NOSPREAD
a.	(μ' μ) \/ H*		*!
b. →	(μ' μ) | H*		

One technical aspect of this analysis still needs to be accounted for: as I have argued, spreading in Class-1 cases follows from the ranking μ' → H >> NOSPREAD. These two constraints by themselves, however, make a wrong prediction: given this particular ranking, nothing could stop the high tone from spreading to *all* post-focal strong moras, thereby creating a high plateau towards the end of the phrase. Whereas we *do* find extended high tone spreading in other dialects (see for instance the post-focal high plateau in Roermond, subsection 5.6.4), this is not the case for Arzbach: here, spreading never crosses syllable boundaries, which I express with the constraint NOSPREAD {σ}. Ranking NOSPREAD {σ} >> μ' → H ensures that spreading occurs only within syllables. As a consequence, pitch falls towards the phrase end. A relevant tonal mapping is shown in (70):

(70)

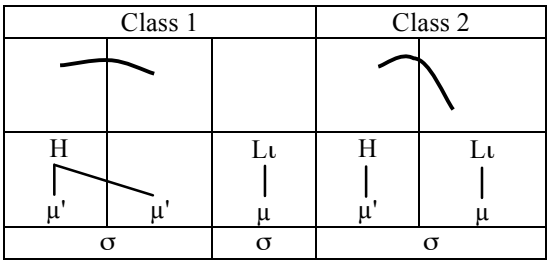


'This has been supposed to be an animal?'

d) Interrogation, final position

The tones are linked as follows:

(71)



As in all other conditions, the tonal phonology of **Class 1** is the same as in non-final position: when there is a post-focal high tone in the relevant syllable, it spreads to the second mora. The corresponding OT implementation has been shown in (68); it is repeated in (72):

(72) μ' → H >> NOSPREAD (repetition of (68))

	(μ'μ') H	μ' → H	NOSPREAD
a. →	(μ' μ') H*		*
b.	(μ' μ') H*	*!	

In **Class 2**, however, there is a difference between the mapping in non-final and final position: in final position, an additional boundary tone is introduced by the grammar, resulting in a falling tone. Therefore, ALIGN-}ι-L must outrank DEP-T. This is shown in (73):

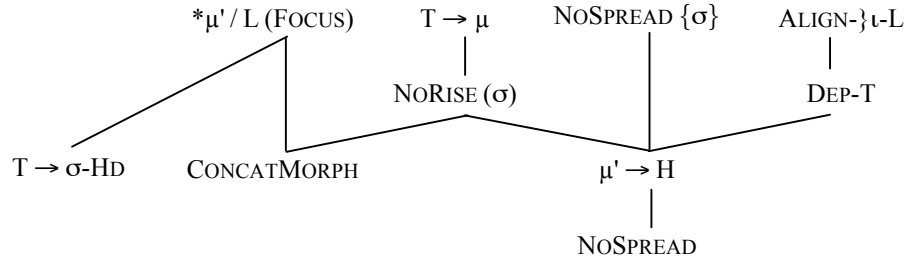
(73) ALIGN-}ι-L >> DEP-T

	(μ'μ) H	ALIGN-}ι-L	DEP-T
a. →	(μ' μ) H L		*
b.	(μ' μ) H	*!	

5.3.5 Final constraint ranking

In total, the Arzbach system is based on the interaction of ten constraints. The final ranking is displayed in (74). The lines in this Hasse diagram indicate dominance relations:

(74)



Within a factorial typology, these constraints predict a variety of potential dialects that cannot be discussed exhaustively. However, most of the possible rankings lead to neutralization or to rather small differences within the tonal mapping. Below, I discuss the most important implications:

a) *μ' / L (FOCUS) >> {CONCATMORPH, T → σ-HD}

If T → σ-HD outranked *μ' / L (FOCUS), this would result in a neutralization of the opposition, at least in interrogation: in that case, L* would link to the first mora of the focus syllable in both accent classes. In the Morbach dialect (Schmidt & Künzel 2006), a possible case of such a partial neutralization is attested. Fournier (2008, 89) discusses a beginning neutralization of the contrast in interrogation for Roermond. Ranking CONCATMORPH >> *μ' / L (FOCUS) could lead to a full neutralization of the opposition: this would result in a default one-to-one mapping of the intonational tones within the same syllable.[60]

b) NOSPREAD {σ} >> μ' → H >> NOSPREAD

Changes to the ranking NOSPREAD {σ} >> μ' → H >> NOSPREAD would lead to relatively small differences. Ranking NOSPREAD high would only affect the tonal mapping in Class 1-declaratives: instead of a spread high tone, we would find H on the first mora and a tonally empty second mora, whereas Class 2 would still consist of the sequence HL. Reranking μ' → H and NOSPREAD {σ} would influence the mapping in interrogatives: as has been pointed out above (subsection 5.3.4), the high tone would spread to all strong, post-focal moras.

c) The role of NORISE (σ). If NORISE (σ) were demoted in the constraint ranking, we would find both L* and H within the focus syllable in non-final Class-1 syllables. That might also be the case for Class 2, where we might end up with L* and H being aligned with the second mora.[61] If NORISE (σ) outranked FAITH-T, the high trailing tone in interrogation would be banned from Class-2 syllables throughout.

d) ALIGN-}ι-L >> DEP-T

Ranking DEP-T above ALIGN-}ι-L would imply that no boundary tones can be introduced by the grammar. That is, there would only be focal tones that could satisfy the corresponding constraints. In declaration, we would still find low trailing tones, whereas in interrogation phrases with a non-final focus syllable, we would not find a boundary tone. With respect to the phonetic implementation, we might then e.g. find a slight fall towards mid pitch, which Gussenhoven (2005) describes as the realization of tonally unspecified prosodic boundaries in Standard Dutch.

[60] However, the outcome might also be affected on the possible influence of constraints against contours. I do not discuss these details.
[61] This however would also violate NOCONTOUR (μ) and NORISE (μ).

5.4 Case study II: the simplest system - the Hasselt dialect

Of the four dialects that I analyze in detail, Hasselt displays the simplest system in the sense that the fewest constraints are needed to express the tonal mapping. There are two reasons for this: first of all, the tonal mapping in focus and non-focus positions follows from a few basic constraints – i.e., unlike in Arzbach, for instance, there are no constraints operating only within the focus syllable. Secondly, the tonal melodies in declaration and interrogation are identical, and the continuation melody differs only slightly. The organization of this section resembles that of the Arzbach analysis. All data are based on the idealized contours provided in Peters (2008, 1009).

5.4.1 Intonational melodies

The intonational melodies for the Hasselt dialect are given in (75):

(75)

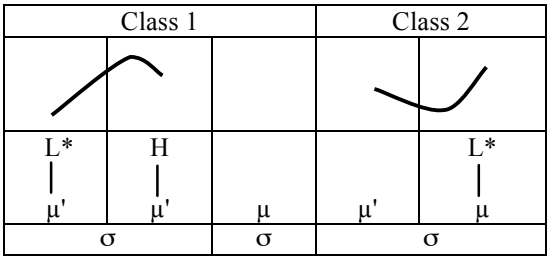
Declaration and Interrogation	L*HL
Continuation	L*H[62]
Boundary tone	Lι

5.4.2 Focus positions I: non-final

a) Declaration, interrogation

The tones are mapped as follows:

(76)



Let me begin with a few words on the phonetic implementation of the tones: it appears to be the case that the tones in Hasselt are aligned 'as early as possible'

[62] Languages where the continuation melody differs from those for other prosodic contexts are widely attested. With respect to Franconian dialects, such differences have been decribed e.g. for Venlo (Gussenhoven & van der Vliet 1999) and Borgloon (Peters 2007).

from a phonetic perspective. When for instance a low tone is aligned with the first mora of a focus syllable and a high tone occurs on the second mora, the resulting rise will start immediately at the left boundary of the syllable. This is different from the other dialects discussed in this thesis, where the phonetic alignment of the tonal targets occurs later within the TBU. In section 7.2, I give a diachronic explanation for this early tonal alignment.[63]

Class 1. Whereas L* and H are realized *within* the focus syllable, the trailing L is realized post-focally. Keeping in mind that for instance CONCATMORPH prefers that all tones be linked to the same syllable, it needs to be explained why the trailing L cannot link to the focus syllable – as in Arzbach, this is due to the work of *μ' / L: whereas L* always has to be realized within the focus syllable (see subsection 5.2.3), the second L is blocked by both strong moras. Therefore, *μ' / L must outrank CONCATMORPH. Consider the tableau in (77):

(77) *μ' / L >> CONCATMORPH

	(μ'μ') L*HL	*μ' / L	CONCATMORPH
a. →	(μ' μ') | | L*H	*	(n)*
b.	(μ' μ') | \ L*H L	**!	

Class 2. The role of *μ' / L becomes more obvious in Class-2 cases: we only find a late-aligned L* in the focus syllable, whereas the high as well as the low trailing tone are realized post-focally. The alignment of L* with the weak second mora is due to the influence of the undominated *μ' / L. A possible association of the trailing H with the second mora is blocked by NOCONTOUR (μ), forbidding the occurrence of two tones on a mora. As has already been demonstrated for Class 1, this comes at the cost of violating CONCATMORPH. The OT implementation is given in (78):

[63] Note that due to this early alignment, Peters (2008) regards the initial L as a pre-focal tone, claiming a high starred tone instead.

(78) {*μ' / L, NoContour (μ)} >> ConcatMorph

	(μ'μ) L*HL	*μ' / L	NoContour (μ)	ConcatMorph
a. →	(μ' μ) | L*			(n)**
b.	(μ' μ) ⟍ L*H		*!	(n)*
c.	(μ' μ) | | L*H	*!		(n)*

b) Continuation

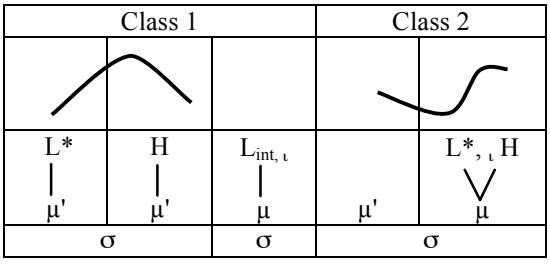
In non-final focus positions, the tonal mapping in the focus syllable is the same as in declaration and interrogation. The only difference is that – since there is no low trailing tone – ConcatMorph has to be violated less often in Class-2 cases and not at all in Class-1 cases.

5.4.3 Focus positions II: final

a) Declaration, interrogation

Consider the tonal mapping in (79):

(79)



Class 1. Due to its obligatory disyllabicity, Class 1 has the same tonal mapping as in non-final positions. However, in the present condition, the post-focal low tone occurs immediately after the focus syllable – in the subsequent empty-headed syllable. Since the temporal distance between the high target and the low target is rather small, we find a rather steep final fall – this fall is due the interpolation from

H to the low boundary tone in the empty-headed syllable. An OT implementation for the tonal mapping within the focus syllable has been given in (77).[64] It is repeated in (80):

(80) *μ' / L >> CONCATMORPH (repetition of (77))

	(μ'μ') L*HL	*μ' / L	CONCATMORPH
a. →	(μ' μ') | | L*H	*	(n)*
b.	(μ' μ') | \ L*H L	**!	

Class 2. In Class-2 syllables, we find that – in contrast to non-final positions – the high tone is realized within the focus syllable. The low trailing tone, however, cannot dock onto the second mora and remains phonetically unexpressed. This is due to the impossibility of associating three tones to one TBU: due to the influence of high-ranked *μ' / L, L* has to be realized on the second mora, which does not leave space for both the high and the low trailing tone. Since I treat the avoidance of 3-to-1-associations as a universal, I do not introduce a formal constraint banning this structure – this would imply a violability of the principle.

However, at least one of both trailing tones can be realized: the high trailing tone is linked to the second mora of the focus syllable. Therefore, we can conclude that – despite the fact that one tone has to be deleted – T → μ must be higher-ranked than NOCONTOUR (μ). Furthermore, as the association of L* with the second mora shows, *μ' / L outranks both T → μ and NOCONTOUR (μ).

[64] The post-focal low (boundary) tone in the empty post-focal syllable is reflected more strongly in the phonetic implementation than in Arzbach, where we only sometimes find such a steep fall (see section 3.4.1 for examples). On the one hand, this might be a consequence of the generalized early tonal alignment that we find in Hasselt – there is more space available to interpolate, and thus we expect to find stronger interpolation effects. On the other hand, differences in the phonetic interpolation of phonological information between different dialects are to be expected anyway. Concerning this matter, consider for instance the differences between Mayen and Roermond, which are discussed in subsection 5.2.5.

An OT tableau is provided in (81):

(81) *μ' / L >> T → μ >> NoContour (μ)

	(μ'μ) L*HL	*μ' / L	T → μ	NoContour (μ)
a. →	(μ' μ) ⋀ L*H		*	*
b.	(μ' μ) | L*		**!	
c.	(μ' μ) | ⋀ L*HL	*!		*
d.	(μ' μ) | | L*H	*!	*	

Deletion of the low instead of the high trailing tone follows from CONTIGUITY: the constraint militates against the deletion of H since it is the *medial* tone in the L*HL-morpheme. Deletion of L, however, does not violate the constraint since it marks the right edge of the morpheme.[65] This leads to a contour on a mora – CONTIGUITY thus outranks NOCONTOUR (μ). The relevant tableau is given in (82):

(82) CONTIGUITY >> NOCONTOUR (μ)

	(μ'μ) L*HL	CONTIGUITY	NOCONTOUR (μ)
a. →	(μ' μ) ⋀ L*H		*
b.	(μ' μ) ⋀ L*L	*!	

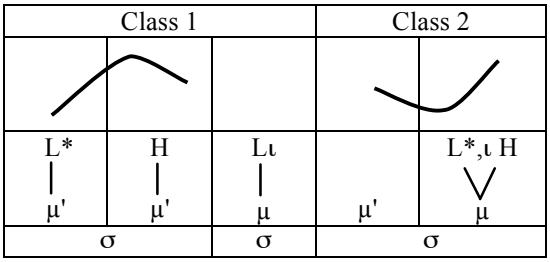
Note furthermore that ALIGN-}$_{\iota}$-L is satisfied by L*, as in Arzbach (see subsection 5.3.3), Cologne (see subsection 5.5.3) and Roermond (see subsection 5.6.3). Since the constraint does not conflict with any other constraint, I do not provide a tableau.

[65] Additionally, deletion of H would create L*L and thus incur a violation of the OBLIGATORY CONTOUR PRINCIPLE (OCP) forbidding adjacent identical tones (see for instance Myers 1994).

b) Continuation

The tonal mapping is displayed in (83):

(83)

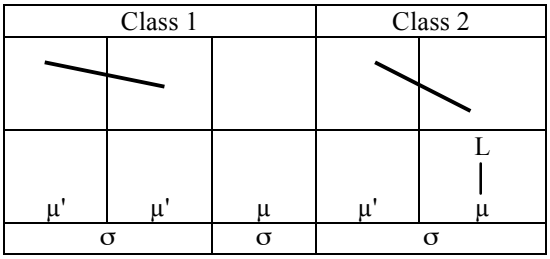


In Class 1, we can observe phonetic lowering of pitch at the end of the pitch contour but less strongly than in declaratives and interrogatives. Peters (2008) regards this as a different phonetic implementation of the low boundary tone: he relates to an observation from Nespor and Vogel (1986) who state that low boundary tones can be realized with relatively higher pitch when they do not coincide with the boundary of an utterance phrase; I adopt this viewpoint. However, there still is a minor difference between continuation and declaration / interrogation: in continuation, the focal melody is L*H instead of L*HL, and hence T → μ does not have to be violated in Class-2 cases (no tone has to be deleted). Since, however, this difference does not affect the surface structure, I do not include a separate tableau. Consider (80) for the corresponding Class-1 tableau and (81) and (82) for the corresponding Class-2 tableaux (minus one T → μ-violation per candidate).

5.4.4 Post-focus positions

a) Declaration, interrogation, non-final position

(84)



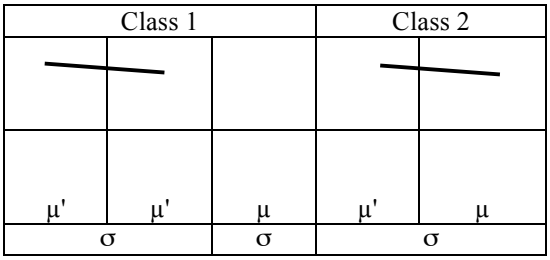
As has been the case for Arzbach, trailing tones in post-focal positions prefer to be linked to a syllable with word stress that is as close as possible to the syllable with the preceding tone (due to the influence of CONCATMORPH). However, there is one important difference between the two dialects: recall that in Arzbach, *μ' / L is active only within the focus syllable (see subsection 5.3.4). This is different in Hasselt: here, *μ' / L is *always* active, i.e., low tones are blocked from post-focal Class-1 syllables as well.

As a consequence, post-focal low tones can only dock onto the second mora of Class-2 syllables. When there is no post-focal, non-final Class-2 syllable available, the low tone will dock onto the final syllable of the phrase and function as a boundary tone (see below for discussion).

b) Continuation, non-final position

The tonal mapping under this pragmatic condition is shown in (85):

(85)

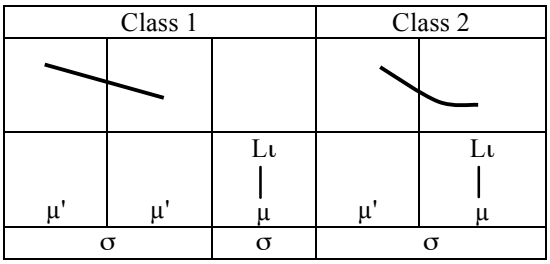


In contrast to declaration and interrogation, there is no low post-focal tone in continuation. Since only post-focal L can lead to an accent contrast (H links to both accent classes in the same way), there is no accent contrast in continuation.

c) Declaration, interrogation, final position

The tones are linked as follows:

(86)



This context provides evidence for the different mapping of boundary tones to Class 1- and to Class-2 syllables.

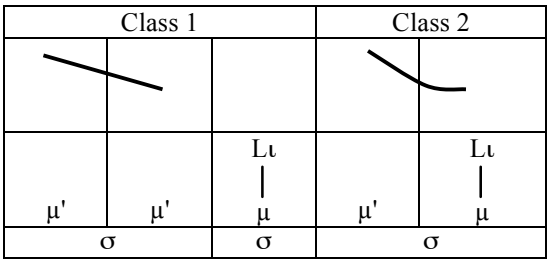
Class 1. In Class-1 cases, the boundary tone is assigned to the (empty-headed) second syllable. Therefore, there is no low tone in the Class-1 syllable, and thus, no low target has yet been reached. This is reflected in the phonetics: we find a continuous fall towards the end of the syllable. This indicates that the actual target does not lie within the audible initial syllable but in the empty-headed syllable following it.

Class 2. In Class-2 syllables, the boundary tone is aligned with the second mora of the stressed syllable (due to *μ' / L). Phonetically, we find a slight fall towards the low tone. From the low target onwards, we find a low plateau until the end of the intonational phrase. Since the influence of *μ' / L on the tonal mapping has been demonstrated repeatedly (see above), I do not include an OT tableau.

d) Continuation, final position

Consider the tonal mapping in (87):

(87)

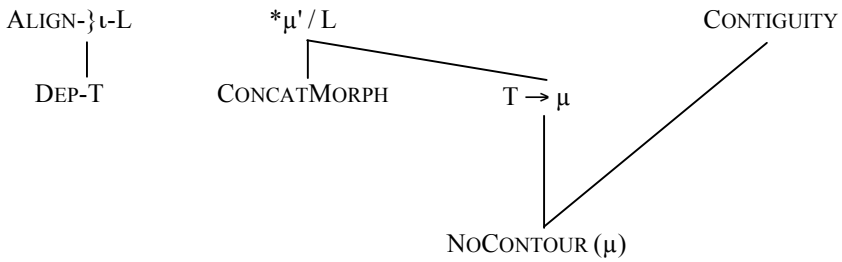


As in final focus positions, pitch falls to mid level rather than to low level (see subsection 5.4.3). Following Peters (2008), I assume that this is a matter of phonetic implementation; the tonal mapping itself is the same as in declaration and interrogation – with one exception: Since the continuation melody is L*H instead of L*HL in declaration and interrogation, the boundary tone has to be introduced by the grammar. This shows that ALIGN-}ι-L must outrank DEP-T.

5.4.5 Final constraint ranking

The Hasselt ranking is given in (88):

(88)



In its basics, the Hasselt grammar closely resembles that of the Arzbach dialect. The only significant difference is that *μ' / L is always active in Hasselt, whereas in Arzbach, its effects are restricted to the focus syllable. Crucial differences between the two dialects can be found only at the representational level (different tonal

melodies). In chapter 7, I provide an account that regards these representational differences as a consequence of a diachronic development.

5.5 Case study III: perfect symmetry – the Cologne dialect

Perfect symmetry between different tonal melodies – this is what we find in the Cologne dialect. That is, the pitch contours of the two accents resemble each other in declaration and interrogation: Class 1 always falls early in declaration and rises early in interrogation. The same symmetry holds for Class-2 syllables – here, however, the tonal movements are always delayed: we find late falls in declaration and late rises in interrogation. All data are taken from Peters (2006a).

5.5.1 Intonational melodies

The tonal melodies and boundary tones in Cologne are displayed in (89):

(89)

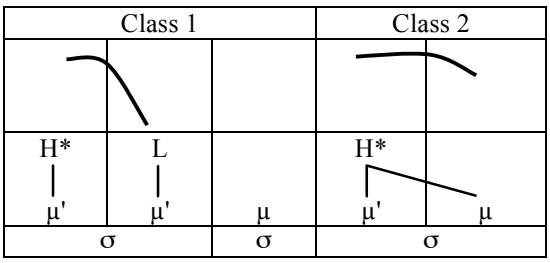
Declaration	H*L
Interrogation	L*H
Boundary tone	Lι

5.5.2 Focus positions I: non-final

a) Declaration

The tonal mapping is displayed in (90):

(90)



Phonetically, Class 1 is characterized by an early fall, whereas in Class 2, pitch falls late towards a post-focal low target. The basics of the mapping in this position have already been provided in subsection 4.2.2, when I discussed the basic tonal mapping within Rule A. Therefore, at this point, I mainly focus on the technical details that are relevant for the OT implementation.

Class 1. Phonologically, Class 1 carries both intonational tones of the declaration morpheme H*L. As has been shown in subsection 4.2.2, this mapping follows from T → μ', which forces tones to be linked to a strong mora. The preference of the trailing tone for the second mora of the focus syllable over a post-focal strong mora can be attributed to the influence of CONCATMORPH:

(91) T → μ', CONCATMORPH

	(μ'μ') H*L	T → μ'	CONCATMORPH
a. →	(μ' μ') | | H* L		
b.	(μ' μ') \ / H*		(n)*!

Class 2. In Class 2, only H* can be realized: due to high-ranked T → μ', the second mora is not an appropriate target for the trailing L, and the tone has to be associated with a post-focal mora. Since accordingly, CONCATMORPH has to be violated, this mapping provides evidence for ranking T → μ' >> CONCATMORPH. Consider the tableau in (92):

(92) T → μ' >> CONCATMORPH

	(μ'μ) H*L	T → μ'	CONCATMORPH
a. →	(μ' μ) \ / H*		(n)*
b.	(μ' μ) | | H* L	*!	

Furthermore, we have to capture the fact that associating both tones with the first mora of the focus syllable is not the preferred solution, although this would satisfy T → μ' as well as CONCATMORPH. This follows from high-ranked NOCONTOUR (μ), militating against H and L on the same mora. That is, NOCONTOUR (μ) must outrank CONCATMORPH. Furthermore, since we *never* find a contour on the first mora in Class-2 cases – even when there is no strong post-focal mora available– NOCONTOUR must be higher-ranked than T → μ' as well. The corresponding tableau is given in (93):

(93) NoContour (μ) >> T → μ' >> ConcatMorph

	(μ'μ) H*L	NoContour (μ)	T → μ'	ConcatMorph
a. →	(μ' μ) \/ H*			(n)*
b.	(μ' μ) \ \ H* L		*!	
c.	(μ' μ) \ H*L	*!		

In a last step, we have to understand why both moras have tonal content: the high tone spreads to the second mora of the focus syllable. The occurrence of spreading shows that each mora prefers to be tonal, which is expressed in the constraint μ → T. Apparently, the urge to link both moras to a tone overrides the cost of spreading. Therefore, NoSpread must be lower-ranked than μ → T. Furthermore, the data indicate that spreading never crosses syllable boundaries. Thus, NoSpread {σ} must outrank μ → T.

This interaction is formalized in the tableau in (94):

(94) NoSpread {σ} >> μ → T >> NoSpread

	(μ'μ) (μ) H*L	NoSpread {σ}	μ → T	NoSpread
a. →	(μ' μ) (μ) \/ H*		*	*
b.	(μ' μ) (μ) \ H*		**!	
c.	(μ' μ) (μ) \/ H*	*!		**

b) Interrogation

The tonal mapping is shown in (95):

(95)

Class 1			Class 2	
				
L*	H		L*	
μ'	μ'	μ	μ'	μ
σ		σ	σ	

Apart from the different quality of the input (L*H instead of H*L), the tonal mapping in interrogation as well as its theoretical treatment is the same as in declaration, which has been discussed above. Therefore, I only give the relevant tableaux but do not discuss the mappings again.

Class 1.

(96) T → μ', CONCATMORPH

	(μ'μ') L*H	T → μ'	CONCATMORPH
a. →	(μ' μ') | | L* H		
b.	(μ' μ') \ L*		(n)*!

Class 2.

(97) T → μ' >> CONCATMORPH

	(μ'μ) L*H	T → μ'	CONCATMORPH
a. →	(μ' μ) | L*		(n)*
b.	(μ' μ) | | L* H	*!	

(98) NOCONTOUR (μ) >> T → μ' >> CONCATMORPH

	(μ'μ) L*H	NOCONTOUR (μ)	T → μ'	CONCATMORPH
a. →	(μ' μ) | L*			(n)*
b.	(μ' μ) | | L* H		*!	
c.	(μ' μ) | L*H	*!		

(99) NoSpread {σ}>> μ → T >> NOSPREAD

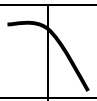
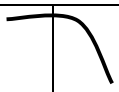
	(μ'μ) (μ) L*H	NOSPREAD {σ}	μ → T	NOSPREAD
a. →	(μ' μ) (μ) | L*		*	*
b.	(μ' μ) (μ) | L*		**!	
c.	(μ' μ) (μ) | L*	*!		**

5.5.3 Focus positions II: final

a) Declaration

The tonal mapping is shown in (100):

(100)

Class 1			Class 2	
				
H*	L	$L_{ι}$	H*	$L_{int, ι}$
|	|	|	|	|
μ'	μ'	μ	μ'	μ
σ		σ	σ	

Class 1. The pitch contours as well as the tonal mapping in Class-1 syllables are similar to those in non-final position – once more this is due to the disyllabicity of Class 1. In (101), I repeat the corresponding tableau from (91):

(101) T → μ', CONCATMORPH (repetition of (91))

	(μ'μ') H*L	T → μ'	CONCATMORPH
a. →	(μ' μ') | | H* L		
b.	(μ' μ') \ / H*		(n)*!

Class 2. In Class 2, we find a late, strong fall. This fall occurs later than the fall in corresponding Class-1 syllables since the Class-2 syllable is phrase-final: that is, the low trailing tone also functions as a boundary tone, satisfying the corresponding alignment constraint ALIGN-$\}_{ι}$-L. The interpolation between H and L occurs phonetically delayed: the delayed fall reflects that the low trailing tone also signals the phrase boundary. The association of L with the second mora follows from NOCONTOUR (μ) >> T → μ'; this ranking has already been motivated in (93). Furthermore, ALIGN-$\}_{ι}$-L >> T → μ' ensures that the low tone can be associated:

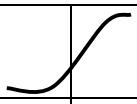
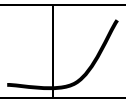
(102) {NoContour (μ), Align-}$_{\iota}$-L} >> T → μ'

	(μ'μ) HL	NoContour (μ)	Align-}$_{\iota}$-L	T → μ'
a. →	(μ' μ) H* L			*
b.	(μ' μ) H* L	*!		
c.	(μ' μ) H*		*!	

b) Interrogation

The tonal mapping is shown in (103):

(103)

Class 1			Class 2	
				
L*	H	Lι	L*,ι	H
μ'	μ'	μ	μ'	μ
σ		σ	σ	

Here, we find an early rise in Class 1 versus a late rise in Class 2. To understand the mapping in this environment, we have to reconsider the fact that Cologne has a low boundary tone. In **Class 1** (where, as has been pointed out repeatedly, the focus syllable is always non-final), this is of no relevance for the mapping within the focus syllable; the boundary tone links to the empty second syllable. The examples provided in Peters (2006, 112) suggest that the presence of the low boundary tone is reflected in a late pitch leveling in Class 1; in Class 2, this leveling is absent (consider subsection 5.2.5 for further discussion of the effects that empty-headed syllables can have on the surface structure). In **Class 2**, we find further evidence for the observation that boundary tones (tones that function as prosodic boundaries) do not necessarily have to be the *last* tone to occur within the intonational phrase. Instead, the corresponding alignment constraint is satisfied if there is a tone of the desired quality *within the final syllable* – a similar phonological mapping has been described for the Arzbach dialect (see subsection 5.3.3) and the Hasselt dialect (see

subsection 5.4.3). As in declaration, this is phonetically realized as a delayed tonal movement, which leads to the difference between Class 1 and Class 2. The high trailing tone is linked to the second mora (and not to the first one) due to NoContour (μ) >> T → μ'. Consider the tableau in (104):

(104) NoContour (μ) >> T → μ'

	(μ'μ) L*H	NoContour (μ)	T → μ'
a. →	(μ' μ) L* H		*
b.	(μ' μ) L*H	*!	

5.5.4 Post-focus positions

In post-focal positions, we can find so-called *echo accents* (Gussenhoven & Peters 2004, Peters 2006a), a kind of miniature pitch accent. Tonally, these echo accents resemble those in the focus syllable, except that the tonal movements are pronounced less strongly. That is, in post-focal declaratives, a Class-1 word is pronounced with slightly falling pitch, a Class-2 word with level pitch. According to Gussenhoven & Peters (2004), they are mainly distinguished by means of duration, Class 2 being longer than Class 1 (which reflects the relatively longer duration of Class-2 syllables in focus positions). Echo accents are not a uniquely Franconian phenomenon – Gussenhoven & Peters (2004) discuss the occurrence of echo accents in other intonational languages. It is unclear how to implement the phenomenon formally in an analysis that is based on only two phonological tones (H and L): the Hs of the echo accents are often not 'really' high, and their Ls are not 'really' low.

However, it might well be the case that echo accents do not constitute systematic contrasts. Instead, they might be instances of secondary phrasal stress. That is, if the prominence of a syllable in question could be sufficiently reduced, the corresponding echo accents might disappear. Since, however, the tone accent minimal pairs used for recordings are usually words with lexical content, it is to be expected that speakers can assign them some kind of secondary stress. Moreover, speakers might be aware of the relevant word being the target word; this will further increase the probability of assigning it secondary stress. I have observed these problems during my own recordings (see section 2.4).

Yet, what the existence of these contrasts *means* from a theoretical perspective still needs further investigation. For instance Braun (2005), who observes thematic contrasts in Standard German (which show echo-accent characteristics, though

without being lexically contrastive), concludes that the tones H and L are not sufficient to represent tonal contours. Therefore, she suggests that more tonal levels have to be introduced.

Certainly, positing a need for more representational options is a possible answer to the problem. However, this would also come at a cost: it implies that we would increase the number of possibly contrastive tonal melodies tremendously (e.g., if we had four tones, we would expect to find the contrastive contours 41, 42, 43, 34, 24, 14, 31, 32, 13, 23, 21, and 12). Whereas we might find such contrasts in 'real' tone languages with several level tones (see Yip 2002 for an overview), I am not aware of any corresponding examples within intonational languages.

Furthermore, when allowing for more representational options, one would have to explain why, apparently, the fully pronounced Hs and Ls mostly occur in focus syllables whereas the reduced Hs and Ls usually occur outside of focus. This observation brings me to the conclusion that the differences between focus tones and echo accents probably must be looked for in the interaction between tones and prosodic structure: still assuming only high and low tones, this interaction might explain the relation between the strength of the tonal movements and the corresponding prosodic position.

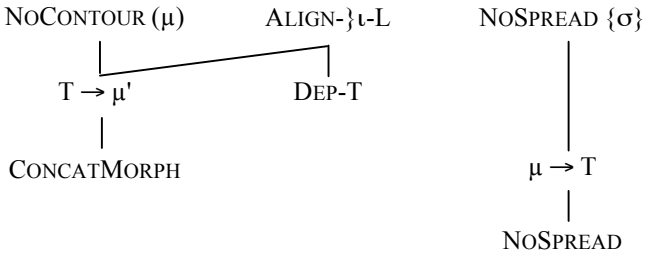
Under this view, focus could be regarded as a 'powerhouse', and therefore, tones under focus are realized in a stronger way than in syllables with secondary stress (which then would be due to additional pitch accents). Here, the capacity of the relevant 'powerhouse' is diminished. However, this approach also has problematic aspects and leaves open questions: for instance, we certainly do find tones that are 'fully pronounced', even when they occur post-focally (see for instance the delayed trailing H in Arzbach interrogatives, subsection 5.3.2). To sum up, at this point, I do not see a conclusive answer to these questions and leave it to future work.[66]

[66] Note that due to the "blurring effect" of the echo accents in combination with the (necessarily) limited number of example sentences in Peters (2006a), it is difficult to determine a clear target of trailing tones from tonal morphemes when they occur in post-focal position; therefore, I do not formalize the post-focal mapping. Still, it seems to me that these tones are linked to the first mora of a post-focal stressed syllable.

5.5.5 Final constraint ranking

The overall constraint ranking for Cologne is shown in (105):

(105)



Cologne and Arzbach have identical intonational melodies; however, they differ with respect to constraint ranking: as has been discussed in section 3.3, the determining factor for the different tonal mapping in Rule A (Cologne) and Rule B (Arzbach) is the ranking of T → μ' and *μ' / L: whereas T → μ' is high-ranked in the Cologne grammar and inactive within the Arzbach grammar, the opposite holds for *μ' / L.

Interestingly, apart from this crucial difference, the Arzbach and the Cologne grammar show strong similarities: for instance, the Cologne ranking NoSpread {σ} >>
μ → T >> NoSpread strongly resembles the Arzbach ranking NoSpread {σ} >> μ' → H >> NoSpread, the typological predictions thus being similar as well (see above, subsection 5.3.5). Furthermore, ranking the crucial constraint for the tonal mapping (here: T → μ', in Arzbach: *μ' / L) above ConcatMorph protects both systems from neutralization.

5.6 Case study IV: complex boundaries – the Roermond dialect

Within my analysis, the Roermond dialect differs from the other dialects discussed in this thesis in some details of the tonal mapping. The most peculiar aspect of the Roermond system is to be found in the tonal mapping at phrasal boundaries: whereas Arzbach, Hasselt, and Cologne only have a low IP-final boundary tone, Roermond has an additional utterance-final H next to the IP-final L. Crucially, however, only the low IP-final boundary tone is always realized whereas the occurrence of the UP-final H is restricted to phrase-final Class-2 syllables (where it surfaces as $L_\iota H_\upsilon$); see subsection 5.6.4 for further discussion. The idealized contours for Roermond are adapted from Gussenhoven (2000).

5.6.1 Intonational melodies

(106) shows the relevant intonational tones for Roermond:

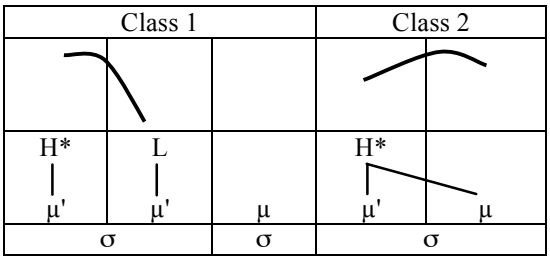
(106)

Declaration	H*L
Interrogation	L*H
Boundary tones	$L_\iota H_\upsilon$

5.6.2 Focus positions I: non-final

a) Declaration

(107)



The basic principle of the Roermond tonal mapping is the same as that of Cologne (see subsection 5.5.2) – each tone wants to occur in a prosodically strong environment, i.e., it wants to be linked to a strong mora (T → μ'). Therefore, both intonational tones can be realized in Class-1 syllables, but only the H* in Class-2

syllables. The OT implementation for the mapping within the focus syllable is (almost) identical to that for the Cologne dialect (see subsection 5.5.2).

Class 1. The mapping as well as the implementation are similar to the Cologne dialect. The relevant tableau is repeated in (108):

(108) T → μ', CONCATMORPH (repetition of (91))

	(μ'μ') H*L	T → μ'	CONCATMORPH
a. →	(μ' μ') | | H* L		
b.	(μ' μ') \/ H*		(n)*!

Class 2. Of the three tableaux provided below, only (111) differs from the corresponding one for Cologne in (94): the constraint NOSPREAD {σ} has been removed. This follows from the post-focal tonal mapping: we can observe that in Roermond, (at least) high tone *can* spread across syllable boundaries, though not across the boundary of the focus phrase. For further discussion, see below, subsection 5.6.4.

(109) T → μ' >> CONCATMORPH (repetition of (92))

	(μ'μ) HL	T → μ'	CONCATMORPH
a. →	(μ' μ) \/ H*		(n)*
b.	(μ' μ) | | H* L	*!	

(110) NoContour (μ) >> T → μ' >> ConcatMorph (repetition of (93))

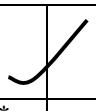
	(μ'μ) HL	NoContour (μ)	T → μ'	ConcatMorph
a. →	(μ' μ) H*			(n)*
b.	(μ' μ) H* L		*!	
c.	(μ' μ) H*L	*!		

(111) μ → T >> NoSpread

	(μ'μ) HL	μ → T	NoSpread
a. →	(μ' μ) H*		*
b.	(μ' μ) H*	*!	

b) Interrogation

(112)

Class 1			Class 2	
				
L* μ'	μ'	μ	L* μ'	μ
σ		σ	σ	

In interrogation, the tonal mapping basically follows the same principles as in declaration; at first sight, it resembles the mapping in the Cologne dialect. However, when taking into account the details, this is only true for **Class 2**: here, we find low pitch within the focus syllable, which I interpret as a spread L*. The theoretical

treatment of this tonal behavior is comparable to the one in declaration and similar to the one in Cologne (see subsection 5.5.2); the relevant tableaus are given below:

(113) T → μ' >> CONCATMORPH (repetition of (97))

	(μ'μ) L*H	T → μ'	CONCATMORPH
a. →	(μ' μ) |/ L*		(n)*
b.	(μ' μ) | | L* H	*!	

(114) NOCONTOUR (μ) >> T → μ' >> CONCATMORPH (repetition of (98))

	(μ'μ) L*H	NOCONTOUR (μ)	T → μ'	CONCATMORPH
a. →	(μ' μ) |/ L*			(n)*
b.	(μ' μ) | | L* H		*!	
c.	(μ' μ) |\ L*H	*!		

(115) μ → T >> NOSPREAD

	(μ'μ) L*H	μ → T	NOSPREAD
a. →	(μ' μ) |/ L*		*
b.	(μ' μ) | L*	*!	

In **Class 1**, on the other hand, we find a difference between Cologne and Roermond: the data indicate that whereas in Cologne, both L* and H are realized within the focus syllable, H *cannot* dock onto the second mora of the focus syllable in Roermond. Instead, the high pitch target of the rising contour can be found on the

first post-focal mora (from which we find a high plateau towards the end of the phrase; see subsection 5.6.4 for further discussion). The rising movement within the focus syllable is due to interpolation to this post-focal high target. Like Gussenhoven (2000), I use NoRise (σ) in order to account for this behavior. NoRise (σ) has been introduced for the Arzbach analysis, where we find a similar tonal mapping (see subsection 5.3.2). In Roermond, avoiding rises in this context is more important than satisfying ConcatMorph – this would lead to a realization of both tones in the same syllable. This is demonstrated in (117):

(116) NoRise (σ) >> ConcatMorph

	(μ'μ') LH	NoRise (σ)	ConcatMorph
a. →	(μ' μ') | L*		*
b.	(μ' μ') | | L* H	*!	

In a second step, we have to capture the fact that L* is only linked to the first mora and does not spread to the second one, as is the case for Class 2.[67] This is due to the influence of *μ' / L. One violation of the constraint is inevitable: T → μ' is high-ranked, and L* has to be aligned with the focus syllable anyway. However, L-spreading to the second mora would incur an additional violation of *μ' / L – both moras are strong in Class 1. Since we end up with a singly linked tone, *μ' / L has to dominate μ → T.[68] This is formalized in (117):

(117) *μ' / L >> μ → T

	(μ'μ') LH	*μ' / L	μ → T
a. →	(μ' μ') | L*	*	*
b.	(μ' μ') \/ L*	**!	

[67] The low tone prefers to be linked to the first and not to the second mora in Class-1 cases because of T → σ-Hd . Since this constitutes a default mapping and since a similar issue has been treated in the Arzbach-analysis (see subsection 5.3.2), I do not discuss this any further.

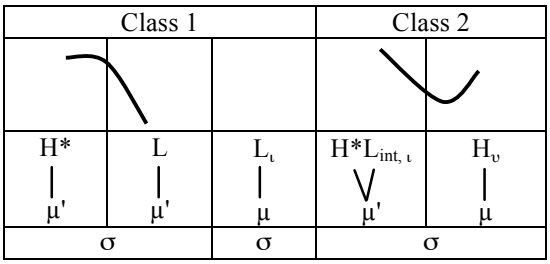
[68] Thus, despite the crucial ranking T → μ' >> *μ' / L (reranking these constraints leads to a Rule B-system, as has been shown in section 3.3), *μ' / L is still active in the Roermond grammar.

5.6.3 Focus positions II: final

a) Declaration

Consider (118) for the tonal mapping in this condition:

(118)



We find two boundary tones in Roermond: a low tone marking the end of intonational phrases (ALIGN-$\}_\iota$-L), and an utterance-final H (ALIGN-$\}_\upsilon$-H). The high utterance-final boundary tone always occurs to the right of the IP-final L. If there is not enough space available to the right of L_ι – i.e., if L_ι and H_υ would have to be linked to the same mora – the UP remains tonally unexpressed (due to a constraint against rises on a mora; see subsection 5.6.4 for discussion): that is, H_υ is only realized in bimoraic, phrase-final syllables. Since Class-1 syllables are always non-final, it thus occurs only in Class-2 syllables.

Furthermore, I assume that the high UP-final boundary tone can never occur to the left of the IP-final boundary tone; the reason for this is to be found within the linear order of the relevant constituents. Since an IP is a constituent of the UP, the right edge of the IP has to be expressed *before* expressing the right edge of the UP. In other words, it is ungrammatical to first have a UP-final boundary tone and then an IP-final boundary tone. We might describe this as a prohibition of 'prosodic metathesis'.

Class 1. Since there is always a second syllable (with or without segmental content), the low IP-final boundary tone is associated with that syllable. The tonal mapping in the focus syllable is thus similar to the one in non-final position; since there are two strong moras available, H* goes to the first mora and L to the second one.

Class 2. The first mora is occupied by the H*L declaration melody. Here, the low tone also represents the right boundary of the IP. On the second mora, we find an epenthetic H_υ. In the phonetic implementation, the boundary tones are phonetically delayed (just as we find it in Cologne, see subsection 5.5.3), which leads to a late rise within the syllable.

With respect to the OT implementation, we have to capture the fact that both boundary tones are realized. In order to account for this outcome, ALIGN-}$_{\iota}$-L and ALIGN-}$_{\upsilon}$-H have to be higher-ranked than NORISE (σ) as well as NOCONTOUR (μ) – otherwise, one of the boundary tones would not be tolerated. This is shown in (119):

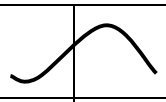
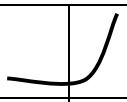
(119) {ALIGN-}$_{\iota}$-L, ALIGN-}$_{\upsilon}$-H} >> {NORISE (σ), NOCONTOUR (μ)}

	(μ' μ) H*L	ALIGN-}$_{\iota}$-L	ALIGN-}$_{\upsilon}$-H	NORISE (σ)	NOCONTOUR (μ)
a. →	(μ' μ) ⟍ | H*L$_{\iota}$ H$_{\upsilon}$			*	*
b.	(μ' μ) | | H* L$_{\iota}$		*!		
c.	(μ' μ) | | H* H$_{\upsilon}$	*!			

b) Interrogation

The tonal mapping under this condition is given in (120):

(120)

Class 1			Class 2	
				
L*	H	Lι	L*, ι	H$_{int}$, υ
|	|	|	|	|
μ'	μ'	μ	μ'	μ
σ		σ	σ	

Class 1. Class-1 syllables are characterized by an early rise and a final fall that is missing in Class 2. Recall that in non-final position, the high trailing tone is realized post-focal, which results in a steady rise that continues after the stressed syllable. In the context at hand, however, H occurs *within* the focus syllable, and furthermore, we find a fall after the H. Thus, this is the *only* context in all dialects discussed here where the Class-1 mapping in focus positions differs between non-final and final syllables (see subsections 5.3.3, 5.4.3, and 5.5.3).

How to explain this exceptional behavior? Since no post-focal strong mora is available, the trailing H links to the second mora of the focus syllable. This follows from high-ranked T → μ', enforcing tones to be associated with strong moras. This mapping then results in a violation of NORISE (σ). Accordingly, NORISE (σ) must be lower-ranked than T → μ'.[69] The syllable-final fall, on the other hand, is due to the interpolation between the high focus tone and the boundary tone in the empty second syllable (see subsection 5.2.5 for further discussion of this issue and a comparison with the related Mayen dialect). An OT implementation of the Roermond facts is given in (121). The low tone in the empty-headed syllable is an inserted IP-final boundary tone, which follows from ALIGN-}$_{\iota}$-L >> DEP-T. Crucially, this alignment constraint must also be higher-ranked than NORISE (σ) since otherwise, the prosodic boundary would remain unexpressed.

(121) ALIGN-}$_{\iota}$-L >> NOCONTOUR (μ) >> T→ μ' >> NORISE (σ)

	(μ'μ') μ LH	ALIGN-}$_{\iota}$-L	NOCONTOUR (μ)	T→ μ'	NORISE (σ)
a. →	(μ' μ') μ L* H L			*	*
b.	(μ' μ') μ L* H L		*!	**	
c.	(μ' μ') μ L* H	*!		*	
d.	(μ' μ') μ L* H L		*!		*

[69] Note that in non-final Class-1 interrogatives, the trailing tone high tone is associated with a post-focal strong mora. Hence, T → μ' can still be satisfied. However, we still would have to wonder what happens if no strong mora is available in post-focal position. Unfortunately, I do not have relevant data in order to discuss the tonal mapping for this particular environment.

Class 2. In phrase-final Class-2 syllables, both boundary tones can be realized: whereas the trailing L of the intonational morpheme functions as the IP-final boundary tone, the trailing H represents the right boundary of the utterance. As we find it in Cologne (see subsection 5.5.3), this additional function of focus tones as boundary tones influences the phonetic realization of the sequence, resulting in a delayed rise. L* and H satisfy the alignment constraints for the prosodic boundaries. Crucially, the trailing H is not deleted, although this association leads to a violation of NORISE (σ). This follows from the ranking {ALIGN-$\}_\iota$-L, ALIGN-$\}_\upsilon$-H} >> NORISE (σ), which has already been motivated in (120).

(122) { ALIGN-$\}_\iota$-L, ALIGN-$\}_\upsilon$-H} >> NORISE (σ)

	(μ'μ) L*H	ALIGN-$\}_\iota$-L	ALIGN-$\}_\upsilon$-H	NORISE (σ)
a.	(μ' μ) | | L* H			*
b.	(μ' μ) | L*		*!	

In a second step, we have to capture the fact that the high trailing tone is associated with the second instead of the first mora. As in the Cologne analysis, this is due to the ranking NOCONTOUR (μ) >> T→ μ' (see (104)).

(123) NOCONTOUR (μ) >> T → μ'

	(μ'μ) L*H	NOCONTOUR (μ)	T → μ'
a.	(μ' μ) | | L* H		*
b.	(μ' μ) \ / L*H	*!	

5.6.4 Post-focus positions

The post-focal tone mapping in Roermond displays two interesting aspects: first of all, there is a contrast in final non-focus positions in declaration as well as in interrogation, whereas we find neutralization in all other non-focal positions. Furthermore, in interrogation, we find a high plateau: the trailing high tone spreads rightwards. I begin with a treatment of the latter process.

a) Post-focal H-spreading in interrogation

Consider the example in (124):

(124)

[zitte dien BEIN^{c1} aan dien veut^{c1}]
L* H Lι
'Are your legs attached to your feet?'

As is indicated in (124), high trailing tones in post-focal position spread rightwards; this also holds for interrogative sentences with a Class-2 item in focus position. Note, however, that there is no H-spreading in non-final Class-2 declaratives (focus position): here, the H* only spreads to the second mora of the focus syllable (see subsection 5.6.2). An example is given in (125):

(125)

[miene ERM^{c2} zit aan miene handj vas]
H* L Lι
'My arm is attached to my hand'

First, let me account for the post-focal spreading displayed in (124): I claim that spreading occurs due to the influence of σ-HD → H that requires syllable heads to be high-toned. Being higher-ranked than NOSPREAD, this constraint leads to the association of the high trailing tone with the heads of post-focal syllables.[70] This interaction is formalized in (126):[71]

[70] The phonetic data give no conclusive evidence for a possible spreading of the low tone in declaration contours. Therefore, I assume that only high tone spreads. Note furthermore, that with respect to the mapping within other contexts, σ-HD → H might merely affect the surface structure within phrase-final focus syllables in interrogation, where a trailing H is located on the second mora of Class 2 (see above, subsection 5.6.3). Since in these cases, H does not associate with the first mora, the mapping indicates that σ-HD → H must be lower-ranked than NOCONTOUR (μ).

[71] Due to reasons of lucidity, I only consider the syllable level in this tableau. Furthermore, I ignore the mapping of the low boundary tone as well as the fact that BEIN^{1} and veut^{1} are followed by empty syllables. A more accurate description of the mapping within the accent syllables themselves is provided below.

(126) σ-Hd → H >> NOSPREAD

		σ-HD → H	NOSPREAD
	σ* σ' σ' σ' BEIN[1] aan dien veut[1] L*H		
a. →	σ* σ' σ' σ' L* H		**
b.	σ* σ' σ' σ' L* H	*!*	

In a second step, we have to turn to the question why we do *not* find spreading of the H* in non-final Class 2-declaratives. I argue that this difference in mapping can only be related to the location of the tones: whereas the trailing high tone in interrogation occurs post-focally, H* is linked to the focus syllable. That is, the data indicate that in the latter case, spreading is blocked by the boundaries of the focus syllable. As a result, only the two moras within the focus syllable receive a high tone, whereas post-focal moras do not. The relevant constraint is NOSPREAD {FOCUS}.

On the other hand, as has been demonstrated above, spreading is *not* blocked when H occurs post-focally: here, the tone can spread farther to the right, since it does not have to cross a boundary of the focus syllable. The influence of NOSPREAD {FOCUS} on non-final focus Class-2 declaratives is shown in tableau (127). In this tableau, I ignore the low trailing tone as well as the low boundary tone at the end of the phrase:

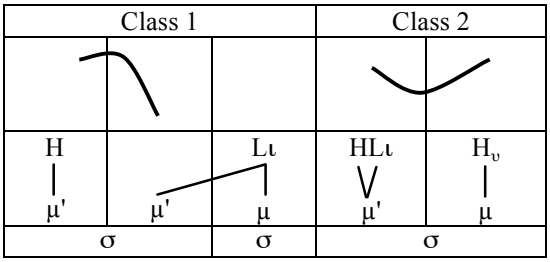
(127) NoSpread {Focus}>> σ-Hd → H >> NoSpread

		NOSPREAD {FOCUS}	σ-HD → H	NOSPREAD
	σ* σ' σ' σ'σ σ' σ' ERM[2] zit aan miene handj vas H*(L)			
a.	σ* σ' σ' σ' σ σ' σ' H*	*!*****		******
b. →	σ* σ' σ' σ' σ σ' σ' H*		******	

b) Interrogation, final position

Consider the tonal mapping under this condition, which is displayed in (128):

(128)



Class 1. In Class 1, we find a falling contour in the focus syllable: the high tone at the beginning of the syllable is the trailing H from the interrogation morpheme. The second mora is occupied by the low boundary tone that is doubly associated: its association with the final syllable satisfies ALIGN-$\}_ι$-L (outranking DEP-T), the association with the preceding stressed mora satisfies T → μ'. From this mapping, we can infer two new ranking arguments: first of all, we can conclude that T → μ' must dominate NOSPREAD. This interaction is formalized in (129) – recall that the L* of the L*H interrogation morpheme is realized in the preceding focus syllable:

(129) ALIGN-$\}_ι$-L >> T → μ' >> NOSPREAD

	(μ'μ') μ H	ALIGN-$\}_ι$-L	T→ μ'	NOSPREAD
a. →	(μ' μ') μ H L			*
b.	(μ' μ') μ H L		*!	
c.	(μ' μ') μ H	*!		

Furthermore, since the last syllable head is not associated with a high tone, T→ μ' must dominate σ-HD → H. Consider the tableau in (130):

(130) T→ μ' >> σ-HD → H

	(μ'μ') μ H	T→ μ'	σ-HD → H
a. →	(μ' μ') μ H L		*
b.	(μ' μ') μ H L	*!	

Class 2. Within phrase-final Class-2 syllables, both the low phrase-final and the high utterance-final boundary tone can be realized. The phonological mapping basically is the same as the one for phrase-final Class-2 declaratives in final focus position (shown in (119)). There are two differences: first of all, the initial high tone is the high trailing tone of the L*H interrogation morpheme (instead of the H* in declaration). Furthermore, both boundary tones have to be introduced by the grammar, whereas in focus, only the final H has to be introduced:

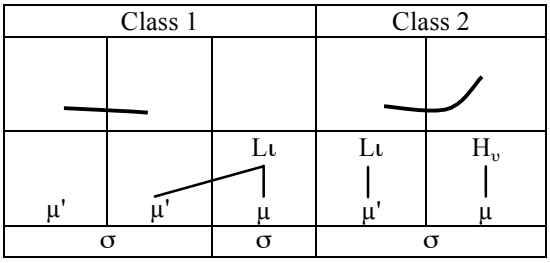
(131) {ALIGN-}$_{\iota}$-L, ALIGN-}$_{\upsilon}$-H} >> {NORISE (σ), NOCONTOUR (μ)}

	(μ' μ) H	ALIGN-}$_{\iota}$-L	ALIGN-}$_{\upsilon}$-H	NORISE (σ)	NOCONTOUR (μ)
a. →	(μ' μ) HL_{ι} H_{υ}			*	*
b.	(μ' μ) H L_{ι}		*!		
c.	(μ' μ) $H_{int, \upsilon}$	*!			

c) Declaration, final position

The tones are linked as follows:

(132)



The mapping is similar to the one in interrogation. The only difference is that we do not find the initial high trailing tone from the interrogation morpheme L*H.

d) Final monomoraic syllables

In monomoraic phrase-final syllables, we only find a low boundary tone; the association of the high UP-final boundary tone is prohibited by a constraint against rises at the mora level, NORISE (μ). The avoidance of rises in final monomoraic syllables implies that NORISE (μ) must be higher-ranked than ALIGN-$\}_υ$-H. This is demonstrated in (133):

(133) NORISE (μ) >> ALIGN-$\}_υ$-H

	(μ)	NORISE (μ)	ALIGN-$\}_υ$-H
a. →	(μ) | L		*
b.	(μ) /\ L H	*!	

Furthermore, since L and not H is realized, ALIGN-}$_{\iota}$-L must be higher-ranked than ALIGN-}$_{\upsilon}$-H. If the ranking were reversed, we would instead find an utterance-final H. Consider the tableau in (134):

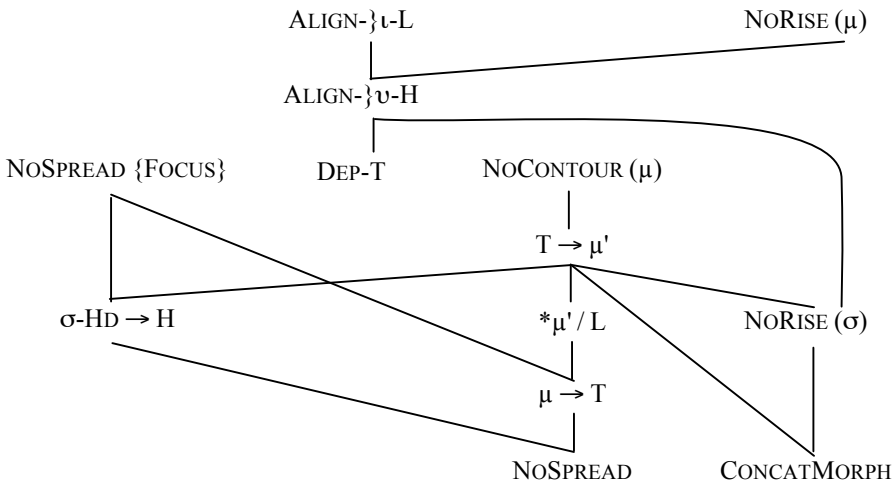
(134) Align-}$_{\iota}$-L >> Align-}$_{\upsilon}$-H

	(μ)	ALIGN-}$_{\iota}$-L	ALIGN-}$_{\upsilon}$-H
a. →	(μ) | L		*
b.	(μ) | H	*!	

5.6.5 Final constraint ranking

The Roermond ranking is shown in (135):

(135)



As becomes evident from the Hasse diagram in (136), the Roermond dialect is the most complex one with respect to constraint interaction. This can mostly be attributed to the fact that – unlike the other dialects discussed here – Roermond has *two* boundary tones instead of one. This not only leads to an additional alignment constraint: the limited occurrence of the phrase-final high boundary tone is the outcome of the interaction of different constraints against contours. Additionally,

there is post-focal H-spreading: with respect to the dialects discussed in this thesis, this is a unique phenomenon as well.

However, in its basics, the Roermond system closely resembles that of the Cologne dialect, the only difference being the avoidance of rises within a syllable in Class-1 cases (see subsections 5.5.3, 5.6.3). Note that the tonal mapping in this context shows that the two crucial constraints for the differences between Rule A and Rule B, T → μ' and *μ' / L, are both active within the Roermond grammar.

With respect to the typological predictions, the Roermond system is equivalent to the Cologne one in its fundamentals. With respect to the phenomena we find only in Roermond, the most crucial change might result from a demotion of ALIGN-$\}_{\upsilon}$-H, which then might lead to such a boundary structure and tonal mapping in final positions as we find in Cologne (only a low boundary tone). In the diachronic section of this thesis (chapter 7), I suggest that the Roermond system is in fact a predecessor of the Cologne system.

Furthermore, ranking NOSPREAD >> σ-HD → H would prohibit spreading of a post-focal high tone to the phrase-final syllable, and NOSPREAD {FOCUS} would become irrelevant. Then again, if σ-HD → H outranked NOSPREAD {FOCUS}, the H* in Class-2 declaratives could also spread across the focus boundary.

This brings the case studies for four dialects to a close. Some additional remarks with respect to typological issues are provided in the conclusion of this chapter (section 5.8). The following section discusses representational questions regarding the opposition.

5.7 The underlying structure of the tone accents

In section 4.2, I have introduced the surface structure of the accents. However, I have not discussed yet how these surface structures relate to underlying representations. This is the topic of the section at hand: I claim that Class 2 is the unmarked accent class, whereas Class 1 is lexically marked. In order to support this viewpoint, I provide evidence from relevant synchronic alternations.

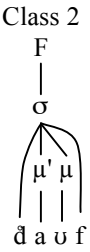
5.7.1 The unmarked foot: Class 2

In Franconian, Class 2 is the unmarked accent class: the lexical representation of Class-2 words is prosodically unmarked, i.e., prosodification (at least with respect to foot structure) is regulated only by the grammar.[72] At the foot level, this always leads to the construction of the default Franconian foot, a moraic trochee. In monosyllabic words, this is perfectly in line with the bimoraic structure of the only syllable. In disyllabic words, the second syllable remains unparsed. In the following, I discuss the footing process for both of these cases.

a) Monosyllabic words

On the basis of the general pattern for Class-2 words that has been introduced in section 5.2, (136) shows the surface structure for the word [ðaʊfˣ²] ‘baptism’ (example taken from the Arzbach dialect). [ðaʊfˣ²] derives from underlying /ðaʊf/ and is the result of the standard footing procedure:

(136) Surface structure for [ðaʊfˣ²] ‘baptism’ (Arzbach dialect)



This default foot construction is regulated by two constraints. The first relevant constraint requires feet to be binary:

[72] Note that I do not discuss the process of morafication since it is not of immediate relevance to the isues discussed here. For fundamental proposals, see for instance Hyman (1985), McCarthy / Prince (1988), Prince (1990). For implementation in OT see Zec (1995), Morén (2000, 2001), Bermúdez-Otero (2001). A recent overview is provided in Zec (2006).

(137) FTBIN: Feet must be binary

This constraint captures one of the basic principles in prosodification; it has been proposed by e.g. Prince (1980), Kager (1989, 1999), Prince & Smolensky (1993), and Hayes (1995). The second constraint at work ensures that the foot type is a trochee, i.e., that the foot is left-headed:

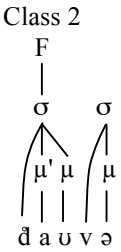
(138) RHTYPE=T: Feet have initial prominence

For instance Kager (1999), Rice (2007) and McCarthy (2008) make use of this constraint. Since RHTYPE=T is never violated in the dialects discussed here, I do not include it in the OT tableaux. Furthermore, since the footing of monosyllabic Class-2 words is self-evident, I do not give an OT tableau for this condition.

b) Disyllabic words

In order to discuss the Class-2 footing in disyllabic forms, let us take [ðaʊ^{c2}və] 'baptism-pl' (Arzbach dialect) as an example. The prosodification of underlying /ðaʊf/ plus the plural marker /ə/ is shown in (139):

(139) Class 2: prosodification of /ðaʊf/ plus /ə/ 'baptism-pl'



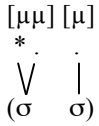
The second syllable in Class-2 cases remains unfooted since this would create a foot of the type (**Heavy** Light), which is a universally dispreferred foot (see e.g. Hayes 1995, Kager 1993, 1995, 1999).

To implement this in my analysis, I build on an approach proposed by Kager 1999 (based on Kager 1993 and 1995): Kager assumes that heavy syllables consist of two microbeats (strong and weak), the alternations being based on sonority factors. These microbeats correspond to moras and are represented with grid marks. Kager shows that at this micro-rhythmic level, there is a universal preference to end a foot in a strong-weak contour. At this level, a standard moraic trochee looks as follows ('*' represents 'strong' and '.' represents 'weak'):

(140) Micro-level strong-weak rhythmic contour of a heavy syllable (Kager 1999, 173)

As can be observed, this moraic trochee ends in a strong-weak alternation. However, in a foot of the type (**Heavy** Light), the mora of the light syllable counts as weak, the corresponding foot ending in 'strong-weak-weak':

(141) Micro level strong-weak-weak rhythmic contour of a heavy syllable followed by a light syllable



According to Kager's approach, there is a universal preference for feet that end in a strong-weak alternation. Therefore, grouping both syllables in (139) into one foot violates that principle. The universal preference for foot-final contours at the micro-rhythmic level is stated in the constraint in (142):

(142) RH-CONTOUR: A foot must end in a strong-weak contour at the moraic level

If the second syllable of the Class-2 foot in (139) were footed, a foot of the type (**Heavy** Light) would be created, and RH-CONTOUR would have to be violated. Satisfying RH-CONTOUR comes at the cost of a constraint that requires every syllable to be parsed by a foot:

(143) PARSE-σ: Syllables are parsed by feet

This constraint is an OT standard, was originally proposed by Prince & Smolensky (1993), and has been used in for instance Beckman (1998), Kager (1999, 2007) and McCarthy (2004). PARSE-σ is based on insights formulated in e.g. Hayes (1980) and Halle and Vergnaud (1987).

The constraint ranking RH-CONTOUR >> PARSE-σ prohibits the second syllable of a disyllabic Class-2 word from being parsed by the same foot as the preceding syllable. Crucially, the second syllable cannot build a foot on its own: this would

create a degenerate foot, which is prohibited by FTBIN and RHCONTOUR.[73] As a consequence, it remains unfooted. These interactions are formalized in the OT tableau in (144); footing is indicated in brackets:

(144) {RH-CONTOUR, FTBIN} >> PARSE-σ

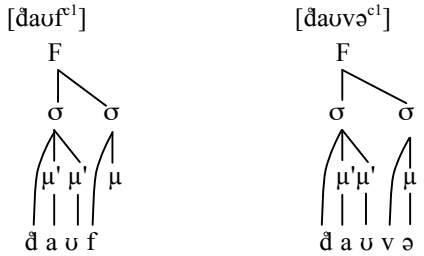
	đ a ʊ f + ə	RH-CONTOUR	FTBIN	PARSE-σ
a. →	(σ) σ \ | μ μ μ | | | đ a ʊ v ə			*
b.	(σ σ) \ | μ μ μ | | | đ a ʊ v ə	*!		
c.	(σ) (σ) \ | μ μ μ | | | đ a ʊ v ə	*!	*	

5.7.2 The marked foot: Class 1

As I have argued in section 4.2, Class-1 words are obligatorily disyllabic with both syllables being incorporated into the foot. The second syllable can be either segmentally empty or filled. Two examples for the words [đaʊf^{c1}] 'pigeon-sg.' and [đaʊ^{c1}və] 'pigeon-pl.' are provided in (145):

[73] Note that monomoraic initial syllables that are followed by a heavy syllable, as for instance prefixes, remain unfooted as well, although the light and the heavy syllable could form a trochaic foot. Feet of this kind are excluded, since footing in Franconian is quantity-sensitive. That is, stressed syllables must be heavy. Formally, this can be captured with the STRESSTOWEIGHT principle (Prince 1990).

(145)



As can be observed, Class-1 feet *always* violate RH-CONTOUR. This makes them different from corresponding Class-2 words, where disyllabic feet are prohibited by the principle.

To account for this mapping, let me start with my representational assumptions: I assume that the foot structure of Class-1 words is stored underlyingly. Generally, the possibility of storing prosodic material underlyingly follows from Richness of the Base (see for instance Prince & Smolensky 1993, Smolensky 1996, Kager 1999) and the assumption of homogeneity of inputs and outputs (see e.g. Moreton 2004).

As we can infer from the footing of disyllabic Class-2 words (see above), underlying Class-1 feet are marked structures: recall that in the unmarked footing process, disyllabic feet are ruled out by RH-CONTOUR. That is, in order to be able to surface, Class-1 feet must be protected by faithfulness. In order to express this formally, I adopt a proposal by McCarthy (1995b, 2000): based on data from Rotuman, McCarthy argues that underlying prosodic heads are protected by faithfulness. I adopt his constraint HEAD-MATCH (FT) to my representation of head domains. The relevant constraint is formulated in (146). For further application of HEAD-MATCH (FT) see e.g. Grijzenhout (2002) and Nelson (2002).

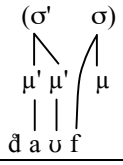
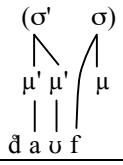
(146) HEAD-DOMAIN-MATCH (FT): An element that belongs to the foot head domain underlyingly must belong to the foot head domain in the output[74]

Being high-ranked, this constraint ensures that the initial syllable of a Class-1 foot remains within the head domain in the output, and the disyllabic foot can be preserved. In the case at hand, this implies that HEAD-DOMAIN-MATCH (FT) must outrank the competing markedness constraint RH-CONTOUR. Consider the tableau in

[74] Note that assuming faithfulness to foot *boundaries* instead of prosodic heads (as we find for instance in Inkelas 1994) would be problematic: it predicts the possible emergence of any underlyingly prespecified foot structure (see McCarthy 1995b). This problem does not exist when only heads are protected. In the case at hand, the non-protection of dependent structures rules out the occurrence of iambic feet in Franconian; if an iambic foot were stored underlyingly, it could not surface: since faithfulness only protects the head (and its domain), RHTYPE=T would militate against the occurence of a right-headed foot. As a consequence, any underlyingly iamb would surface as a trochaic foot.

(147) for the example [đaʊfᶜ¹]; high-ranked HEAD-DOMAIN-MATCH (FT) protects the disyllabic trochee in a. and militates against an unmarked moraic trochee (displayed in b.):

(147) Head-Domain-Match (Ft) >> Rh-Contour

		HEAD-DOMAIN-MATCH (FT)	RH-CONTOUR
			
a. →			*
b.		*!	

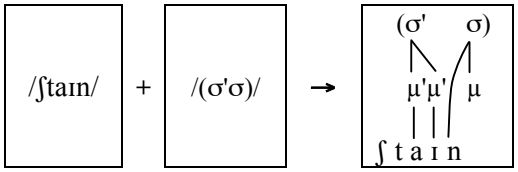
5.7.3 Evidence for marking Class 1: synchronic alternations

Confirmation for the hypothesis that Class 1 is the underlyingly marked accent class can be found in synchronic alternations; these alternations indicate that Class 1 is the morphologically active class: with respect to accent minimal pairs, alternations between morphologically *simplex* Class 2-forms and *complex* Class-1 forms are common within all parts of the area. However, corresponding alternations between morphologically simplex Class-1 forms and segmentally identical complex Class-2 forms are unattested. As Van Oostendorp (2005) argues, this provides evidence in favor of Class 1 being the marked accent.

In order to understand how this observation can be incorporated into my approach, consider the synchronic alternation between [ʃtaɪnᶜ²] 'stone, sg.' and [ʃtaɪnᶜ¹] 'stone, pl.' (data from Arzbach) as an example: here, Class-1 membership comes with pluralization. The underlying representation of 'stone-sg' is /ʃtaɪn/, which – according to the default footing procedure discussed in subsection 5.7.1 – results in a Class-2 membership. When forming the plural, however, the class membership of the item changes to Class 1. My approach can account for this alternation by assuming that in such cases, a disyllabic foot is introduced as a segmentally empty plural morpheme. This foot then maps onto the underlying segmental material, creating a heavy syllable followed by an empty-headed syllable.

Consider the example in (148):[75]

(148)



[75] There are two more types of morphological alternations where class membership correlates with more complex forms (however, this does not concern accent minimal pairs): the first of these two types is similar to the one discussed in the subsection at hand, however, segmental information accompanies the Class 1 plural morpheme. An example for these alternations is the change from [ðaʊf^{c2}] 'pigeon-sg.' to [ðaʊ^{c1}və] 'pigeon-pl.' (Arzbach dialect). Here, plural formation can be expressed along the same lines as discussed above, the only difference being that the underlying foot comes with segmental content. Furthermore, in Rule A2, we also find switches from Class 1 to Class 2 next to the standard switch from Class 2 to Class 1 (for instance [ðaʊf^{c1}] vs. [ðaʊ^{c2}və] in the Maastricht dialect, Endepols 1955), yet these alternations never lead to tonal minimal pairs. My account treats these forms as allomorphs.

5.8 Conclusion

Building on the basic synchronic analysis of the tone accents discussed in chapter 4, the present chapter dealt with analytical details: it introduced the surface structure of the tone accents, provided four case studies from different Franconian dialects, and discussed the underlying representation of the opposition.

In section 5.2, I introduced my basic analytical assumptions as far as necessary to understand the case studies. The core of my analysis is the formal surface representation of the two accents. It was shown how the differences in tonal mapping between the two accents can be related to foot structure: I claimed that Class 1 is characterized by a disyllabic foot whereas Class-2 feet are always bimoraic. Therefore, the two feet have different foot heads: the head of a Class-1 foot is the first syllable, the head of a Class-2 foot is the first mora. These foot heads constitute head domains that incorporate all lower-level structure that is associated with the foot head. In the case at hand, this leads to two prosodically strong moras in Class-1 cases (both occur within the foot head domain), whereas in Class 2, only the first mora is part of the head domain. The second mora, on the other hand, is located outside of the head domain and thus prosodically weak at the foot level. However, at the syllable level, Class 1 and Class 2 are identical: both of them are bimoraic. Subsequently, I proposed the mora as the TBU in Franconian, discussed the status of the different intonational tones, and introduced my constraint set whose core consists of a constraint family governing the interaction of tones and prosodic head domains.

In sections 5.3 to 5.6, I have shown how my theoretical equipment can successfully account for the tonal mapping in the four dialects discussed in this thesis. Recall that, from a typological perspective, the crucial interdialectal difference between Rule A and Rule B consists of a different ranking of the constraints T → μ' and *μ' / L (see section 4.3 for discussion). However, the factorial typology for the different dialects indicates that apart from this crucial constraint interaction, the grammars of all dialects are surprisingly similar – they rather differ with respect to the intonational melodies than with respect to constraint interaction. In my analysis, this similarity at the constraint level might be attributed to the fact that – as I have argued above – reranking the constraints in the different dialects would lead to either minor changes in the tonal mapping or to a neutralization of the contrast.

Interestingly, the ranking *μ' / L >> T → μ' in the grammar of the Rule A2-dialect of Hasselt suggests that – at least from a grammatical perspective – it has more in common with Rule B (Arzbach) than with the Rule-A(2) dialects of Cologne and Roermond. From a geographic perspective, this is rather surprising, since the two dialect areas are not only non-adjacent but also located at opposite borders of the area (Hasselt in the north west, Arzbach in the south east). However, there might be a diachronic explanation for this phenomenon. As I discuss in chapter 7, Rule A and Rule B may have emerged from a common predecessor; I argue that the tonal

contours of this predecessor are still reflected in the Hasselt dialect. Whereas the Rule-A grammar originates from a phonological reinterpretation of pitch (due to a change in the phonetic implementation of tonal melodies), Rule B originated from a phonologically motivated change. The phonological nature of the latter adaptation strategy might explain why the recent Arzbach grammar is closer to the Hasselt one than to those of neighboring Rule A(2)-dialects.

In section 5.7, I have introduced the underlying representation for the two accents and formalized how they surface as Class 1 and Class 2: whereas Class 2 is prosodically unmarked and surfaces as a default moraic trochee, Class 2 is represented with an underlying disyllabic foot. In order to remain disyllabic in the output, it is protected by a faithfulness constraint preserving underlying head domains. Subsequently, I have shown that my approach can sufficiently account for synchronic alternations where segmentally identical items undergo a switch in class membership from simplex Class 2-forms to morphologically complex Class 1-forms.

Certainly, my proposal of head domains (here with respect the foot level) differs from 'traditional' notions of head dependent relations that have been used in former metrical theories. Within these former approaches, having two adjacent moras of equal strength cannot be expressed. That is, the differences in tonal mapping that I propose could not be captured within traditional frameworks.

Therefore, from a theoretical viewpoint, it would be desirable to discuss further implications of my approach, as for instance with respect to other prosodic domains, such as the syllable. Here, it might for instance be interesting to relate aspects of onset faithfulness vs. coda faithfulness to my proposal (see for instance Beckman 1998, 2009). However, since these issues are not of immediate relevance to the empirically based topic of this thesis but address universal principles, they would go beyond the scope of this dissertation. Therefore, I leave these questions to future work.

6. Synchronic analysis III: alternative approaches

6.1 Introduction

This chapter discusses alternative approaches to my proposal, including competing prosodic approaches as well as tonal analyses of the phenomenon. The discussion mainly focuses on empirical aspects of these different approaches.

In section 6.2, I explain why my analytical concept has to be preferred over three other possible concepts within a prosodic approach. I show that despite being able to provide an analysis for the Rule-A facts, all of them face severe problems in accounting for the basic empirical facts from Rule B.

Section 6.3 is devoted to the traditional autosegmental approach to the tone accents: an analysis of the facts that is based on the assumption of lexical tones. It serves to illustrate why I chose to develop an alternative analysis of the phenomenon. I start out by arguing that possible tonal analyses face severe problems when trying to account for the Arzbach facts. To motivate this claim, I discuss eight possible privative representations of the contrast – either H or L on each of the possible moras (two for Class 1, two for Class 2) vs. an unmarked accent. Furthermore, I compare the tonal analyses for Hasselt (Peters 2008), Cologne (Peters 2006a) and Roermond (Gussenhoven 2000a) to the prosodic one I propose.

Section 6.4 concludes the chapter.

6.2 Alternative prosodic approaches

In this section, I discuss possible alternative approaches within a prosodic account of the phenomenon. I start out from the assumption that *all* intonational tones (tones from different tonal morphemes, boundary tones) are linearized on the same tier.[76] Given these preliminaries, one might think of varying two parameters in order to express the accent contrast:

a) the number of tonal positions for each accent
b) the relative (prosodic) strength of these positions

With respect to a), I assume that in Franconian dialects, there are no more than two tonal positions within the stressed syllable. For reasons of simplicity, I refer to tonal positions from now on as *moras* at a descriptive level; note that this is not meant to imply that all competing approaches indeed work with moras as the TBU (see below for further discussion). While two moras per accent class are thus the maximum, there must obviously be at least *one* tonal position in the accent syllable, which makes one the minimum.

Concerning b), we might classify these tonal positions into (relatively) strong vs. (relatively) weak ones, as I have done in my analysis of the phenomenon. Recall that I represent these notions in the following way: a mora with a prime (μ') refers to a 'strong' mora, a mora without a prime (μ) indicates a 'weak' mora. Since tone accent syllables always carry word stress, they must contain at least one prosodically strong mora.

An overview of the possibilities that can be derived by working with these parameters is given in Table 6.1:

	Class 1	Class 2	Analytical concept
A	μ' μ'	μ' μ	'Strong + strong' vs. 'strong + weak'
B	μ μ	μ	'Two vs. one'
C	μ' μ	μ μ'	'Strong + weak' vs. 'weak + strong'
D	μ' μ'	μ μ'	'Strong + strong' vs. 'weak + strong'

Table 6.1: Possible analytical concepts for an analysis of prosodic oppositions

Possibility A represents the analytical concept I have made use of during my analysis (see chapters 4 and 5). Synchronic analyses of Franconian along the lines of 'two vs. one' (Hermans 2009, Kehrein to appear) and 'Strong + weak vs. weak + strong' (Kehrein 2007) have already been provided, whereas the analytical concept in D is an as yet unexplored possibility. My main arguments against these

[76] That is, I disregard the possibility that, for instance, focus tones and boundary tones might be assigned to different prosodic units (see Kehrein to appear for such a proposal). Furthermore, I also do not discuss possible alternative stratal approaches to the phenomenon.

alternative analyses concern problems with respect to their applicability to the empirical facts of Rule B. These problems are discussed below.

I apply the different analytical concepts to the basic empirical facts from Rule A and Rule B. Since in general, the reversal of tonal contours might also be attributed to a 'reversed' lexical representation, I also discuss the possibility of an opposite lexical accent marking in both dialect groups. Since Rule B has traditionally been regarded as having the reversed distribution ('rule reversal', see section 1.1), I refer to the Rule-A representation as the non-reversed default representation.

I assume that the declaration melody is H*L and that the interrogation melody is L*H. Furthermore, for reasons of clarity, I ignore once more the fact that the rise within Class-1 interrogatives can continue outside of the focus syllable (see subsections 4.2.1, 5.3.3, and 5.6.3). As it was the case above, this does not affect the validity of the analysis.

6.2.1 'Two vs. one'

Possibility B, the notion 'two vs. one', is the most popular one among the few prosodic approaches that have been proposed as yet. Boersma (2006) makes use of this idea in order to explain a diachronic stage of the opposition – the original, predictable contrast between Class 1 and Class 2. He claims that all original Class-1 words have *bimoraic* stressed syllables, whereas all original Class-2 words have *monomoraic* stressed syllables.[77] Hermans (2009) and Kehrein (to appear) make use of the same analytical concept. In their accounts, however, the idea of 'two vs. one' is not only a step within a diachronic development but also claimed to be a sufficient representation from a synchronic point of view. However, the way that these concepts relate to an underlying representation differs from Boersma's idea. Whereas Hermans (2009) argues that the contrast follows from differences in the segmental representation for Class-1 and Class-2 words, Kehrein (to appear) attributes the differences in the tonal mapping to the underlying presence of foot structure: Kehrein's approach starts out from the assumption that Class 1 has a moraic trochee whereas Class 2 has a syllabic trochee. Note that this is just the opposite of the structure that I propose (Class-1 foot branching at the syllable level, Class-2 foot branching at the moraic level).

Since my criticism of these approaches mainly refers to the – as I claim – non-applicability to the empirical facts of the Rule B, I do not discuss the representational solutions themselves any further and simplify the representation as having two moras for Class 1 vs. one mora for Class 2. That is, I only focus on the empirical test of the analytical concept 'two vs. one' that the different approaches share.

[77] At a later stage, according to Boersma (2006), the opposition was reinterpreted as a mora accent contrast (for more information on the diachronic development of the accents, see chapter 7).

As is shown in (1), the concept nicely accounts for the basic Rule A facts:

(1) Tonal mapping in Rule A: ‘two vs. one’

	Class 1		Class 2
	μ	μ	μ
declaration, non-final			
	H* | μ	L | μ	H* | μ
interrogation, non-final			
	L* | μ	H | μ	L* | μ

Since there are two tonal positions in Class 1, both tones of the two intonational melodies can be realized. In Class 2, however, only one position is available within the focus syllable. Thus, only the starred tones of both intonational morphemes can map onto the focus syllable whereas the trailing tones occur post-focally.

Being confronted with the Rule-B data, however, the concept fails – no matter whether we assume the same representation as in Rule A (2a) or a reversed one (2b):

(2a) Tonal mapping in Rule B: 'two vs. one' (non-reversed representation)

	Class 1		Class 2
	μ	μ	μ
declaration, non-final			
	H* μ	μ	H*L μ
interrogation, non-final			
	L* μ	H μ	L* μ

(2b) Tonal mapping in Rule B: 'two vs. one' (reversed representation)

	Class 1	Class 2	
	μ	μ	μ
declaration, non-final			
	H* μ	H* μ	L μ
interrogation, non-final			L*
	L*H μ		L* μ

The representation in (2a) is able to account for the interrogation contours – Class 1 has two positions and carries two tones, whereas the mono-positional Class 2 carries one phonological tone.[78] In declaration, however, we find a rather implausible mapping: the bi-positional Class 1 carries only one tone, whereas Class 2 carries two tones, although it only has one tonal position.

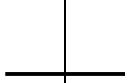
[78] Recall that I regard the inital pitch fall in Class 2 as a matter of phonetic implementation (see above, section 5.3.2).

Mapping the tones from the perspective of a reversed underlying representation, as it is shown in (2b), leads to the same dilemma: here, everything works fine with respect to declaration (two positions with two tones, one position with one tone) – but in interrogation, there is a similar problem to the one we find in (2a): why should Class 1 allow for *both* tones, if it only has *one* TBU, whereas Class 2 allows for only *one* intonational tone, although it consists of *two* TBUs? Thus, applied to the Rule B data, the concept 'two vs. one' can either account for declaration (reversed representation) or for interrogation (non-reversed representation) but it can never account for both conditions at the same time. Consequently, this analytical concept has to be rejected.

6.2.2 'Strong + weak' vs. 'weak + strong'

Possibility C represents the concept 'strong + weak' vs. 'weak + strong'. It assumes that Class 1 and Class 2 differ with respect to the position of their 'strong' mora: in Class 1, the first mora is the strong one and the second one weak, whereas in Class 2, the second mora is strong and the first one weak. Again, this approach does well with respect to the basic Rule A facts. This is demonstrated in (3):

(3) Tonal mapping in Rule A: 'strong + weak' vs. 'weak + strong'

	Class 1		Class 2	
	μ'	μ	μ	μ'
declaration, non-final				
	H* | μ'	L | μ	μ	H* | μ'
interrogation, non-final				
	L* | μ'	H | μ	μ	L* | μ'

The starred tone always aligns with the strong mora. Since contours on moras are avoided if possible, trailing tones always occur post-focal in Class 2, while they can be realized on the second mora in Class 1. Possibly, the starred tone in Class 2 spreads to the first mora (see Kehrein 2007).

When applied to the basic Rule B data, though, the model runs into problems. Applied straightforwardly, the concept of 'strong + weak' vs. 'weak + strong' cannot capture the fact that the alignment of the tonal melodies varies between

declaration (Class 2 aligns early) and interrogation (Class 1 aligns early). (4a) shows the outcome if we assume the same underlying structure as in Rule A:

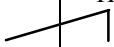
(4a) Tonal mapping in Rule B: 'strong + weak' vs. 'weak + strong' (non-reversed representation)

	Class 1		Class 2	
	μ'	μ	μ	μ'
declaration, non-final				
	H* μ'	μ	H* μ	L μ'
interrogation, non-final				
	L* μ'	H μ	μ	L* μ'

The mapping in declaration is particularly problematic: in Class 1, it is difficult to capture the fact that the low tone is not tolerated by a weak mora, whereas a spread high tone is. With respect to Class 2, I do not see a reasonable way to explain why the high starred tone avoids the strong mora of the syllable – such a mapping would conflict with the mutual attraction of high tone with strong and low tone with weak prosodic units (see section 4.2 and subsection 5.2.4 for further discussion).

In (4b), a reversed underlying representation is assumed:

(4b) Tonal mapping in Rule B: 'strong + weak' vs. 'weak + strong' (reversed representation)

	Class 1		Class 2	
	μ	μ'	μ'	μ
declaration, non-final				
	 μ	H* μ'	H* μ'	L μ
interrogation, non-final				
	L* μ	H μ'	μ'	L* μ

This mapping does not follow straightforwardly either. However, by introducing two constraints (and assuming the reversed lexical representation), it is technically possible to achieve the desired result: under this assumption, the model works if we introduce the constraints * μ' / L and T* → μ'. Whereas the default representation and the ranking T* → μ' >> * μ' / L results in a Rule-A mapping, a reversed underlying representation plus the ranking * μ' / L >> T* → μ' leads to a Rule-B mapping.[79]

We can thus conclude that this analysis is empirically sufficient to account for the basic facts of both Rule A and Rule B. The downside to this solution is a typological one;[80] by allowing for two representations and for the interaction of two constraints, we predict the existence of four dialect groups, two of which are unattested:

[79] High-ranked *FT-HD/L forbids any low tone to attach to the head mora, and therefore, it must go to the dependent position. In Class 1, this results in a peak delay in declaration (no space for the low trailing tone in the focus syllable), whereas in interrogation, the low starred tone is assigned to the first mora. The same principles hold for Class 2: the low tone cannot attach to the head mora. Since, however, under the assumption of a reversed representation, the second mora is the non-head, there is always enough space for the realization of L within the focus syllable.

[80] This approach also comes with theoretical problems related to the typology of possible foot structures: see Kehrein (to appear) for discussion.

(5) Factorial typology for an extended version of the concept 'strong + strong' vs. 'weak + strong', allowing for reversed lexical representations and the interaction of two constraints

	non-reversed representation	reversed representation
T* → μ' >> *μ' / L	declaration non-reversed, interrogation non-reversed attested (Rule A)	*declaration reversed, interrogation reversed* *unattested*
μ' / L >> T → μ'	*declaration non-reversed, interrogation reversed* *unattested*	declaration reversed, interrogation non-reversed attested (Rule B)

Its non-restrictiveness is an undesirable effect of this approach. Note that my analysis does not show such overgeneralizations, as has been demonstrated in subsection 4.2.3: in order to account for the basic facts, we do not need to assume reversed representations but only the interaction of two constraints, * μ' / L and T → μ'. Accordingly, applying that concept to the basic facts gives two instead of four possibilities. Therefore, the approach proposed in this thesis is to be preferred over this alternative.

6.2.3 'Strong + strong' vs. 'weak + strong'

The analytical concept D – 'strong + strong' vs. 'weak + strong' – is as yet unproposed. Still, like any other of the discussed concepts, it can be successfully applied to the Rule A facts, as is shown (6):

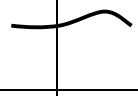
(6) Tonal mapping in Rule A: ‘strong + strong’ vs. ‘weak + strong’

	Class 1		Class 2	
	μ'	μ'	μ	μ'
declaration, non-final				
	H* | μ'	L | μ'	μ	H* | μ'
interrogation, non-final				
	L* | μ'	H | μ'	μ	L* | μ'

When we assume that all tones prefer to be linked to strong moras, we end up with two tonal positions under Class 1 and one late-aligned tonal position under Class 2, which captures the facts in a sufficient way.

However, when applied to the Rule B data, the concept fails – no matter which of the two possible representations we propose. This is shown in (7a) and (7b):

(7a) Tonal mapping in Rule B: ‘strong + strong’ vs. ‘weak + strong’ (non-reversed underlying structure)

	Class 1		Class 2	
	μ'	μ'	μ	μ'
declaration, non-final				
	H*		H*	L
	μ'	μ'	μ	μ'
interrogation, non-final				
	L*	H		L*
	μ'	μ'	μ	μ'

(7b) Tonal mapping in Rule B: ‘strong + strong’ vs. ‘weak + strong’ (reversed underlying structure)

	Class 1		Class 2	
	μ	μ'	μ'	μ'
declaration, non-final				
		H*	H*	L
	μ	μ'	μ'	μ'
interrogation, non-final				
	L*	H		L*
	μ	μ'	μ'	μ'

In (7a), there is no insightful way to explain why H* would avoid the strong mora in Class-2 cases, whereas L* does not. Once more, this is the opposite of what we would expect given the typological evidence for the mutual attraction between high tones and strong prosodic positions as well as that between low tones and weak prosodic positions. In (7b), it would for instance be difficult to account for the behavior of L: given two adjacent strong moras, why would it align with the second instead of the first one? Altogether, I do not see many prospects for this model either

– therefore, I reject analytical concept D as well. That is, we can conclude that – at least from an empirical perspective – none of the tested alternatives has the same analytical adequacy as my prosodic approach.

6.3 The tonal approach

6.3.1 Arzbach

In this subsection, I provide a discussion of a variety of possibilities for a tonal analysis of the Arzbach dialect. As will become evident, each of these attempts runs into severe problems at some point of the analysis.

In order to keep the number of possible analyses at a reasonable size, I restrict myself to the discussion of privative oppositions (one accent unmarked, the other one marked with a lexical tone).[81] Here, we get eight possible representations – four available moras (two per accent) plus the tones L and H. These possibilities are stated in (8):

(8) Possible representations of the Arzbach accents within a tonal approach

	Class 1	Class 2
1	μ μ | H	μ μ
2	μ μ | H	μ μ
3	μ μ | L	μ μ
4	μ μ | L	μ μ

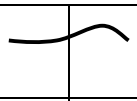
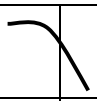
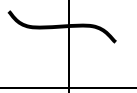
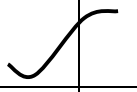
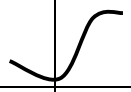
	Class 1	Class 2
5	μ μ	μ μ | H
6	μ μ	μ μ | H
7	μ μ	μ μ | L
8	μ μ	μ μ | L

The possibilities 1 to 4 represent Class 1 as the marked class; in 5 to 8, Class 2 carries the lexical tone. In the following, I apply each of these possible lexical representations to the Arzbach facts.

Analysis 7 – a lexical L on the second mora of Class 2 – is the most likely possibility for a tonal analysis, and therefore, I discuss this option in more detail. Consider the tonal mapping for this possibility in (9). Declaration is represented with H*, interrogation with L*H:

[81] However, I also do not see any other possibility of accounting for the facts when assuming lexical representations with more than one tone.

(9) Tonal mapping for Arzbach: lexical L on the second mora of Class 2

	Class 1		Class 2	
(a) declaration, focus, non-final				
	H*		H*	L_{lex}
	μ	μ	μ	μ
(b) interrogation, focus, non-final				
	L*	H		L_{lex} L*
	μ	μ	μ	μ
(c) declaration, focus, final				
	H*		H*	L_{lex}
	μ	μ	μ	μ
(d) interrogation, focus, final				
	L*	H		L_{lex}L*H
	μ	μ	μ	μ

The positive aspects of this representational possibility primarily concern the tonal mapping of Class 2 in non-final declaratives in (a): here, we would have to assume an intonational H*. This tone would occupy the first mora of the focus syllable, the lexical L follows on the second mora. The corresponding Class-1 syllable would contain H* only which spreads to both moras.

In final declaratives, given in (c), the low lexical tone would then also express the phrase-final phonological boundary, satisfying a corresponding alignment constraint. However, since there is sufficient evidence for the existence of a low boundary tone, one might wonder why the low boundary tone does not show up as a clear target in final Class-1 declaratives: there, as in non-final positions, we only find a high level tone. We might account for this behavior by introducing a constraint against contours at the syllable level (NO CONTOUR (σ)) that would have to be higher-ranked than ALIGN-$\}_{\iota}$-L. This would account for the Class-1 mapping in final declaratives. Furthermore, in order to account for the Class-2 mapping, NO CONTOUR (σ) would have to be lower-ranked than FAITH-T. This could explain the

fact that H*L is tolerated in Class-2 cases with a pre-linked lexical L on the second mora, as is shown in (c).

Within this analysis, the tonal mapping in interrogation is more difficult to account for. As is shown in (b) and (d), we would have to assume that the interrogation morpheme L*H always shows up *after* the lexical tone. Consider particularly the mapping in phrase-final interrogatives in (d): here, the first mora would be tonally empty, and the lexical L would be followed by both intonational tones L* and H.

The question is: why is the interrogation morpheme not realized to the left of the lexical L, thereby e.g. creating a L*HL tonal mapping (e.g. with L* on the first and H and L on the second mora). I can see only one way to account for this tonal behavior: we would have to stipulate that the syntax introduces the interrogation morpheme as a tonal suffix that has to be realized after the lexical tone. However, I am not aware of any cross-linguistic evidence for the introduction of a specific intonational melody as a tonal suffix – note that the declaration melody would *not* be introduced as a suffix. Therefore, it does not seem to be a likely solution to the problem. Furthermore, having a 3-to-1-association on the second mora of final Class-2 interrogatives – whereas the first mora would be tonally empty – is not a preferable situation either. Due to these disadvantages, I dismiss this possibility.

Since all remaining analyses are less likely than the one I discussed above, I keep the discussion brief. Let me begin with a summary of those possibilities that can be ruled out more or less easily: first of all, we can exclude all analyses that postulate a lexical tone in a position where we never or very rarely find a tone of that quality in the data. For instance, there never is a low tone on the second mora of Class 1, and thus, there cannot be a low lexical tone on that mora, which rules out **analysis 3**. The same argument holds for **analysis 8,** which postulates a low tone on the first mora of Class 2. Since we never find L on the first mora of Class-2 syllables, this mora cannot be marked with a lexical low tone. With respect to **analysis 5** (high lexical tone on the second mora of Class 2), we can argue along the same lines: the only relevant context where a high tone shows up on the second mora of Class 2 is the final position in interrogatives – in all other relevant contexts, there are only low targets on the second mora.

Furthermore, we can exclude analyses where we would have to account for qualitative changes of the lexical tone that cannot be motivated. Take for instance **analysis 2**, a lexical H tone on the first mora of Class 1: in this case, the lexical tone would surface as H in declaration and as L in interrogation. However, in *all* of these contexts, the second mora of the focus syllable is associated with a high tone. I do not see any principle that could explain why – when preceding a high tone – a lexical tone would sometimes surface as L and sometimes as H. The same reasoning holds for **analysis 4**, a lexical low tone on the first mora of Class 1: again, we could not explain why the lexical tone surfaces as H in declaration and L in interrogation. At this point, six of the eight possibilities have been excluded, and possibilities 1 and 6 remain.

Analysis 1 assumes a lexical H on the second mora of Class 1. Under this assumption, we can account for the mapping in declaration as well as the mapping in phrase-final interrogatives. However, this possibility has a fatal problem with respect to the analysis of non-final interrogatives: as has been discussed above (see subsections 3.3.1, 5.3.2), the interrogation rise starts on the first mora of the focus syllable and ends on a *post-focal* stressed syllable. Hence, the data do not provide evidence for a tonal target on the second mora of Class-1 syllables in this context. I argue that this rules out the possibility of having a lexical high tone on that mora.

Analysis 6 is based on a lexical H on the first mora of Class 2. Note that this representation works fine for non-final interrogation contours, where we find relatively high initial pitch before L*. Of all possible interpretations, this is the only one that can account for this initial high pitch from a phonological perspective without having to introduce an epenthetic tone (recall that in my account, this is regarded as a matter of phonetic implementation, see subsection 5.3.2).

However, this is also the only aspect where this analysis could claim elegancy: problems begin when we look at phrase-final interrogatives: here, the initial fall is so slight that analyzing it as being due to the presence of a high tone is undesirable. Furthermore, we would have to capture the fact that in declaration, the lexical tone would change the quality of the following H* to L*. Whereas this might be possible from a technical perspective, such an influence of lexical tones on intonational tones is as yet unattested. Therefore, as has been the case for the other approaches discussed here, I dismiss this option as well.

Since all of the possible tonal approaches mentioned here face severe problems in attempting to account for the empirical data, I conclude that, with respect to the Arzbach facts, the prosodic approach developed in this thesis is to be preferred over a tonal analysis.

6.3.2 Former analyses for Hasselt, Roermond, and Cologne

In this subsection, I discuss tonal analyses for the dialects of Hasselt (Peters 2008), Cologne (Peters 2006a) and Roermond (Gussenhoven 2000a) and compare them to my own approaches introduced in sections 5.4, 5.5 and 5.6. I follow the order of these analyses and therefore begin with the Hasselt dialect.

a) Hasselt

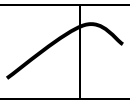
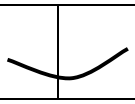
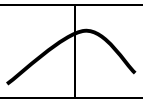
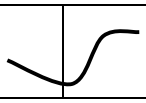
The tonal analysis presupposes the presence of a low lexical tone in Class 2; the TBU is the syllable. Class 1 is underlyingly toneless:

(10)

Class 1	Class 2
σ	σ | L_{Lex}

The tonal mapping for Hasselt along the lines of Peters' account is shown in (11) for focal positions in declaration and interrogation. The intonational melodies for both declaration and interrogation are $LH^*L_ι$:

(11) Tonal mapping for Hasselt for declaration and interrogation

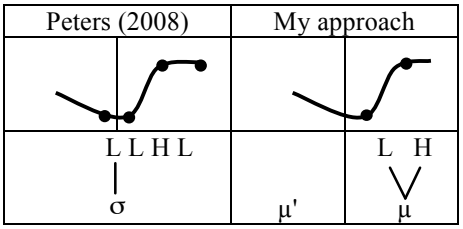
	Class 1	Class 2
(a) declaration, interrogation, focus, non-final	 H* | σ	 L_{lex} L | σ
(b) declaration, interrogation, focus, final	 $H^*L_ι$ | σ	 $L_{lex}LH^*L_ι$ | σ

Note that in Peters' approach, the rising contour at the beginning of Class-1 focus syllables derives from a pre-focal low tone. In Class 2, where a lexical low tone is pre-linked to the accent syllable, the intonational melody $LH^*L_ι$ has to be realized to the right of the lexical tone: in non-final position, only L is assumed to be realized in the focus syllable, whereas H* occurs post-focal. The tonal analysis is able to capture the tonal mapping in these contexts – still, there may be some aspects where my prosodic approach accounts for the tonal mapping in a simpler way.

First, consider the tonal mapping in phrase-final Class-2 syllables in declaration and interrogation: phonetically, we find a late rise in that position. The tonal analysis derives this contour from a sequence of four tones: only the lexical tone is linked to a TBU, followed by two unassociated intonational tones (L*H) plus the unassociated low boundary tone; this creates a LLHL-sequence on one syllable. Straightforwardly, we might expect this tonal mapping to be phonetically realized as a rise-fall rather than as a late rise. Whereas Peters attributes this mapping to a rule concerning the phonetic implementation, it follows straightforwardly from the phonological representation in my account (see subsection 5.4.3): my mapping assumes two late-aligned phonological tones within the relevant syllable, and hence,

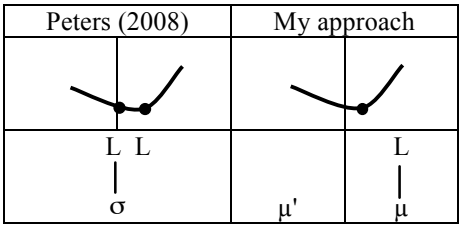
the pitch contour corresponds to the tonal mapping directly. Both mappings are provided in (12):

(12) Tonal mapping for Class 2, declaration and interrogation, final position



Class-2 syllables in non-final position provide a related case: there, we only find *one* low target within the relevant syllable, followed by a subsequent rise. In a tonal approach, this target corresponds to *two* phonological tones, a lexical low tone and an intonational L. Peters acknowledges that accounting for one target with one instead of two tones would be preferable: "A more elegant analysis would suggest that there is only one low target in the stressed syllable" (Peters 2008, 1005). The analysis presented in this thesis fulfils this desideratum: there, we find a one to one-correspondence, i.e., a single low tone (L*) accounts for the low pitch target (see subsection 5.4.2). Consider (13) for the tonal mappings; in both approaches, the late rise follows from interpolation towards a post-focal high target.

(13) Tonal mapping for Class 2, declaration and interrogation, non-final position



A possible empirical problem for a tonal analysis of the Hasselt dialect concerns the apparent non-presence of the lexical low tone in post-focal, non-final position in continuation phrases. Recall that the post-focal occurrence of low tones is restricted to Class-2 syllables (see subsection 5.4.4 for further discussion). Within a tonal approach, this is attributed to the presence of a lexical low tone on Class 2. Whereas this analysis holds for declaration and interrogation, there might be a problem in non-final continuatives: here, the idealized contours in Peters (2008, 1009) do not indicate a contrast between the accents under this condition (no phonetic data are provided in the paper). Given that this is the case, this obviously creates severe problems for a tonal account. I cannot see an insightful way to explain why a lexical

tone would show up in post-focal Class-2 declaratives and interrogatives but be deleted in corresponding continuation phrases.

Note that in my account, this discrepancy in the tonal mappings follows from a difference in the focal melodies (L*HL in declaration / interrogation and L*H in continuation). That is, the non-occurrence of post-focal, non-final low tones in continuation is due to the lack of a low post-focal trailing tone.

b) Cologne

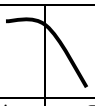
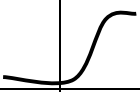
Peters (2006a) proposes an unspecified lexical tone T_{Lex} on the first mora of Class 2, Class 1 is toneless in the underlying representation. The TBU is the mora:

(14)

Class 1		Class 2	
μ	μ	μ | T_{lex}	μ

The lexical tone always assimilates in quality to the following starred intonational tone. That is, if T_{Lex} precedes L*, it surfaces as L_{Lex}, when preceding H*, it surfaces as H_{Lex}. The intonational melodies are H*LL_{ι} for declaration and L*HL_{ι} for interrogation. The tonal mapping for declaration and interrogation in focal position is provided in (15):

(15)

	Class 1		Class 2	
(a) declaration, focus, non-final				
	H* | μ	L | μ	H_{lex} | μ	H* | μ
(b) interrogation, focus, non-final				
	L* | μ	H | μ	L_{lex} | μ	L* | μ
(c) declaration, focus, final				
	H* | μ	L | μ	H_{lex} | μ	H*$LL_{ι}$ \ μ
(d) interrogation, focus, final				
	L* | μ	$HL_{ι}$ | μ	L_{lex} | μ	L*$HL_{ι}$ \ μ

The analysis is based on the assumption that the pre-linked lexical tone cannot share a mora with an intonational tone. As a result, the intonational melody is 'pushed' to the right. The tonal mapping can capture the facts adequately (for final positions, no analysis is provided in Peters 2006a; here, the analysis is taken from another paper on Cologne by Gussenhoven & Peters 2004). Still, one issue may be worth mentioning. It is of theoretical nature and concerns the postulation of an unspecified lexical tone T_{Lex} (as assumed in Peters 2006a). Within a formal representation, this may best be accounted for as an empty tonal node: in such a case, however, the nature, meaning and consequences of such a representation for autosegmental phonology in general should be discussed since the possibility of having empty nodes (that is, nodes without any featural content) constitutes a radical innovation. This discussion is absent in Peters (2006a).

c) Roermond

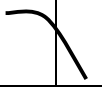
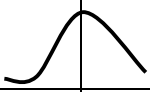
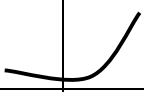
Gussenhoven (2000a) starts out from the assumption that the Roermond tone accent opposition is due to a high lexical tone on the second mora of Class 2, whereas Class 1 is lexically unmarked:

(16)

Class 1		Class 2	
μ	μ	μ	μ | H_{lex}

The intonational melodies are $H^*L_ι$ for declaration and $L^*H_ιL_ι$ for interrogation. Consider the overview in (17):

(17):

	Class 1		Class 2	
(a) declaration, focus, non-final				
	H* | (μ	$L_ι$ | μ)	H* | (μ	H_{lex} | μ)
(b) interrogation, focus, non-final				
	L* | (μ	μ)	L* | (μ	L_{lex} | μ)
(c) declaration, focus, final				
	H* | (μ	$L_ι$ | μ)]	H* | (μ	$L_ιH_{lex}$ | μ)]
(d) interrogation, focus, final				
	L* | (μ	$H_ιL_ι$ | μ)]	L* | μ	$L_ιL_ιH_{lex}$ | μ]

Gussenhoven (2000a) analyzes the tonal mapping in the different contexts within OT. The analysis is able to derive the relevant contours. Still, it may be worthwhile to take a closer look at the effect of the constraint NORISE in comparison with relevant alignment constraints.

In Gussenhoven (2000a), NORISE forbids rising contours within syllables. A rise can be found when two tones L and H are linked to two moras within a heavy syllable. The relevant constraint is given in (18):

(18) NORISE: * (μ μ)
| |
L H

The work of this constraint can best be observed in Class 1, interrogation, focus, final position. Phonetically, we find a rising-falling contour in this syllable. Still, Gussenhoven (2000a) argues that NORISE is not violated in this context.

This is the case since the two boundary tones $H_ιL_ι$ are not linked to a TBU, the mora, but only to the constituent node of the phrase boundary. Phonetically, this still results in a rise-fall since tones are also implemented as full tonal targets in cases where they are not associated with a TBU.

The non-association of two tones with TBUs results in a violation of the constraint TBU, which is given in (19):

(19) TBU: A tone should be associated with a sonorant mora in a stressed syllable in the output.

Given a ranking NORISE >> TBU, the high boundary tone is not associated with a TBU to avoid a rising contour. Furthermore, the identity of the high tone needs to be preserved: otherwise, to avoid a violation of NORISE, $H_ι$ may change to $L_ι$, resulting in a low plateau. The relevant constraint is formulated in (20):

(20) IDENT (T): * αT_{input}
|
$-\alpha T_{output}$

Like NORISE, IDENT (T) outranks TBU. The relevant tableau is given in (21). Constraint hierarchies are adapted from Gussenhoven (2000a); that is, not all rankings can necessarily be derived from the mappings discussed here:

(21)

	(μ μ)] L*H$_ι$L$_ι$	NoRise	Ident (T)	TBU
a. →	(μ μ)] L* H$_ι$ L$_ι$			**
b.	(μ μ)] L* H$_ι$ L$_ι$	*!		
c.	(μ μ) L* L$_ι$ L$_ι$		*!	

Note that phonetically, candidates a. and b. lead to the *same* tonal melody. That is, empirically, both candidates cannot be separated from each other, the ranking follows theory-internal reasons (Gussenhoven 2000a, 162).

As a second step, consider phrase-final Class-2 interrogatives in focus position. Here, we find a late rise. Gussenhoven (2000a) attributes this rise to a tonal contour L*L$_ι$L$_ι$H$_{lex}$; all tones are associated with TBUs. Thus, the constraint NoRise is violated. The late rise is caused by the right-aligned high lexical tone. Gussenhoven (2000a) regards this rise as being due to two high-ranked constraints. The first one requires the lexical tone to be aligned rightmost within the syllable:

(22) AlignLexRt (H, R, Syl, R): The right edge of the lexical tone coincides with the right edge of the syllable

This constraint outranks a corresponding alignment constraint that aligns the right edge of the prosodic phrase with a boundary tone:

(23): AlignT$_ι$Rt (T$_ι$, R, Phrase, R): The right edge of a phrasal boundary tone coincides with the right edge of the Phrase

The right-aligned lexical tone remains high because of a high-ranked positional faithfulness constraint that requires phrase-final tones to retain their quality:

(24) IdentFin (T): * $\alpha]T]_{input}$
$-\alpha]T_{output}$

Consider the relevant OT tableau in (25):

(25)

	(μ μ)] L*H_{lex} HιLι	ALIGNLEXRT	IDENTFIN (T)	NORISE	IDENT (T)	TBU	ALIGNTIRT
a.	(μ μ)] L*L_{lex} Hι Lι	*!			*	**	
b. →	(μ μ)] L* Lι LιH_{lex}			*!	*		*
c.	(μ μ)] H* Hι HιH_{lex}				***		

In the winning candidate b., the first boundary tone Hι turns to Lι to avoid another violation of NORISE. Note that given Gussenhoven (2000a)'s constraint ranking, candidate c. should be the winner: changing all low tones to H prevents a violation of high-ranked NORISE, whereas b. violates that constraint. This is not discussed in Gussenhoven (2000a). In fact, given Gussenhoven's constraint ranking, all final Class-2 syllables should be high-toned throughout (focus and non-focus position, declaration and interrogation). From a technical point of view, these undesired winners might be excluded by splitting the relevant faithfulness constraints: IDENT (L) would have to be undominated, whereas IDENT (H) would have to be sufficiently low-ranked.

Another issue that may be discussed is the dissatisfaction of ALIGNLEXRT by candidate a. Despite the fact that the boundary tones would not be associated with a TBU in the syllable, they are still relevant for the constraint from Gussenhoven's viewpoint: according to Gussenhoven (2000a), there is only one prosodic edge in phrase-final positions. That is, the syllable can also see the tones that are only aligned with the constituent node of the phrasal boundary (for an overview of Gussenhoven's account, see Gussenhoven 2004). Thus, in this case, the syllable takes tones from higher prosodic units into account.

Recall that this was not the case in phrase-final Class-1 declaratives (see above). Here, NORISE had not been violated by the winning candidate since the boundary tones were not associated to TBUs in the syllable. However, following Gussenhoven's argument that there is only one prosodic phrase edge that is visible to all constituents, one might expect that the TBUs, the moras, should also take these tones into account. Thus, NORISE should also be violated in this case. This would

also suit the functional motivation of the constraint (see Gussenhoven 2000a, 150). If rises in syllables are avoided due to functional reasons, then it may be undesirable to have two candidates with identical tonal contours (candidate a. and candidate b. in (21)) – where one violates the constraint, whereas the other one does not.

The difference in interpretation of these two constraint types is crucial for the analysis. Under the assumption that both constraints should work in similar ways, either the mapping in phrase-final Class-2 declaratives could not be accounted for (if lower prosodic units cannot see tones on higher prosodic units, as in NORISE), or we would expect a neutralization of the opposition in non-final interrogatives in focus position (if lower prosodic units can see tones on higher prosodic units, as in ALIGNLEXRT). In both cases, the analysis would break down.

Furthermore, a possibly interesting difference between Gussenhoven (2000a) and my analysis of the Roermond dialect (see section 5.6) may be found in the treatment of continuation intonation. Here, Gussenhoven reports in a footnote that in phrase-final Class-2 syllables, we do not find the standard falling-rising contour but rather a fall to mid level. Under the assumption of a lexical H on the second mora, this tonal contour does not follow straightforwardly; Gussenhoven argues that "this difference is most probably to be attributed to a phonetic implementation rule which is sensitive to the utterance boundary" (Gussenhoven 2000a, footnote 4). Still, there seems to be no clear phonetic evidence for the presence of a high lexical tone on the second mora of Class 2 in the given context. Crucially, this tonal contour could easily be given a phonological interpretation within my approach: recall that I claim the existence of two boundary tones, an IP-final L and an utterance-final H; as the term *continuation* indicates, we expect not to find an utterance-final boundary tone in this context. Instead, within my approach, we would only find a low IP-final boundary tone; this tone would then be implemented as a fall to mid level. This implementation would be comparable to what we find in Hasselt, where low boundary tones in continuation phrases are phonetically realized as a fall to mid level rather than to low level (Peters 2008 makes a similar assumption in his tonal analysis for Hasselt; see subsection 5.4.3 for further discussion).

6.4 Conclusion

In this chapter, I have discussed why my prosodic analysis of the tone accents is to be preferred over other prosodic approaches as well as over tonal accounts. In section 6.2, I have tested the analytical power of three possible prosodic approaches. I have shown that all but one of these analytical concepts are insufficient to account for the basic empirical facts from Rule A and Rule B. One possible approach that might be used to capture the basic facts could be ruled out due to unfortunate typological predictions.

Subsequently, section 6.3 focused on showing why the 'traditional' autosegmental method of analyzing the Franconian tone accents as a tonal contrast may be less favorable than the prosodic approach introduced in this thesis. My main argument concerned the Arzbach dialect and the severe problems that arise when trying to find a sufficient tonal analysis for the facts. Subsequently, I have discussed previous tonal analyses for the dialects of Hasselt (Peters 2004), Cologne (Peters 2006a) and Roermond (Gussenhoven 2000a). I have shown that, from an empirical perspective, the prosodic analyses presented here are at least as effective as competing tonal approaches. In particular for the Hasselt dialect, I have shown that a prosodic approach may be able to handle the tonal mapping in a better way than the competing tonal one. Furthermore, I have argued that the Roermond analysis is based on theoretical assumptions that may be debatable. Additionally, for several contexts, there is an alternative winning candidate that is disregarded in Gussenhoven (2000a).

7. Diachronic analysis: explaining the split between Rule A and Rule B

7.1 Introduction

Whereas chapters 4 to 6 dealt with the synchronic analysis of the tone accent opposition, the focus of this chapter is on the diachronic developments that led to the present-day opposition. Three aspects are of relevance for this thesis: first of all, there is the development of diverse tonal contours in different dialect groups, leading to the split between Rule A and Rule B. Secondly, there is the question of how the synchronic representation introduced in chapter 5 of this thesis relates to the diachronic development of the opposition. Furthermore, the lexical distribution of the tone accents in Arzbach will be discussed.

In section 7.2, I provide a comprehensive account of the development of the semi-reversed tonal contours we find in Rule B. Based on the new Arzbach data that have been gathered for this thesis, I propose an account that captures the relation between Rule A and Rule B: the section illustrates how this explanation not only allows us to understand the relation between these dialect groups but also to reconstruct a common predecessor that seems largely preserved in West-Limburgian dialects.

The approach proposed here is based on the assumption that a large group of Limburgian dialects underwent a split of intonation contours, in which the originally identical declaration and interrogation melodies were differentiated due to a change of the declaration melody. As I show below, the split between Rule A and Rule B is due to different and independent strategies in adopting tonal contours from neighboring dialects.

Section 7.3 goes further back in time and serves to motivate my synchronic representation of the contrast from a diachronic perspective. I suggest that the present-day surface representation of the opposition (introduced in section 5.2) was valid from the beginning: it arose as a consequence of a phonological process (a split between originally mid and low vowels and other relevant phoneme groups) and was entirely predictable. Over time, the opposition was most likely lexicalized due to a phonological reinterpretation of phonetic differences between both accent classes (crucial factors being Open Syllable Lengthening and apocope, see e.g. de Vaan 1999, Schmidt 2002, and Boersma 2006 for further discussion). Since a lexicalization process based on my representational assumptions does not add any new insights but can be incorporated into existing genesis theories by e.g. Schmidt (2002) and Boersma (2006, to appear), I do not discuss these issues in further detail.

Section 7.4 deals with the lexical distribution of the Arzbach accents and its relation to the distributions in Rule A and Rule A2. Improving on Bach (1921), I propose a

refined lexical distribution of the Arzbach accents. My revisions concern the distribution of lengthened vowels: I show that some important generalizations with respect to this part of the distribution have as yet been overlooked. These new generalizations not only allow us to unravel some obscure but as yet unchallenged distributional patterns Bach assumes, but they also shed light on the typological distributional relation between Rule B and other dialects areas: whereas, to this point, only a relation between Rule B and Rule A has been assumed, the new results indicate that the Arzbach distribution constitutes an intermediate distribution between Rule A and Rule A2.

Section 7.5 then provides a schematic overview of the diachronic developments discussed in this chapter, focusing mainly on the developments of the tonal melodies.

Section 7.6 presents a conclusion.

7.2 Deriving Rule A and Rule B from a common predecessor

This section provides a diachronic explanation for the split between Rule A and Rule B. Scholars have already made several attempts to account for this phenomenon – some of them regarding the split as a result of independent processes (Bach 1921, Boersma 2006, Kortlandt 2007), one of them seeing it as the result of a borrowing process, in which Rule B is regarded as the outcome of a failed adaption process to neighboring Rule-A dialects (Schmidt 2006). Yet none of these approaches could account for the newly found non-reversed interrogation contours (see subsection 7.2.5 for further discussion).

In this section, I show that the development of these semi-reversed tonal contours can be understood as a result of different adaptation strategies to neighboring 'non-accent dialects'. Furthermore, analyzing these different adaptation strategies enables us to reconstruct a common predecessor of modern Franconian, from which all basic dialect groups can be derived. With respect to the dialects discussed in this thesis, the Hasselt contours represent the oldest stage of the opposition.

7.2.1 Finding the common predecessor

As a first step in deriving the predecessor of modern Franconian, we have to identify the fundamental synchronic differences and similarities between different dialect groups. For this reason, I start out by comparing the realization of the accents in the dialects that I have discussed chapter 5. These dialects can be grouped as follows:

(1) Dialect grouping in Franconian

Dialect group	Dialect area	Places
Rule A[82]	East Limburgian, Ripuarian	Roermond, Cologne
Rule O	West Limburgian	Hasselt
Rule B	Westerwald	Arzbach

Note that by referring to West-Limburgian dialects as belonging to *Rule O* instead of Rule A(2), I introduce a new term. I chose this term since, as I show below, Rule O comes closest to the reconstructed earliest stage of Franconian within my proposal ('O' referring to the word 'origin').

When we compare the realization of the accents in these three areas, we can make a striking observation. Whereas the pitch contours are (substantially) different from each other in declaration, they are much more similar in interrogation: this is shown in (2):

[82] For reasons of simplicity, I do not differentiate between Rule A and Rule A2 at this point.

(2) Realization of Class 1 and Class 2 in different dialect groups in declaration and interrogation, non-final position

Accent class	Class 1			Class 2		
Dialect group	Rule A	Rule O	Rule B	Rule A	Rule O	Rule B
Declaration						
Interrogation						

First, consider the declaration contours: here, it proves difficult to discover any systematic similarity between the different areas. Whereas Class 1 is realized with falling intonation in the majority of the dialects in Rule A, we find rises in Rule O and high level tones in Rule B. The same goes for the realizations of Class 2, which also differ tremendously between the different areas (high level for Rule A, falling for Rule B, and low level for Rule O).

Crucially, however, the interrogation contours resemble each other closely. Note that *all dialect groups* show early rises in Class 1 and delayed tonal movements in Class 2 (in all dialects, there is a high post-focal target to follow).

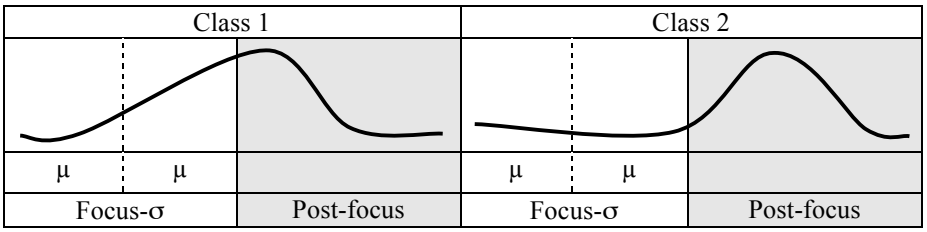
Building upon this observation, I propose that the similarity between the interrogation contours in the different dialect groups might indicate that these contours are leftovers of a common old stage of Franconian. The dissimilarity of the declaration contours, on the other hand, can be regarded as an indication that these contours developed in different ways over time.

In order to explain the development towards Rule A and Rule B, we first need to introduce the common predecessor of the different modern Franconian dialect groups: I claim that at an early stage of the contrast, most likely already at the time of accentogenesis, there was no difference in Franconian between declarative intonation and interrogative intonation — both were realized with rising intonation. Of the four synchronic tonal systems under discussion, the Hasselt dialect would then represent the oldest stage: in this dialect, both declaration and interrogation contours are still pronounced with rising intonation from the focus syllable onwards.

However, the Hasselt dialect probably does not feature the original contours but displays an intermediate stage in the development towards the common Rule-A contours. The reasons for this assumption are to be discussed in detail below. As I have indicated above, the oldest contours are to be found in the interrogative forms, and phonetically, they probably resembled the ones we find synchronically in Rule A: we find an early rise in Class-1 words and a late (almost post-focal) rise in Class-

2 words. The complete sentence intonation must have been L*HL, as in present-day Hasselt. The tonal contours of the predecessors are shown in (3):

(3) Tonal contours of the predecessor of modern day Franconian dialects for declaration and interrogation



Note that in (3), the high target of the L*HL melody is located outside of the focus syllable within Class 1. This tonal mapping is still reflected in several non-neighboring modern Franconian dialects (see for instance the Arzbach data in subsection 5.3.2 as well as the Roermond data in subsection 5.6.2). It therefore might already have been present when the contrast developed.

7.2.2 Different adaptation strategies: the development towards Rule A and Rule B

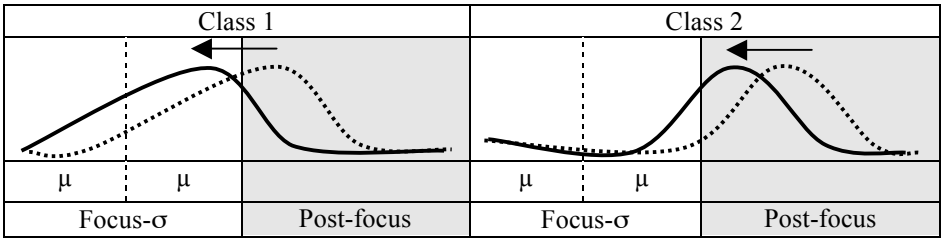
As we have seen, the proposed common predecessor of the modern Franconian dialects displays the same tonal contours in declaration *and* in interrogation - an early rise in Class-1 words opposed to a late rise in Class-2 words. First of all, note that from a cross-linguistic perspective, having rising contours in the focus syllable is unmarked for *interrogation* whereas rises in *declaration* are considered to be pragmatically marked (see e.g. Bolinger 1972, Gussenhoven 2004). This is certainly true for West Germanic in general as well as for the non-accent dialect areas surrounding the Franconian dialect area in particular: typological studies show that neighboring non-accent dialect areas have falling contours or high level focus contours in declaration (Schmidt 1986, Gilles 2005, Peters 2006b, my data[83]). I claim that the development from the common predecessor towards Rule A and Rule B is strongly related to these facts: let us assume that the above-mentioned declaration contours in surrounding dialect areas are not only falling or high-level synchronically, but that this was also the case at the stage when the Franconian dialects split into different dialect groups. As I show below, the split between Rule A and Rule B and the accompanying tonal semi-reversal can be understood as a result of different and thus independent adaptation strategies to the tonal contours of their neighbors.

[83] Unpublished data from the Weroth dialect (a neighboring dialect of Arzbach) show that there, we find falling intonation in declaratives.

a) The development towards Rule O

Rule O displays an intermediate stage in the development from the predecessor to Rule A. Speakers of Rule O adapted to the frequently occurring overt tonal contours of their neighbors: since in these non-accent dialects, pitch was high at the beginning of the focus syllable, the phonetic implementation of the phonological L*HL melody was shifted leftwards. As a result, the tonal targets were located leftmost from a phonetic perspective, thereby shifting the high trailing tone closer towards the beginning of the focus syllable. In Class-1 words, the L* was thus aligned immediately with the left edge of the syllable, as in present day Hasselt. The phonological system, however, remained the same. The result of this process is shown in (4):

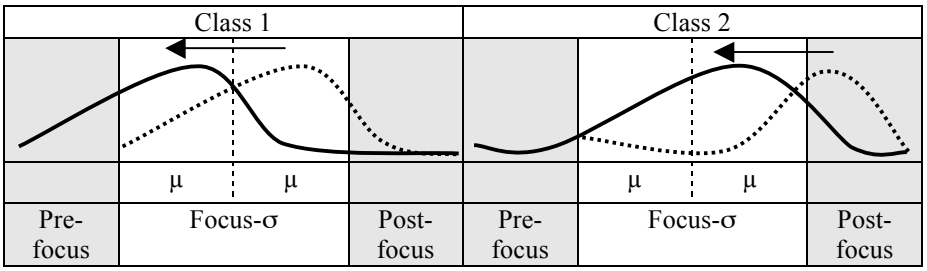
(4) The development from the predecessor towards Rule O



b) The development towards Rule A

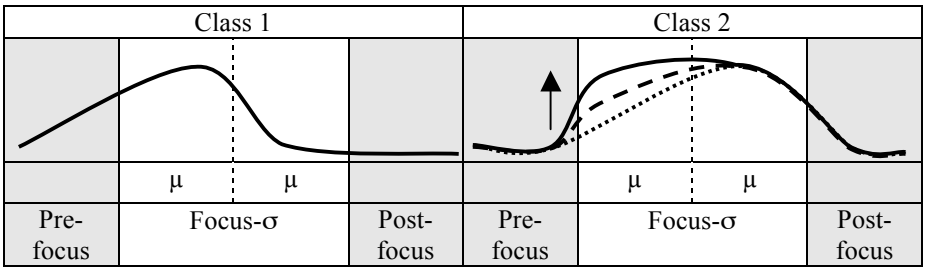
As indicated above, Rule A displays a further development in the adaptation process. Here, the intonational melody in declaration was changed from L*HL to LH*L. This might be due to a phonological reinterpretation: if, as we find in Class-1 cases, the low tone is phonetically located at the left edge of the syllable, it sometimes may have been realized pre-focally – synchronically, we still find this in the Hasselt dialect. This again may have led a new generation of learners to analyze it as a pre-focal low tone: the high trailing tone was reinterpreted as the starred tone, and the melody changed from L*HL to LH*L:

(5) First step in the development from Rule O towards Rule A



In a last step, the Class-2 contours were adjusted in such a way that they fulfilled a requirement that having H* as the starred focal tone imposes on the focus syllable: the pitch at the beginning of the focused syllable had to be raised to a point where it corresponded to a phonological high tone. Different dialects implemented this last adjustment in different ways. Whereas some dialects raised pitch only to a certain level, so that the spread high tone within the focus syllable is still phonetically realized as a rise (e.g. Roermond), other dialects raised pitch further to a high level contour (e.g. Cologne). Therefore, in comparison to Cologne, Roermond can be regarded as an older stage in the adjustment of the phonetic contours. The process is illustrated in (6). Roermond is represented with a dashed line, whereas Cologne is represented with a solid line:

(6) Second step in the development from Rule O towards Rule A

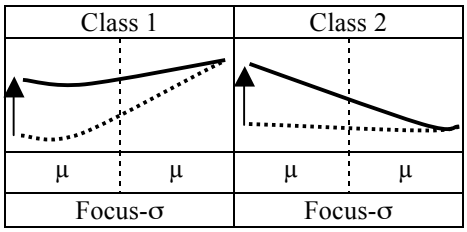


c) The development towards Rule B

Rule B displays a different adaptation strategy. Here, a neighboring H*L-declaration melody was borrowed and incorporated into the Rule-B system, replacing the old L*HL-melody.[84] Phonetically, this led to two adjustments in the declaration contour. First of all, pitch was raised at the beginning of the focus syllable, thereby introducing a high starred tone:

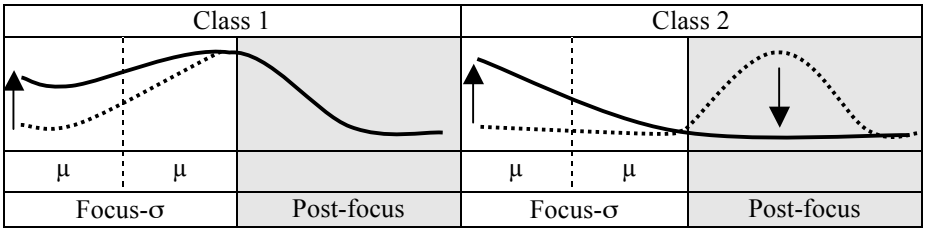
[84] In an alternative approach, we might also regard this as a system-internal process, whereby the L* of a L*HL melody is deleted, resulting in a H*L melody.

(7) The development from the predecessor towards Rule B (focus syllable)



The pitch contours that were created during this process are still retained in the synchronic system. However, one more adjustment had to accompany this change. By implementing H*L into the grammar, the former post-focal high pitch target in Class-2 words (originating from the former L*H melody) was eliminated; post-focal pitch was lowered, and the Rule B-system was adjusted to its present structure:

(8) The development from the predecessor towards Rule B (post-focus)



This process towards the development of Rule B might seem more complicated than that to Rule A from a phonetic perspective, since phrases with a Class-2 word in non-final focus position underwent pitch-raising in the focus syllable as well as post-focal pitch-lowering. However, from a phonological perspective, this change was less dramatic than that from Rule O to Rule A. Note that, as I have shown in the course of chapter 3, the Hasselt system (Rule O) and the Arzbach system (Rule B) are phonologically similar – i.e., the two most crucial constraints in determining the phonological system, *μ' / L and T → μ', are ranked *μ' / L >> T → μ' in both dialect groups. Cologne and Roermond, however, have a ranking of T → μ' >> *μ' / L. This suggests that the change from Rule O to Rule A came along with a constraint reranking (most likely as a consequence of a phonological reinterpretation) whereas the change from Rule O to Rule B can be understood as an implementation of a new declaration melody while keeping the original phonological system intact.

d) Summing up: the diachronic development towards Rule A and Rule B

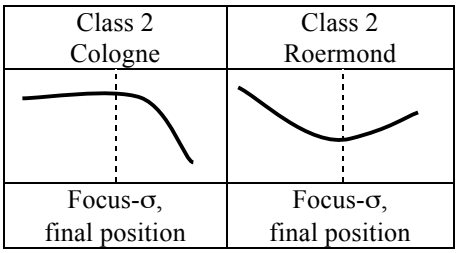
As I have shown, the split between Rule A and Rule B and the accompanying tonal semi-reversal can be understood as a result of different strategies for adapting to neighboring dialects. In order to adapt to their neighbors, Rule-A dialects as well as

Rule-B dialects gave up the original rising declaration contours. However, in doing so, they opted for different strategies. Whereas in Rule A, the complete sentence intonation was shifted to the left (which we might call *a horizontal change*), Arzbach speakers borrowed a neighboring H*L declaration system into their dialect. The primary phonetic correlate was a raising of pitch at the beginning of the focus syllable (*vertical change*). These different strategies led to the semi-reversed tonal contours that constitute the difference between the two dialect areas.

7.2.3 One step beyond: phrase-final declaratives in Rule A

Now that the basics of the development towards Rule A and Rule B have been discussed, I would like to address one more crucial question with respect to the tonal mapping within Rule A. We find two variant realizations of phrase-final Class-2 syllables in declaration - either with a high level tone and a late fall (e.g. Cologne), or with an early fall followed by a final rise (e.g. Roermond):

(9) Synchronic variants of realizing Class 2 in phrase-final declaratives, Rule A



Recall that the adaptation of the tonal contours was carried out with a leftward movement of the former tonal contour in these dialects. In phrase-final position, however, the strategy might have worked differently: note that in these cases, there is no (overt) post-focal domain to the right of the focus syllable that could be shifted to the focus syllable. Both dialects must have chosen different strategies, which I discuss below in a) for Cologne and b) for Roermond. In c), I discuss the question whether there might be a diachronic order between these shifts.

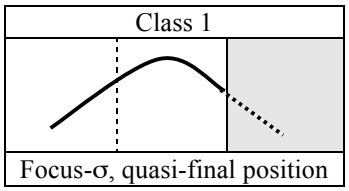
a) Cologne
In Cologne, the tonal focus contour from non-final positions was transferred to final positions: whereas Class 1 remained identical (early fall), the interaction with the prosodic boundary (marked with a low tone) led to a late fall in interrogation. How these contours can be implemented in a grammar in my approach has been discussed in subsection 5.5.3.

b) Roermond

The Roermond strategy was more complex than the Cologne one: I assume that a leftward shifting of the sentence intonation was possible and applied to Class-1 words. However, shifting was *impossible* for Class-2 words – therefore, a high starred tone was introduced into the tonal contour.

In order to explicate these changes, let us take another look at the original contours: recall that my synchronic approach to the Franconian tone accents implies that Class-1 words are obligatorily disyllabic (see Chapter 5 for discussion and synchronic evidence for my claim). Furthermore, as I will explicate in section 7.3, I regard this (surface) representation to be valid from the initial stage of the opposition on: that is, Class-1 words have always been (at least) disyllabic. This implies that, whereas there was no *overt* second syllable in seemingly phrase-final Class-1 words, there always was an empty-headed second syllable present. Therefore, the Roermond speakers might have incorporated this knowledge into the shift.[85] In the original system, this might have looked as shown in (10):

(10) Class 1 in phrase-final declaratives, predecessor

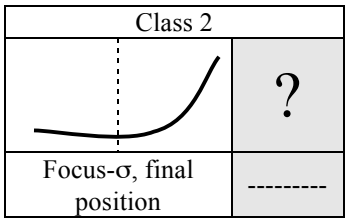


In (10), the dotted line in the grey-shaded area (the empty-headed second syllable) indicates that part of the tonal contour that remains unpronounced but might be present in the speakers' heads. Assuming the speaker made use of that knowledge during the transition from Rule O to Rule A, the process would work along the same lines as has been described for the change from Rule O to Rule A in subsection 7.2.2. In the case at hand, however, the leftward movement would render originally inaudible parts of the tonal contour audible.

In Class 2, we would have to assume a different strategy, since Class-2 words can be monosyllabic and can thus occur in phrase-final position: in such cases, there was no post-focal tonal melody (audible or inaudible) that could have been shifted into the focus syllable. This is shown in (11); the non-existence of post-focal space is indicated with a question mark:

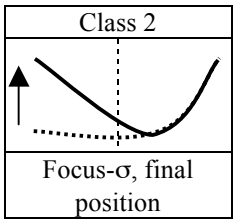
[85] This might in fact also be true for the Cologne speakers, who, as a consequence, then only transferred the Class-2 contours from non-final to final positions.

(11) Class 2 in phrase-final declaratives, predecessor system



Since shifting was not possible under these circumstances, the Roermond speakers seem to have transferred the high starred tone of the new declaration melody (see above, section 4.2.2) to the phrase-final focus contour. The outcome of this process led to the structure in (12), which closely resembles the recent tonal contour in Roermond:

(12) Development from the predecessor towards Rule A, Class 2, phrase-final declaratives



From a phonological perspective, the high tone at the end of the intonational melody survived as a high boundary tone, whose occurrence is restricted to phrase-final Class-2 words. In Class-1 words, it cannot show up as a boundary tone since this syllable is not phrase-final. Furthermore, in syllables with only one (sonorant) mora, it remains unrealized: in these cases, we would have to express the three tonal targets HLH on one mora – I exclude this massive crowding on principled grounds, as stated in subsection 5.4.3. Therefore, the high boundary tone is deleted. How this change can be implemented in a phonological grammar along the lines of my approach has been shown in section 5.6, the synchronic analysis of the Roermond dialect.

c) Might there be a diachronic order between these changes?

While giving a possible explanation for the differences between phrase-final Class-2 syllables in Roermond and Cologne, I have been treating these as independent developments. However, in concluding this subsection, we might reflect upon the question whether one of the two systems could be older than the other.

If the strategies proposed in a) and b) are not independent developments but two stages of a single diachronic development, Roermond might display an older stage and Cologne an innovation. The argument runs as follows: as mentioned above, the occurrence of the Roermond high utterance-final boundary tone sequence is restricted to phrase-final Class-2 syllables. Due to these relatively heavy occurrence restrictions, we might regard it as being potentially endangered. Therefore, it might display a tendency to disappear in some dialects. If that happens, only the low boundary tone is left – by implementing this change into the phonological system, we end up with a system like the one we find in Cologne.

In principle, going the opposite way (assuming the introduction of a high utterance-final boundary tone in Roermond) might be possible as well; however, the implementation process - for instance the restriction to phrase-final Class-2 syllables - strikes me as being much more complex than the alternative development from the Roermond system towards the Cologne system. Therefore, I conclude that if one of the two systems is older, it is more likely the Roermond one, and Cologne is a derived innovation.

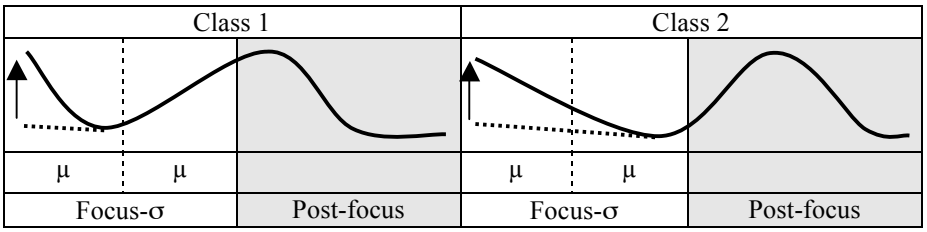
7.2.4 Two implications of my approach

Implication I: another possible adaptation strategy. Above, I have discussed two different phonetic and phonological strategies for 'creating' intonational melodies with a high starred tone, leading to Rule A and Rule B. Interestingly, neither strategy simply involved the introduction of a new high starred tone, while keeping the original tonal melody LHL. This again would create a rather complex intonational melody with three trailing tones: H*LHL.

Maybe it is the complexity of this melody that makes this a (possibly) undesirable adaptation strategy. Still, there might still be dialects that went this way. One such example might be provided by the Tongeren dialect. However, note that for the Tongeren dialect, little data has been published so far: Gussenhoven (2004, 246) points out that "more work on Tongeren is needed." Since I base myself only on idealized contours taken from Gussenhoven (2004), my preliminary conclusions have to be treated with care, until more data eventually confirm the patterns.

The introduction of an initial H* into an original L*HL melody would probably result in a tonal contour like the one shown in (13):

(13) Possible development from the predecessor towards the Tongeren system



Note that these different intonation contours match the idealizations in Gussenhoven (2004) surprisingly well. Thus, the predicted adaptation strategy might indeed be found in Tongeren.

Implication II: what speakers can do. My proposal has two important implications concerning what speakers of a dialect are capable of when adapting to neighboring dialects: they concern the general ability of speakers to adapt to tonal contours from neighboring non-accent dialects as well as the phonetic implementation of intonational melodies. The first implication is given in (14):

(14) Tone accent dialects *can* incorporate intonational melodies from non-accent dialects into their own system – even *without* giving up the accent contrast

This implication follows from my claim that the changes that have been described can (probably) be attributed to influence of neighboring non-accent dialects. With respect to this claim, de Vaan (p.c.) has pointed out to me that it might be problematic to assume a borrowing scenario (or an adaptation towards neighboring intonational contours) since it would be difficult for speakers to take over or adapt to neighboring intonational melodies. To a certain degree, I agree with this remark. One could for instance assert that with respect to single speakers, the acquisition of a limited dialect competence in Franconian dialects comes at the cost of the tone accent opposition. Consider the case of one of the subjects in an experiment by Werth (to appear): the subject, who moved to Mayen at young age, considered herself to be fully competent in the local dialect. However, as perception tests showed, she was not able to identify the tone accents correctly. Thus, whereas she was still able to adapt to the phoneme system of the Mayen dialect, she was incapable of acquiring the tone accent contrast.[86]

However, this does not necessarily imply that it is impossible to take over tonal contours from other dialects. If tonal melodies could not be borrowed, might we then have to regard the Franconian tone accent area with its various dialects as a

[86] Furthermore, there is a lot of anecdotal evidence indicating that the acquisition of the tone accents seems to become more difficult at a certain age (Boersma p.c.).

consequence of *independent* developments for each of these dialects? This seems very unlikely. Furthermore, there is various evidence indicating that several Franconian dialects may have adopted Standard Dutch or Standard German intonational melodies without giving up on the accent contrast (Gussenhoven & Van der Vliet 1999, Fournier 2008 for Venlo, Hanssen 2005 for Sittard, Peters 2006a for Cologne).

As these examples show, adapting towards neighboring intonational systems must be possible and furthermore does not have to come at the cost of neutralization. Therefore, the implication in (14) seems to be confirmed by independent data from various Franconian dialects.

The second implication is given in (15):

(15) The development from the predecessor to Rule A implies that there can be different phonetic realizations of the same intonational melody.

This must be the case, since in the predecessor system, declaration and interrogation contours were identical (see above, subsection 7.2.1). Then, however, the leftward shift began in declaratives, leading to a reinterpretation of L*HL as LH*L. The interrogation melody, however, basically remained the same in Rule A, so that one original intonational melody was split into two.

Note that from a cross-linguistic perspective, different phonetic implementations for identical intonational melodies are well attested. As has been pointed out by Gussenhoven (2004), there are several instances where declarative intonation and interrogative intonation are phonologically identical but are interpreted in different ways phonetically. For instance, as Shen (1990) and Duanmu (2000) show, questions are pronounced with higher pitch than statements in Standard Chinese. Furthermore, in Swedish, final falls in declaration have the tendency to be realized more strongly and / or with lower pitch than final falls in interrogation (Gussenhoven 2004). In conclusion, I regard the possibility of having different phonetic implementations for phonologically identical intonational contours as sufficient evidence to regard the implication in (15) as being verified.

7.2.5 Alternative approaches

Over the course of time, several approaches have been published to account for the reversal of tonal contours between Rule A and Rule B. As has been briefly mentioned in subsection 7.2.1, there are two ways of approaching the phenomenon: on the one hand, two independent developments have been assumed (Bach 1921, Boersma 2006, Kortlandt 2007). The viewpoint taken by Schmidt (2006), on the other hand, regards the reversal as the outcome of a borrowing scenario where Rule-B dialects adapted to Rule-A dialects but reversed the tonal melodies.

These proposals have in common that they are necessarily based on data from Bach (1921). However, following traditional methods, Bach (1921) only discusses the realization of the tone accents in declaration. This limitation to one pragmatic environment leads Bach (and following generations of researchers) to the conclusion that there is a reversal in the lexical distribution of the accents, thereby implying that the contours in interrogation should be reversed as well (see subsection 3.5 for further discussion).

Accordingly, all former approaches that aimed at explaining the origins of the rule reversal took the assumption of a full tonal reversal as a starting point. However, the data I gathered for this thesis show that there is not a full reversal of tonal contours: in interrogation, the tonal contours are not reversed but strongly resemble those in Rule A (see section 3.5 for a comparison between the contours in Rule B and Rule A). As I have argued in section 4.2, this implies that the difference between Rule A and Rule B cannot be regarded as the outcome of a distributional reversal. Therefore, former approaches to the phenomenon cannot be maintained since they inevitably started out from incorrect fundamental assumptions.

For these approaches, integrating the newly gathered data would only be possible if one would regard the uniformity in the interrogation contours of Rule A and Rule B as an innovation. That is, we would have to assume that Rule B once had fully reversed tonal contours and adapted to the interrogative intonation of Rule A dialects at a later stage.

In a borrowing scenario (as in Schmidt 2006), we thus would have to say that first, Rule B borrowed the accents from Rule A but reversed the tonal melodies. At a later stage, again under the influence of Rule A, Rule B *re-reversed* the tonal melodies, but only in interrogation.

When proposing a fully independent development (as in Bach 1921 or Kortlandt 2007), we have to start out from the assumption that the genesis of the tone accents in Rule B was independent of that in Rule A. This implies that in neighboring areas, an accent contrast developed independently, however with an almost identical lexical distribution. Taking into account that a distribution like that of the Franconian tone accents is unattested in other languages, this would be a rather amazing coincidence. Furthermore, as in the borrowing scenario, we would have to assume that at a later stage, Rule B adopted only the interrogative contours from Rule A, thereby reversing the tonal melodies of their original interrogative intonation.

In comparison with my approach, both of these possible scenarios seem much more complex to me with respect to the basic assumptions and the necessary steps in the diachronic development. Especially the necessary assumption of Rule B partially re-reversing the tonal melodies in interrogation seems hard to incorporate into a plausible approach: it would involve a complete reversal of the interrogative

melodies within the dialect. That is, early rises in Class 2 would have to become late rises, and at the same time, late rises in Class 1 would have to change to early rises.

7.3 The emergence of the tone accents: phonologization of a sonority contrast

This section serves to provide a connection between my synchronic analysis of the tone accents and the diachronic development of the opposition. It argues that from the initial stage, the surface structure of the tone accents was the same as the one proposed in section 4.2. However, it was not functionally relevant yet but resulted from a predictable interaction between vowel quality and prosodic structure. Thus, the section is concerned with the stage that predates the period when the tone accents became contrastive (see de Vaan 1999, Gussenhoven 2000b, Schmidt 2002, Boersma 2006, to appear, Kortlandt 2007, Hermans 2008, 2009, Kehrein to appear for proposals concerning the genesis of this contrast).

The nature of the interaction between vowel quality and prosodic structure that I propose is strongly related to the defining characteristics of this initial period: a variety of scholars agree that at the stage before the tone accents became functionally relevant (i.e. before there were tonal minimal pairs), there was an *allophonic contrast* in the tonal contours of old long mid and low vowels on the one hand, and other phoneme groups on the other hand (see de Vaan 1999, Schmidt 2002, Boersma 2006, to appear, Kortlandt 2007, Hermans 2008, 2009, Kehrein to appear).[87] This difference is still reflected synchronically: the successors of non-high long monophthongs obligatorily belong to Class 1, whereas high vowels, diphthongs, and short vowels plus sonorants can belong to both accent classes (see section 4.3 for further discussion).[88]

In the following, I would like to consider the thought that *sonority* played a key role in the development of this allophonic difference (see Hermans 2008, 2009 for a related proposal): whereas the phonetic correlates of sonority itself are difficult to define,[89] there is wide agreement that (peripheral) mid and low vowels are *more sonorous* than (peripheral) high vowels. As has been shown repeatedly, sonority is an important factor in the interaction of vowel quality and prosodic structure. In a nutshell, we can say that head positions prefer highly sonorous vowels, whereas non-head positions prefer vowels with low sonority (see for instance Kenstowicz 1994a, 1994b, 2004, de Lacy 2002b, 2004, 2006).

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[87] To my knowledge, Mihm (2002) is the only paper on Franconian where the obligatory Class-1 membership of old non-high long vowels is regarded as an outcome of a neutralization process subsequent to the genesis of the opposition rather than as a consequence of an initial special status of these vowels.

[88] Lengthened vowels are not included here, since vowel lengthening occured at a later stage of the diachronic development.

[89] Note that – from a phonetic point of view – this notion is certainly problematic: despite the fact that – going back to at least Sievers (1893) – sonority (or a related notion) is a widely accepted principle for the internal structure of syllables, no clear definition of a primary phonetic parameters has been provided (see Kenstowicz 1994). Instead, several multidimensional correlates have been proposed, such as duration, amplitude, voicing, hiss and silence (see e.g. Price 1980).

I assume that the allophonic difference between the abovementioned phoneme groups derives from these differences in sonority: I claim that mid and low vowels were interpreted as being *prosodically stronger* than the other relevant phoneme groups. That is, based on my analytical concept introduced in subsection 5.2.1, they were interpreted as too strong to appear in the weak position of a foot, or, in other words, too strong to occur outside of a foot head domain. To ensure that both moras of long mid and low vowels are strong, they were footed as syllabic trochees: as follows from my approach, both moras within a heavy syllable are part of the foot head domain if the foot branches at the syllable level.

Crucially, this created a prosodic opposition between two accent classes since syllabic trochees were marked feet: I claim that, originally, only moraic trochees – i.e., trochaic feet that branch at the mora level – were tolerated in Franconian.[90] This default moraic trochee was kept for high vowels as well as for short vowels plus sonorants, since in these cases, the second mora was not too sonorous to be in the dependent position.[91]

Formally, the interaction of vowel quality and prosodic structure can be expressed as follows: first of all, we have to capture the fact that mid and low vowels are prohibited in the weak position of a foot. Adopting de Lacy (2006)'s framework (at least at a descriptive level), we can express this with the constraint given in (16): [92]

(16) *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o: Peripheral mid and low vowels are prohibited outside of the foot head domain

This constraint is based on the sonority hierarchy given in (17):

(17) Sonority hierarchy for vowels following Kenstowicz (1994b) and de Lacy (2006)

low vowels > mid-low peripheral vowels > mid-high peripheral vowels > high peripheral vowels > mid central vowels > high central vowels

[90] This markedness relation is reflected synchronically: I claim that moraic trochees (characterizing Class 2) are still the unmarked Franconian feet, as opposed to the marked syllabic Class-1 trochee (see section 5.7 for further discussion).

[91] Since, as I have argued in section 7.2, the Hasselt dialect still reflects the original situation from a phonological perspective, the footing difference must therefore have resulted in an early-aligned low tone for Class 1 (with a subsequent rise that may have continued post-focally) versus a low level tone (possibly with a late rise that continued post-focally) for Class 2.

[92] Since it is not of immediate relevance for this thesis, I do not discuss the question whether sonority effects are expressed by a constraint set (as e.g. de Lacy 2006 argues) or follow from the representation of segments (see for instance Van Oostendorp 1995, Hermans 2008). See Köhnlein (to appear) for further discussion.

High-ranked *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o militates against mid and low peripheral vowels in the weak position of a foot. Crucially, high vowels and closing diphthongs are not affected by this constraint.

In order to exemplify this, let us first consider an item with a long high vowel, as for instance MHG *sîte* 'side', which is given as /ziitə/ (/ii/ indicates an underlyingly bimoraic vowel). The foot structure of this item is displayed in (18):

(18)

(18) shows that the item is footed as a moraic trochee with an unparsed second syllable. As has been argued in section 5.7, the disyllabic foot is excluded in this standard footing process since it would violate RH-CONTOUR; this constraint requires each foot to end in a strong-weak contour at the moraic level (see subsection 5.7.1, (142)). The second syllable remains unparsed due to FTBIN (see subsection 5.7.1, (144)). To understand the differences in footing between high vowels and non-high vowels, we have to consider the ranking *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o >> RH-CONTOUR; as we can observe in (19), high-ranked *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o does not influence the prosodification of /siitə/:

(19) *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e >> RH-CONTOUR

	μ μ μ s i t ə	*FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o	RH-CONTOUR
→ a.	(σ) σ μ' μ μ s i t ə		
b.	(σ' σ) μ' μ' μ s i t ə		*!

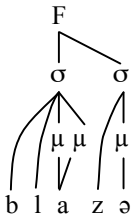
In a second step, let us take a look at words with long mid / low vowels: when the sonority difference between mid and low vowels and the other relevant phoneme groups was phonologized, all mid and low vowels were footed as syllabic trochees; this satisfied high-ranked *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o. Note that there are other possible ways to satisfy this constraint. For instance, the quality of the vowels might be changed, either by means of diphthongizing them to closing / centralizing diphthongs, or by means of raising.[93] This is prohibited by a set of faithfulness constraints, which I combine in the constraint in (20):

(20) FAITH-IO (MID, LOW): Mid and low vowels must be preserved.[94]

In Franconian, FAITH-IO as well as *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o must have been high-ranked. That is, mid and low vowels could not appear in the weak position of a foot but their quality had to be preserved. Therefore, the only way to satisfy both constraints lay within building a syllabic trochee where the foot head domain incorporates *both* moras of the first syllable. Below, I show how this is applied to mono- as well as to disyllabic words.

Let us begin with a disyllabic word: the prosodification of for instance MHG *blâse* 'blister', which I give as /blaazə/, is shown in (21):

(21)



As we can observe in (22), high-ranked *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o and FAITH-IO (MID, LOW) force the grammar to build a foot that branches at the syllable level. This structure violates RH-CONTOUR, which requires each foot to end in a strong-weak contour at the moraic level. The corresponding OT tableau is shown in (22). I do not discuss the process of moraification and already include all moras in the input. The footing is indicated in brackets:

[93] Another possible solution, which I do not include into the tableau, might be to shorten the vowel. This could be prohibited by e.g. MAX-μ.

[94] Note that this formulation of the constraint might create problems with respect to schwa if it was specified as being [mid]. Here, I follow Van Oostendorp (1995) and regard schwa as a featureless vowel.

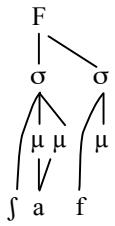
(22) FAITH-IO (MID, LOW), *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e >> RH-CONTOUR

		FAITH-IO (MID, LOW)	*FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o	RH-CONTOUR
	μ μ μ bla z ə			
→ a.	(σ σ) μ'μ' μ bla z ə			*
b.	(σ) (σ) μ' μ μ' bla z ə		*!	*
c.	(σ) σ μ' μ μ bla z ə		*!	
d.	(σ) σ μ' μ μ bli z ə	*!		

In originally monosyllabic words with a long non-high vowel, the footing procedure is slightly more complex. Here, in order to build a syllabic trochee, a second syllable has to be created. Let us assume that this is done by insertion of a mora (violating DEP-μ); this mora is parsed by an empty-headed syllable.

Take for instance the MHG word *schâf* 'sheep', which I give as underlying /ʃaaf/. After the prosodification process, we get the following output structure:

(23)



The corresponding OT implementation is shown in (24). Note that in this case, I only give the two underlying moras of the long vowel in the input:

(24) {FAITH-IO (MID, LOW), *FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e} >> {RH-CONTOUR, DEP-μ}

	μ μ ʃ a f	FAITH-IO (MID, LOW)	*FT-NON-HD / a, ɑ, æ, ɛ, ɔ, e, o	RH-CONTOUR	DEP-μ
→ a.	(σ' σ) μ' μ' μ ʃ a f			*	*
b.	(σ) μ' μ ʃ a f		*!		
b.	(σ) μ' μ ʃ i f'	*!			

The sketched interaction of vowel quality and prosodic structure marks the birth of Class 1 (long mid and low vowels) as being opposed to Class 2 (other relevant phoneme groups). Crucially, the footing of both accent classes at this early stage is already the same as the synchronic surface structures that I have introduced in

subsection 5.2.1. However, the ways to get to these surface structures still differ from each other: whereas, at the initial stage, the Class-1 footing was the result of a phonological process, it has been lexicalized synchronically. I do not discuss the details of this lexicalization process any further: most likely, the change from a predictable opposition to a lexical contrast originates from a phonological reanalysis, as has been argued by for instance Schmidt (2002, on apocope) or Boersma (2006, to appear, on Open Syllable Lengthening). Their approaches might differ from mine with respect to the representation of the opposition – Schmidt and Boersma propose mora accent contrasts. However, since these analyses are based on comparable pitch contours to the ones I established in section 7.2 (early movement for Class 1, late movement for Class 2), my proposal can be integrated into both theories.

7.4 A revised lexical distribution for the Arzbach accents

As has been stated in section 1.2, the synchronic lexical distribution of the tone accents correlates with an idealized MHG reference system: the accent class a certain item belongs to synchronically can be deduced from the MHG form of that item. In this section, I revise the lexical distribution of lengthened vowels as it has been published in Bach (1921). Since my revised distribution of the Arzbach accents indicates similarities with Rule A as well as with Rule A2, I start by introducing these distributions.

7.4.1 The most widespread distribution: Rule A

The Rule-A distribution is the most widespread distribution within the tone accent area. It is given in Table 4.3 (examples taken from Münch 1904, Cologne).[95]

[95] See e.g. Müller (1900, Aegidienberg) and Schmidt 1986 (Mayen) for more data from Rule A-dialects.

<table>
<tr><th colspan="3">Lexical distribution for Rule A</th></tr>
<tr><th colspan="3">Class 1</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Long mid and low vowels</td><td colspan="2">all[96]</td></tr>
<tr><td>Long high vowels</td><td colspan="2" rowspan="4">+ voiced syllable boundary
+ schwa (retained or apocopated)[97]</td></tr>
<tr><td>Closing diphthongs</td></tr>
<tr><td>Short vowels + sonorant</td></tr>
<tr><td>Lengthened vowels</td></tr>
<tr><th colspan="3">Class 2</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Long high vowels</td><td rowspan="4">(+) auslaut[98]</td><td rowspan="4">+ non-voiced syllable boundary[99]
+ schwa (retained or apocopated)</td></tr>
<tr><td>Closing diphthongs</td></tr>
<tr><td>Short vowels + sonorant</td></tr>
<tr><td>Lengthened vowels</td></tr>
</table>

Table 4.2: Lexical distribution for Rule A. Different categories are marked with solid lines whereas dashed lines indicate optional possibilities within one category.

As Table 4.2 shows, original long low and mid vowels always belong to Class 1, independent of the context they occur in (*spontaneous accentuation*). This is different for the other phoneme groups (long high vowels, closing diphthongs, short vowels plus sonorant, lengthened vowels): these can belong to both accent classes (*combinatory accentuation*). Only words that were originally followed by a voiced syllable boundary belong to Class 1 synchronically: that is, they must have been (at least) disyllabic; furthermore, all intervening consonants between the relevant phoneme group in the stressed accent syllable and the schwa in the second syllable must have been voiced. In Rule A, it does not matter whether the second syllable was retained or was lost through schwa-apocope. This is different in Rule A2 (see below, subsection 4.3.2).

---

[96] Note that these vowels correspond to MHG ê – oe – ô, ie – üe – uo, æ – â. Examples are: [kli:^{c1}], MHG *klê*; [lu:n^{c1}], MHG *lôn*, 'wages'; 'clover'; [le:t^{c1}], MHG *lied*, 'song' [ho:t^{c1}], MHG *huot*, 'hat'; [ɔ:s^{c1}], MHG âs, 'carrion'. According to Frings (1913), ie – üe – uo are direct reflexes of West Germanic ē – ō in Franconian, and thus they have never been diphthongized. Whereas this might not be true for the whole area (counterevidence might be provided by Middle Limburgian manuscripts, Ben Hermans, p.c.), this difference is not crucial for the purposes of this thesis. Therefore, I do not discuss this issue any further and treat ie – üe – uo as monophthongs. See e.g. Schmidt (2002) and Goossens (2006) for further discussion.

[97] [ʃru:fœ^{c1}], MHG *schrûbe*, 'screw'; [dri:^{c1}və], trîben, 'to drift'; [me:^{c1}nə], MHG *meinen*, 'to mean'; [ʃte:n^{c1}], MHG *steine*, 'stone-dat.'; [kan^{c1}], MHG *kanne*, 'can'; [bi^{c1}ŋə], MHG *binden*; [ʃla:^{c1}ɣə], MHG *slagen*, 'to punch'; [bei^{c1}], MHG *bine*, 'bee'

[98] [bɔu^{c2}], MHG *bû*, 'building'; [hu:s^{c2}], MHG *hûs*, 'house-nom.'; [dro:m^{c2}], MHG *troum*, 'dream'; [ʃte:n^{c2}], MHG *stein*, 'stone'; [fiŋk^{c2}], MHG *fink*, 'finch'; [dɑmp^{c2}], MHG *tampf*, 'steam'; [fla:s^{c2}], MHG *vlahs*, 'flax', [da:l^{c2}], MHG *tal*, 'valley

[99] [ri:f^{c2}], MHG rîfe, 'frost'; [ʃli:^{c2}fə], MHG *slîfen*, 'to polish'; [me:^{c2}stɐ], MHG *meister*, 'master' [lo:^{c2}fə], MHG *loufen*, 'to run'; [bliŋ^{c2}kə], MHG *blinken*, 'to blink'; [viŋk^{c1}tɐ], MHG *winter*, 'winter' [ka:^{c2}stə], MHG *kasten*, 'box', [hɔu^{c2}fə], MHG *hoffen*, 'to hope'

All other possible segmental combinations lead to a Class-2 membership: monosyllabic words (accent-carrying phoneme in the auslaut or followed by one or more auslaut consonants) belong to Class 2. Additionally, all words where the relevant phonemes have originally been followed by a non-voiced syllable boundary (a voiceless onset consonant and / or a voiceless coda consonant) belong to Class 2 as well.

7.4.2 The most widespread variant: Rule A2

Consider the distribution of Rule A2 in Table 4.3 (examples from Boersma 2006, Geleen).[100] Shaded boxes indicate the differences between Rule A and Rule A2.

[100] See e.g. Dols (1953, Sittard), Goossens (1959, 2010, Genk), Grootaers and Grauls (1930, Hasselt) and Endepols (1955, Maastricht) for more data from Rule A2-dialects. In the details, we find distributional differences between different dialects; however, the distribution given here seems to be the most widespread one among Rule-A2 dialects.

<table>
<tr><th colspan="4">Lexical distribution for Rule A2</th></tr>
<tr><th colspan="4">Class 1</th></tr>
<tr><th>Phoneme group</th><th colspan="3">Segmental context</th></tr>
<tr><td>Long mid and low vowels</td><td colspan="3">all[101]</td></tr>
<tr><td>Short vowels + sonorant</td><td colspan="3">+ voiced syllable boundary
+ schwa (retained or apocopated)[102]</td></tr>
<tr><td>Long high vowels
Closing diphthongs
Lengthened vowels</td><td colspan="3">+ voiced syllable boundary
+ apocopated schwa[103]</td></tr>
<tr><th colspan="4">Class 2</th></tr>
<tr><th>Phoneme group</th><th colspan="3">Segmental context</th></tr>
<tr><td>Short vowels + sonorant</td><td>(+) auslaut [104]</td><td colspan="2">+ non-voiced syllable boundary[105]
+ schwa (retained or apocopated)</td></tr>
<tr><td>Long high vowels
Closing diphthongs
Lengthened vowels</td><td>(+) auslaut [106]</td><td>+ non-voiced syllable boundary[107]
+ schwa (retained or apocopated)</td><td>+ voiced syllable boundary
+ retained schwa[108]</td></tr>
</table>

Table 4.3: Lexical distribution for Rule A2. Different categories are marked with solid lines whereas dashed lines indicate optional possibilities within one category. Differences from the Rule-A distribution are grey shaded.

While Rule A2 displays large similarities with the Rule-A distribution given in Table 4.3, there is one important difference between the two dialect areas: they differ from each other with respect to the interaction of originally voiced consonants and schwa drop for high vowels, diphthongs, and lengthened vowels. Whereas in Rule A, all words with originally voiced consonants plus original schwa belong to Class 1, this is only true for *apocopated* forms within Rule A2 – words where we find a voiced syllable boundary and a retained schwa belong to Class 2.

---

[101] [ʃlɔ:^{c1}pən], MHG *slâfen*, 'to sleep'; [kne:^{c1}], MHG *knie*, 'knee'

[102] [vɑ^{c1}lən], MHG *vallen*, 'trap-pl'; [mɑ^{c1}ɲən], MHG *manden*, 'basket-pl.', (Boersma p.c.); [zon^{c1}], MHG *sunne*, 'sun'; [vɑl], MHG *valle*, 'trap'

[103] [ʃi:^{c1}v], MHG *schîbe*, 'disc'; [du:v^{c1}], MHG *tûbe*, 'pigeon'; [ɔuɣ^{c1}], MHG *ouge*, 'eye'; [ɑlɛin^{c1}], MHG *alleine*, 'alone'; [na:m^{c1}], MHG *name*, 'name'; [ʃto:v^{c1}], MHG *stube*, 'stove'

[104] [mɑn^{c2}], MHG *man*, 'man'; [domp^{c2}], MHG *tump*, 'stupid'

[105] [dɛŋ^{c2}kən], MHG *denken*, 'to think'; [kɑɲ^{c2}cən], MHG *kanten*; 'side-pl.'

[106] [hu:s^{c2}], MHG *hûs*, 'house'; [vrij^{c2}], MHG *vrî*, 'free'; [ʃtɛin^{c2}], MHG *stein*, 'stone'; [bɔum^{c2}], MHG *boum* 'tree'; [da:x^{c2}], MHG *tac*, 'day'; [hɔ:f^{c2}], MHG *hof*; 'yard'

[107] [bi:^{c2}tən], MHG *bîszen*, 'to bite'; [ri:^{c2}kən], MHG *rîchen*, 'rich-masc/sg'; [ʃlɛi^{c2}pən], MHG *sleifen* 'to drag'; lɔu^{c2}pen, MHG *loufen*, 'to run'; [wɛ:^{c2}kən], MHG *wochen,* 'week-pl.'*;* [ma:^{c2}kən], MHG *machen*, 'to make';

[108] [bli:^{c2}vən], MHG *belîben*, 'to stay'; [du:^{c2}vən], MHG *tûben*, 'pigeon-pl.'; [ɔu^{c2}ɣən], MHG *ougen*, 'eye-pl.'; klɛi^{c2}nən, MHG *kleinen*, 'small-masc-sg.'; [lɛ:^{c2}vən], MHG *leben*, 'to live'; [hɔ:^{c2}lən], MHG *holen*, 'to fetch'

7.4.3 Between Rule A and Rule A2: Rule B

Bach's distribution for Arzbach. Table 4.4 sums up Bach's distribution for Arzbach.[109]

<table>
<tr><th colspan="3">Lexical distribution for Arzbach, following Bach (1921)</th></tr>
<tr><th colspan="3">Class 1</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Orig. mid and low vowels</td><td colspan="2">all[110]</td></tr>
<tr><td>Orig. high vowels</td><td colspan="2" rowspan="3">+ voiced syllable boundary[111]</td></tr>
<tr><td>Orig. closing diphthongs</td></tr>
<tr><td>Short vowels + sonorant</td></tr>
<tr><td>Lengthened vowels</td><td colspan="2">+ sonorant, g + schwa (retained or apocopated)[112]</td></tr>
<tr><th colspan="3">Class 2</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Orig. high vowels</td><td rowspan="3">(+) auslaut[113]</td><td rowspan="3">+ non-voiced syllable boundary[114]</td></tr>
<tr><td>Orig. closing diphthongs</td></tr>
<tr><td>Short vowels + sonorant</td></tr>
<tr><td>Lengthened vowels</td><td colspan="2">+ obstruent (except g)[115]</td></tr>
</table>

Table 4.4: Bach's lexical distribution for Arzbach. Different categories are marked with solid lines whereas dashed lines indicate optional possibilities within one category. Differences from the Rule-A distribution are grey shaded.

Following Bach's classification, the lexical distribution of Rule B matches that of Rule A with respect to all originally long vowels and short vowels plus sonorants. However, there is one striking exception that concerns the distribution of lengthened vowels; here, Rule B differs from Rule A in two ways:

a) Consider that – according to Bach – in the case of lengthened vowels followed by obstruents, the distinction between Class 1 and 2 is apparently not dependent on the voicing quality of the obstruent, as we find in Rule A. Instead, these items always belong to Class 2.

---

[109] Recall that my way of classifying the accents into Class 1 and Class 2 leads to different accent markings than those we find in former descriptions of the Arzbach accents (see subsection 1.2.2 for further discussion).

[110] [ʃnɛɪ], MHG *snê*, 'snow'; [bʁɔut] MHG *brôt*, 'bread'.

[111] [ʁaɪ^{c1}və], MHG *rîben*, 'to grind'; [saɪt^{c1}], MHG *sîde*, 'silk'; [hɛl^{c1}] MHG *helle* 'hell'; [fal^{c1}], MHG *valle*, 'trap', [man^{c1}], MHG *mande*, 'basket'; [hɛl^{c1}fən], MHG helfen, 'to help'; [baɪn^{c1}], MHG *beine*, 'leg-pl'; [ʃtaɪn^{c1}], MHG *steine*, 'stone-pl'

[112] [so:l^{c1}], MHG *sole*, 'sole'; [ʃa:^{c1}mə], MHG *schamen*, 'to be ashamed'; examples for original *g* are discussed below, (23).

[113] [fʁaɪ^{c2}], MHG *frî*, 'free'; [vaɪt^{c2}], MHG *wît*, 'far'; [laɪm^{c2}], MHG *lîm*, 'glue'; [kaɪl^{c2}], MHG *kîl*, 'wedge'; [baɪn^{c2}], MHG *bein*, 'leg-sg'; [ʃtaɪn^{c2}], MHG *stein*, 'stone-sg'; [man^{c2}], MHG *man*, 'man'; [hɛl^{c2}], MHG *hel*, 'bright'

[114] [aɪ^{c2}], MHG *ei*, 'egg'; [saɪf^{c2}], MHG *seife*, 'soap'

[115] [kɔ:^{c2}ʁɐ], MHG *kater*, 'tomcat'; [le:^{c2}və], MHG *leben*, 'to live'

b) However, notice one remarkable exception from this rule: original *g* does *not* group with the other obstruents but seemingly forms a 'natural class' with the sonorants – such a distribution is elsewhere unattested.

Although these facts are atypical from a typological perspective and therefore certainly deserve closer attention, no explanations have been suggested to account for these groupings as of yet, nor have Bach's generalizations been questioned. In order to shed some light on this issue, I aim at doing both: I show that the 'strangeness' of Bach's distribution of lengthened vowels does not follow from exceptional data but from an incorrect way of grouping them. Bach, as well as the generations after him, has overlooked a possible generalization that allows for integrating the Arzbach distribution much better into the general typology. Furthermore, it indicates an interesting relation between Rule B and Rule A2. The exceptional behavior of original *g*, on the other hand, might follow from an early deletion process. Both aspects are discussed subsequently.

The behavior of lengthened vowels in general. In order to understand the distribution of lengthened vowels, the first and most crucial question that needs to be answered is: do items with lengthened vowels plus obstruents really belong to Class 2 *spontaneously*? The answer is simple: they don't. They rather behave *combinatorily*, i.e., the voicing quality of a following segment plays a role in determining the accent class. However, in this specific phoneme group, a syllable only belongs to Class 1 if the vowel is followed by an originally voiced obstruent and - this is the crux - an original schwa that *got lost* due to apocope. If, however, the original schwa is retained, the corresponding syllable belongs to Class 2. Note that this is similar to the Rule-A2 distribution given in Table 4.3. The revised distribution is displayed in Table 4.5.

<table>
<tr><th colspan="3">Revised lexical distribution for Arzbach</th></tr>
<tr><th colspan="3">Class 1</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Orig. mid and low vowels</td><td colspan="2">all</td></tr>
<tr><td>Orig. high vowels</td><td colspan="2" rowspan="3">+ voiced syllable boundary
+ schwa (retained or apocopated)</td></tr>
<tr><td>Orig. closing diphthongs</td></tr>
<tr><td>Short vowels + sonorant</td></tr>
<tr><td>Lengthened vowels</td><td colspan="2">+ sonorant, g + schwa (retained or apocopated)</td></tr>
<tr><td>Lengthened vowels</td><td colspan="2">+ voiced obstruent (except g)
+ apocopated schwa</td></tr>
<tr><th colspan="3">Class 2</th></tr>
<tr><th>Phoneme group</th><th colspan="2">Segmental context</th></tr>
<tr><td>Orig. high vowels</td><td rowspan="4">(+) auslaut</td><td rowspan="4">+ non-voiced syllable boundary
+ schwa (retained or apocopated)</td></tr>
<tr><td>Orig. closing diphthongs</td></tr>
<tr><td>Short vowels + orig. singleton sonorant</td></tr>
<tr><td>Lengthened vowels</td></tr>
<tr><td>Lengthened vowels</td><td colspan="2">+ voiced obstruent (except g)
+ retained schwa</td></tr>
</table>

Table 4.5: Revised lexical distribution for Arzbach. Different categories are marked with solid lines whereas dashed lines indicate optional possibilities within one category. Differences from Bach's original distribution are grey shaded.

In the following, I provide four examples (two synchronic alternations, two diachronic changes from Bach 1921 to my recent data) in order to motivate the revised distribution for lengthened vowels. The synchronic alternations are given in (10):

(10) Synchronic alternations

MHG *wise*	'meadow, sg.'	[viːs^{c1}]
MHG *wisen*	'meadow, pl.'	[viː^{c2}zə]
MHG *rede*	'speech'	[ʁeːt^{c1}]
MHG *reden*	'to talk-inf.'	[ʁeː^{c2}də]

Consider the case of /viːz/ 'meadow' (example from Bach 1921): whereas the monosyllabic singular [viːs^{c1}] (apocopated schwa, final devoicing) belongs to Class 1, the disyllabic, non-apocopated plural [viː^{c2}zə] is part of Class 2. Bach, following his classification, treats [viːs^{c1}] as a lexical exception. However, it perfectly fits my revised distribution: here, for the phoneme group at hand, the loss of schwa is an additional condition for Class 1 membership.

Another example of a synchronic alternation is [ʁeː^{c2}də] 'to talk-inf.' vs. [ʁeːt^{c1}] 'speech' (my data). In [ʁeː^{c2}də], where the second syllable is retained, we find Class 2, whereas in [ʁeːt^{c1}], where the second syllable was lost, we find Class 1. This behavior follows from the revised distribution – under the one from Bach (1921), we would have to treat [ʁeːt^{c1}] as a lexical exception.

Now I turn to two examples where diachronic changes of the word form (from Bach 1921 to present) have led to accent changes. These examples are provided in (11):

(11) Diachronic changes from Bach (1921) to present

MHG *schade*	'pity'	[ʃɔːʁə^{c2}] → [ʃɔːt^{c1}]
MHG *krage*	'collar'	[kʁaːx^{c1}] → [kʁaːɣə^{c2}]

Whereas in Bach (1921), the Arzbach form for MHG *schade* 'pity' is listed as [ʃɔːʁə^{c2}], my informants pronounce the same word as [ʃɔːt^{c1}]. Again, notice the switch from Class 2 to Class 1 that goes along with the drop of the second syllable. The opposite has happened with MHG *krage* 'collar': whereas in 1921, the word was pronounced as [kʁaːx^{c1}], my informants pronounce it with a schwa and as a Class-2 syllable: [kʁaːɣə^{c2}]. Thus, when the schwa was restored, the accent class changed from Class 1 to Class 2.

The synchronic alternations in particular demonstrate how the (non-) presence of schwa can determine the accent class for this specific phoneme group. This not only shows that Bach's generalization for lengthened vowels plus obstruents (always belonging to Class 2) does not hold, it also opens up an entirely new perspective with respect to the typological relation of Rule B with Rule A2: in both areas, schwa apocope can play a role in determining the accent class; whereas in Rule A2, this is the standard for voiced consonants plus original schwa (with the exception of short vowels plus sonorants, only apocope leads to Class-1 membership; see subsection

4.3.2), we find such a relation in Arzbach only for lengthened vowels plus obstruents. Thus, we can observe that an important insight follows from the revised distribution for Arzbach: Bach's grouping only indicated a relation between Rule A and Rule B and in addition provided a unique distribution for lengthened vowels. The revised distribution, however, not only offers a more comprehensible pattern from a typological perspective. Furthermore, it also shows that the Arzbach distribution - albeit being more closely related to Rule A – is also related to Rule A2. Note that being 'caught' between Rule A and Rule A2 is not an isolated phenomenon that we only find in Arzbach. On the contrary, in the so-called 'Bergisches Land', a split between Rule A and Rule A2 seems to be common. Here, as in Arzbach, a Rule-A2 grouping can be found for lengthened vowels, whereas the rest of the phoneme system follows Rule A: for instance, this has been documented by Hasenclever (1904) for Wermelskirchen as well as by Maurmann (1898) for Mühlheim. Wiesinger (1975) reconstructs that the tone accents are distributed along these lines in an area north of Cologne with a size of around 600 square kilometers – he refers to it as Distribution 1. However, there is no evidence that any of these dialects makes differences in the distribution of lengthened vowels plus sonorants / obstruents, as we find in Arzbach.

The unnatural behavior of original *g*. One more issue remains with respect to the overall distribution of lengthened vowels in Arzbach: the behavior of original *g*. As has been shown, original *g* groups with the sonorants in the sense that apocope is *not* an additional condition for belonging to Class 1 if the intervocalic consonant is voiced. Two aspects are of interest here: first of all, synchronically, we virtually never find an intervocalic /g/ in these words - instead, we find a hiatus.[116] Examples are provided in (12):

(12) Synchronically monosyllabic forms:

MHG *nagel*	'nail'	[nɔːl^{c1}]
MHG *flegel*	'boor'	[fleːl^{c1}]
MHG *wige*	'cradle'	[viː^{c1}]

Synchronically disyllabic forms:

MHG *segen*	'blessing'	[seː^{c1}ə]
MHG *fegen*	'to sweep-inf.'	[feː^{c1}ə]
MHG *klagen*	'to moan'	[klɔː^{c1}ə]

When taking into account this deletion process, we might have an explanation for the exceptional behavior of original *g*: at the time that the recent lexical distribution of lengthened vowels came into existence, original *g* may already have been deleted: where the phoneme /g/ once was present as an intervocalic consonant, a *hiatus* had emerged. These hiatus forms patterned not with the other voiced obstruents but with the sonorants. Note that this is in line with the behavior of old long high vowels and

[116] [kʁaːɣə^{c2}] MHG *kragen*, 'collar' where *g* is retained intervocalically (see (11)), constitutes an isolated case.

closing diphthongs: if these were followed by a hiatus, they always belong to Class 1 synchronically.

7.5 Summing up: a possible chronology

The goal of this section is to summarize and combine the results of the three preceding sections. Based on the discussion of the melodic developments from the Predecessor (given as 'P') towards Rule O, Rule A, and Rule B (see section 7.1), Figure 7.1 presents a graphical overview with a possible chronology in the development towards the recent dialect groups. The figure also provides some information concerning the lexical distribution of the tone accents. Whereas the diachronic order in the development of the tonal melodies follows my account, the possible development of the different distributions is based on Boersma (2006)'s proposal that Rule A2 preceded Rule A. The brief discussion of these distributional issues below certainly does not do justice to the distributional complexity within the area, nor to the assumed chronology. Since, however, this thesis is mainly concerned with the melodic differences between Rule B and other dialect areas, I do not treat these issues in further detail (for an elaborate discussion, see Boersma 2006).

The relevant stages and processes are numbered from 1 to 6. In this order, I will briefly (re)state the most relevant facts and refer to the corresponding sections in this thesis.

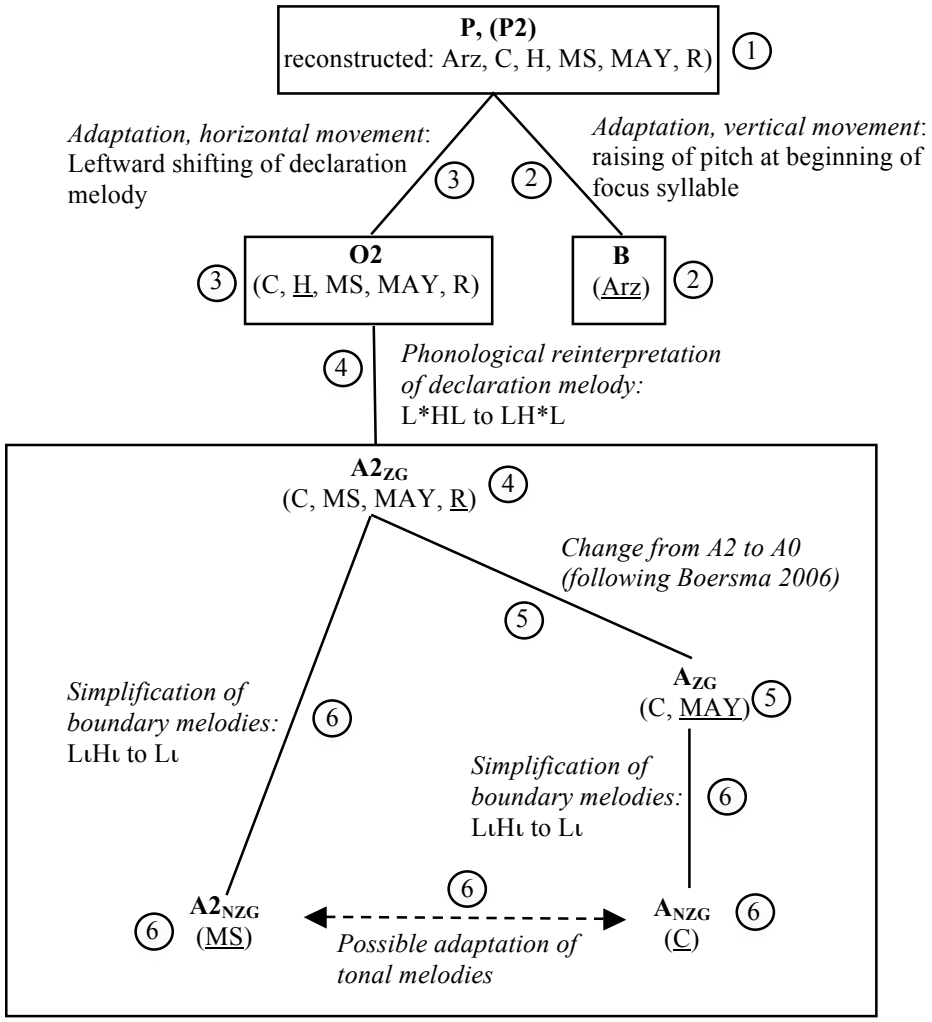


Figure 7.1: Overview of the developments towards the different tonal systems in Franconian dialects. Abbreviations for place names: A (Arzbach), C (Cologne), H (Hasselt), MS (Maastricht, see Gussenhoven & Aarts 1999), MAY (Mayen), R (Roermond). Underlining indicates which dialects belong to a certain dialect group synchronically. Abbreviations for different tonal melodies in Rule A(2) for phrase-final Class-2 items: ZG ('zweigipflig'), NZG ('not zweigipflig'). Whereas the tonal developments are based on my account, the order of the lexical distribution follows the assumptions of Boersma (2006).

1 – The predecessor

The tonal melodies of the predecessor are an early rise for Class 1 versus a late rise for Class 2 (see subsection 7.2.1). These melodies have been reconstructed from the present day dialect groups Rule O, Rule A, and Rule B. The lexical distribution of the predecessor P before vowel lengthening and apocope was as follows: all long mid and low vowels belonged to Class 1, all other phoneme groups belonged to Class 2. An account of how this distribution may have come into existence is provided in subsection 7.3.

In the graph, I give a possible stage P2 in brackets. This intends to indicate the possibility that all dialects may have had a distribution like recent Rule A2 at some point (following Boersma 2006's assumption that Rule A2 preceded Rule A) from where several dialects then developed towards a distribution along the lines of Rule A or Rule B. However, given the interdialectal variation in details of the distribution, especially with respect to the treatment of lengthened vowels, it may certainly be possible that some dialect groups implemented vowel lengthening and apocope independently after the dialect area had split up already.

2 – The development towards Rule B

Rule B adapted a surrounding H*L declaration melody and incorporated it into its phonological system (similar to the one for Rule O2). Phonetically, this was realized by raising pitch at the beginning of the focus syllable (see subsection 7.2.2). The recent distribution follows a mix of Rule A2 (lengthened vowels plus obstruents) and Rule A (rest) (see subsection 7.4.3 for further discussion). This seems to be an independent development, since this distribution is (as yet) unattested in other dialect areas.

3 – The development towards Rule O

In subsection 7.3.2, I have argued that the development towards Rule O is the outcome of an adaptation process where a group of Franconian dialects phonetically adapted to the high level or falling contours of neighboring dialects. The intonation contours were shifted leftwards to move high pitch as closely as possible to the left edge of the focus syllable. The intonational melody was retained (L*HL, as in interrogation). Rule O has the same lexical distribution as Rule A2 synchronically (see subsection 7.4.2). The system is retained in the Hasselt dialect.

4 – The development towards Rule A(2)

In Rule A, the shifted focal melodies of Rule O were phonologically reinterpreted: the high trailing tone of the former L*HL declaration melody became the starred tone of a new declaration melody LH*L (see subsection 7.2.1 for discussion). Under the assumption that Rule A2 preceded Rule A, all Rule-A dialects initially had the Rule-A2 distribution. Following my diachronic discussion of the phrase-final fall-

rise that we find in Class-2 syllables in several present day dialects (see '6' below, subsection 7.2.3), "Zweigipfligkeit" may have been the standard realization at the first Rule-A(2) stage. This stage in the development of the accents is still displayed in Roermond.

5 – The change from Rule A2 to Rule A

As Boersma (2006) argues, a group of Central Franconian dialects changed the distribution from Rule A2 to Rule A. Since these changes are not of immediate relevance to the issues discussed in this thesis, I refer the reader to Boersma (2006) for further discussion.

6 – Simplification of boundary melodies in Rule A2 and Rule A

As I have argued in subsection 7.2.3, dialects without *Zweigipfligkeit* may have undergone a development where the complex Class-2 boundary melodies have been simplified. That is, the high boundary tone, which we find in phrase-final Class-2 items in dialects as Roermond (A2) and Mayen (A0), has been deleted. This resulted in boundary melodies as we find them in Cologne (A0) or Maastrivht (A2, see Gussenhoven & Aarts 1999 for the relevant data). This indicates that in both dialect groups, similar developments have taken place. It may be the case that these developments occurred independently. Alternatively, as I have indicated in the graph, they may also be the outcome of language contact among dialects.

7.6 Conclusion

In this chapter, I have discussed several issues related to the development of the Franconian tone accents, especially with respect to Rule B. Section 7.2 dealt with the question how the semi-reversal of tones between Rule A and Rule B can be accounted for from a diachronic perspective. I have proposed an account that shows how both dialect areas can be derived from one common predecessor. This predecessor represents an old (possibly the original) stage of the opposition. As I argue, synchronic reflexes of this predecessor are to be found in the Hasselt dialect.

In my proposal, the development towards Rule A and Rule B is the result of different adaptation strategies to the declaration melodies of neighboring non-accent dialects: whereas Rule-A dialects adapted to the overt tonal melodies from neighboring dialects and shifted the whole sentence intonation leftwards, Rule-B dialects incorporated a neighboring H*L-melody into their phonological system. On the surface, this resulted in opposite declarative contours from those we find in Rule A.

The goal of section 7.3 was to indicate when my synchronic representation of the tone accents came into existence in the diachronic development of Franconian. I argued that the synchronic difference in foot structure between Class 1 and Class 2 is present from the origin of the accent opposition. However, as I show, the opposition was not lexicalized yet in the original stage (as is the case in present day Franconian) but followed from a constraint banning vowels with high sonority from non-head positions of a foot.

Section 7.4 proposed a revision of the lexical distribution by Bach (1921). I showed that Bach incorrectly described the behavior of lengthened vowels plus obstruents within a MHG reference system; my revised distribution not only incorporates the Arzbach system much better into the general typology but it also indicates that the Arzbach accents are not only related to Rule A from a typological perspective: the data suggest a previously overlooked relationship with Rule A2 as well.

In section 7.5, I have summarized the proposed diachronic developments in Franconian. The focus is on the development of the tonal melodies in the different dialect groups. Furthermore, I have added some remarks on the possible development of the diachronic distribution based on Boersma (2006)'s assumption that Rule A2 preceded Rule A (see Boersma 2006 for further discussion).

8. Conclusion

It was the goal of this thesis to help gain a better understanding of the tone accents in the Franconian Rule B area and of the typological relation between Rule B and Rule A – from a synchronic as well as from a diachronic perspective. Guided by three basic research questions, a variety of phonetic as well as phonological studies were carried out on several Franconian dialects. The main focus lay on the Arzbach dialect where Bach (1921) had first described the reversal of the standard tonal melodies we find in Rule A.

Chapters 2 and 3 gave a detailed description of all aspects that are related to the perception and production of the tone accents in Arzbach. These chapters served to validate and extend Bach's original descriptions with modern methods.

They served to answer the first research question that is repeated in (1).

(1) Do the tonal melodies in Rule B really display a phonetic reversal of those we find in Rule A?

The answer to this question is yes and no: there *is* a reversal of tonal contours in Arzbach, but not a *full* reversal, as indicated by Bach (1921). As a typological comparison between the Arzbach contours and those from the Rule-A dialect of Cologne (data from Peters 2006a) indicates, we only find *semi-reversed* tonal contours: whereas declarative intonation shows a reversal of the Rule-A contours, interrogative intonation is similar in the two dialect areas. Therefore, Bach's description of the Arzbach accents, which has been the basis of analyses of Rule B for almost 90 years, has to be (partially) revised.

These new findings have large consequences of how the Rule-B phenomenon has to be analyzed, from a synchronic as well as from a diachronic perspective. Chapters 4 to 6 discussed these consequences for the synchronic analysis and provided answers to the second research question, which is repeated in (2):

(2) How can we account for the tonal mapping in Rule B, and how is it related to Rule A synchronically?

Building on the theoretical frameworks of autosegmental metrical theory and optimality theory, the basic analytical insight into the synchronic relation between Rule A and Rule B can be expressed as follows: the fundamental similarities and differences between the mapping in Rule A and Rule B derive from the same underlying representation. The basics of the tonal mapping can be expressed with the interaction of two constraints, *μ' / L (read: a strong mora

does not have a low tone) and T → μ' (read: a tone needs to be linked to a strong mora). Whereas in Rule B, *μ' / L is the constraint governing the basics of the tonal mapping, T → μ' is its Rule-A counterpart. The notion of strong moras versus weak moras related to the proposal of *(foot) head domains*. From a theoretical perspective, this might be the most innovative contribution this thesis offers: the surface contrast between both accents is regarded as the outcome of a difference in foot structure: whereas the Class-1 foot branches at the syllable level and is disyllabic, the Class-2 foot branches at the mora level and is bimoraic.

These different levels of branching lead to differences with respect to headedness at the foot level: I assume that each foot head constitutes a head domain that incorporates all lower-level structure within a metrical tree – thus, Class 1 (syllable is the foot head) has a head domain that incorporates both moras, whereas the head domain of Class 2 (first mora is the foot head) only contains the first mora of the accent syllable.

To a large degree, the empirical motivation of head domains is based on the Arzbach data: whereas the basic tonal mapping in Rule A can be expressed in a variety of frameworks, it has been argued that these competing frameworks – alternative prosodic ones as well as the standard tonal approach to the phenomenon – are not able to sufficiently capture the tonal melodies in the Arzbach dialect. In order not to extend the scope of this thesis, further implications of my proposal have not been discussed. This needs to be done in future work: in general, I am convinced that my concept can be of relevance with respect to theoretical questions such as syllabification as well as to segmental phenomena such as diphthongization and monophthongization (see Köhnlein to appear). Furthermore, future work will also focus on the analysis of other tone accent languages along the lines of my approach.

Next to the synchronic analysis of the phenomenon, the diachronic split between Rule A and Rule B was a major topic of this thesis. The corresponding research question is repeated in (3):

(3) What is the diachronic relation between Rule B and Rule A?

Chapter 7 was dedicated to this question. I proposed an account that relates the synchronic tonal contours in Rule A and Rule B to a common predecessor, whose synchronic reflexes are still present in West Limburgian dialects (e.g. Hasselt). Since, within the approach advertised in this thesis, the Hasselt dialect represents a direct continuation of an old stage of the opposition, I renamed the relevant area *Rule O*. My basic proposal was that the developments towards Rule A and Rule B have to be regarded as independent developments from Rule O. The driving forces for these changes were adaptation processes: Rule-A dialects as well as Rule-B dialects were replacing their old declarative intonation (L*HL, identical to

interrogation) with (L)H*L intonation contours from neighboring non-accent dialects.

The reversed declaration melodies are the result of different adaptation strategies in the two dialect groups: whereas Rule A adapted to the overt tonal contours of neighboring non-accent dialects and shifted the whole sentence intonation to the left, Rule-B dialects borrowed a neighboring H*L intonational melody and incorporated it into their phonological system. These different strategies then led to reversed declaration contours in the two dialect areas, whereas the interrogative intonation remained unchanged.

This account not only provides information on the nature of the split between Rule A and Rule B but also suggests the tonal characteristics of a common predecessor, which most likely reflects the original tonal melodies in Franconian. The implications of this proposal are manifold: cross-linguistically, reconstructing changes within the intonational systems of different dialects might help us gain a deeper understanding not only of diachronic stages that lead to diverse intonational melodies in related dialects. Moreover, they might be useful in reconstructing former metrical structures and might be combined with insights that can be drawn from diachronic segmental changes and synchronic processes at different stages of a language: the analytical tools developed in the diachronic section of this thesis might be used to find older common stages in West Germanic intonation systems. These reconstructed tonal mappings might then shed light on the general prosodic / metrical structure of the languages in question.

Next to the proposed synchronic and diachronic insights that future research can build on, there are a variety of issues related to the Franconian tone accents that were only briefly addressed in this thesis. For instance, as stated in subsection 5.5.4, the phenomenon of *echo accents* – possibly contrastive contours in non-focal positions that do not correlate with clear low and high tonal targets – certainly deserves further investigation. Furthermore, there is the issue of segmental effects of the tone accents: a variety of dialects display segmental processes that lead to phoneme splits between Class-1 and Class-2 items. Whereas the *diachronic* phonetic nature of these splits has been explored by Gussenhoven & Driessen (2003) and Gussenhoven (2007), the *synchronic* organization within the grammar deserves closer attention (see Kehrein to appear, Köhnlein 2009, to appear for further discussion).

Additionally, there are questions left concerning the lexical distribution of the tone accents within the area. In subsection 7.4.3, I have argued that the Rule-B distribution is related to both Rule A and Rule A2: large parts of this distribution are similar to those in Rule A: however, most lengthened vowels follow a Rule-A2 distribution. Future research has to address the question *why* it is the lengthened vowels that behave differently from other phoneme groups, in Arzbach as well as in other dialects that show a related behavior.

Generally, in order to further deepen our understanding of the tone accents, more case studies on different Franconian dialects have to be carried out: the new Arzbach facts in particular as well as the general cross-dialectal variation that can be observed lead one to suspect that there are many more ‘linguistic surprises’ to be discovered in Franconian dialects.

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Appendices

A Informants

Informant	Place of birth	Year of birth	Sex	Profession
1	Arzbach	1935	male	Painter
2	Arzbach	1939	female	Clerical worker
3	Arzbach	1964	female	Nurse
4	Arzbach	1949	female	Insurance worker
5	Arzbach	1937	female	Housewife
6	Arzbach	1932	male	Brick layer
7	Arzbach	1960	female	Clerk
8	Arzbach	1935	male	Brick layer
9	Bad Ems	1974	male	Insurance salesman
10	Arzbach	1937	male	Type setter
11	Bad Ems	1968	male	Social worker
12	Bad Ems	1935	male	Insurance worker

B Corpus

Focus position

a) [man^{c1}] ‘basket’ / [man^{c2}] ‘man’

Declaration, non-final	Sie hat einen *Korb* gesehen. ‘She has seen a *basket*’	Sie hat einen *Mann* gesehen. ‘She has seen a *man*’
Declaration, final	Sie sieht einen Korb. ‘She sees a *basket*’	Sie sieht einen *Mann*. ‘She sees a *man*’
Interrogation, non-final	Hat sie einen *Korb* gesehen? ‘Did she see a *basket*?’	Hat sie einen *Mann* gesehen? ‘Did she see a *man*?’
Interrogation, final	Sieht sie einen *Korb*? ‘Does she see a *basket*?’	Sieht sie einen *Mann*? ‘Does she see a *man*?’
Continuation, non-final	Wenn ich einen *Korb* betrachte, dann sag ich dir Bescheid. ‘When I look at a *basket*, I will let you know’	Wenn ich einen *Mann* betrachte, dann sag ich dir Bescheid. ‘When I look at a *man*, I will let you know’
Continuation, final	Ich sehe einen Korb, und dann gehe ich weg. ‘I look at a basket, and then I go away’	Ich sehe einen Mann, und dann gehe ich weg. ‘I look at a man, and then I go away’

b) [sʊn^{c1}] ‘sun’ / [sʊn^{c2}] ‘son’

Declaration, non-final	Sie hat die *Sonne* gesehen. ‘She has seen a *son*’	Sie hat einen *Sohn* gesehen. ‘She has seen a *son*’
Declaration, final	Sie sieht die *Sonne*. ‘She sees the *sun*	Sie sieht einen *Sohn*. ‘She sees a *son*’
Interrogation, non-final	Hat sie die *Sonne* gesehen? ‘Did she see the sun?’	Hat sie einen *Sohn* gesehen? ‘Did she see a *son*?’
Interrogation, final	Sieht sie die *Sonne*? ‘Does she see a *basket*?’	Sieht sie einen *Sohn*? ‘Does she see a *son*?’
Continuation, non-final	Wenn ich die *Sonne* betrachte, dann sag ich dir Bescheid. ‘When I look at the *sun*, I will let you know’	Wenn ich einen *Sohn* betrachte, dann sag ich dir Bescheid. ‘When I look at a *son*, I will let you know’
Continuation, final	Ich sehe die *Sonne*, und dann gehe ich weg. ‘I look at the *sun*, and then I go away’	Ich sehe einen *Sohn*, und dann gehe ich weg. ‘I look at a *son*, and then I go away’

c) [fal^{c1}] ‘trap’ / [fal^{c2}] ‘case’

Declaration, non-final	Sie hat eine *Falle* gesehen. ‘She has seen a *trap*’	Sie hat einen *Fall* gesehen. ‘She has seen a *case*’
Declaration, final	Sie sieht eine *Falle*. ‘She sees a *trap*’	Sie sieht einen *Fall*. ‘She sees a *case*’
Interrogation, non-final	Hat sie eine *Falle* gesehen? ‘Did she see a *trap*?’	Hat sie einen *Fall* gesehen? ‘Did she see a *case*?’
Interrogation, final	Sieht sie eine *Falle*? ‘Does she see a *trap*?’	Sieht sie einen *Fall*? ‘Does she see a *case*?’
Continuation, non-final	Wenn ich eine *Falle* betrachte, dann sag ich dir Bescheid. ‘When I look at a *trap*, I will let you know’	Wenn ich einen *Fall* betrachte, dann sag ich dir Bescheid. ‘When I look at a *case*, I will let you know’
Continuation, final	Ich sehe eine *Falle*, und dann gehe ich weg. ‘I look at a *trap*, and then I go away’	Ich sehe einen *Fall*, und dann gehe ich weg. ‘I look at a *case*, and then I go away’

d) [hɛl^{c1}] ‘hell’ / [hɛl^{c2}] ‘bright’

Declaration, non-final	Es ist die *Hölle* gewesen. ‘It has been like *hell*’	Es ist *hell* gewesen. ‘It has been *bright*’
Declaration, final	Es ist die *Hölle*. ‘It is like *hell*’	Es ist *hell*. ‘It is *bright*’
Interrogation, non-final	Ist es die *Hölle* gewesen? ‘Has it been like *hell*?’	Ist es *hell* gewesen? ‘Has it been *bright*?’
Interrogation, final	Ist es die *Hölle*? ‘Is it like *hell*?’	Ist es *hell*? ‘Is it *bright*?’
Continuation, non-final	Wenn ich die *Hölle* betrachte, dann sag ich dir Bescheid. ‘When I look at the *hell*, I will let you know’	Wenn es *hell* ist, dann sag ich dir Bescheid. ‘When it is *bright*, I will let you know’
Continuation, final	Ich sehe die *Hölle*, und dann gehe ich weg. ‘I look at the *hell*, and then I go away’	Ich finde es *hell*, und dann gehe ich weg. ‘I find it *bright*, and then I go away’

e) [ʃtaɪn^{c1}] ‘stone-pl’ / [ʃtaɪn^{c2}] ‘stone-sg’

Declaration, non-final	Sie hat die *Steine* gesehen. ‘She has seen the *stones*’	Sie hat einen *Stein* gesehen. ‘She has seen a *stone*’
Declaration, final	Sie sieht die *Steine*. ‘She sees the *stones*’	Sie sieht einen *Stein*. ‘She sees a *stone*’
Interrogation, non-final	Hat sie die *Steine* gesehen? ‘Did she see the *stones*?’	Hat sie einen *Stein* gesehen? ‘Did she see a *stone*?’
Interrogation, final	Sieht sie die *Steine*? ‘Does she see the *stones*?’	Sieht sie einen *Stein*? ‘Does she see a *stone*?’
Continuation, non-final	Wenn ich die *Steine* betrachte, dann sag ich dir Bescheid. ‘When I look at the *stones*, I will let you know’	Wenn ich einen *Stein* betrachte, dann sag ich dir Bescheid. ‘When I look at a *stone*, I will let you know’
Continuation, final	Ich sehe die *Steine*, und dann gehe ich weg. ‘I look at the *stones*, and then I go away’	Ich sehe einen *Stein*, und dann gehe ich weg. ‘I look at a *stone*, and then I go away’

f) [baɪn^{c1}] ‘leg-pl’ / [baɪn^{c2}] ‘leg-sg’

Declaration, non-final	Sie hat die *Beine* gesehen. ‘She has seen the *legs*’	Sie hat ein *Bein* gesehen. ‘She has seen a *leg*’
Declaration, final	Sie sieht die *Beine*. ‘She sees the *legs*’	Sie sieht ein *Bein*. ‘She sees a *leg*’
Interrogation, non-final	Hat sie die *Beine* gesehen? ‘Did she see the *legs*?’	Hat sie ein *Bein* gesehen? ‘Did she see a *stone*?’
Interrogation, final	Sieht sie die *Beine*? ‘Does she see the *legs*?’	Sieht sie ein *Bein*? ‘Does she see a leg?’
Continuation, non-final	Wenn ich die *Beine* betrachte, dann sag ich dir Bescheid. ‘When I look at the *legs*, I will let you know’	Wenn ich ein *Bein* betrachte, dann sag ich dir Bescheid. ‘When I look at a *leg*, I will let you know’
Continuation, final	Ich sehe die *Beine*, und dann gehe ich weg. ‘I look at the *legs*, and then I go away’	Ich sehe ein *Bein*, und dann gehe ich weg. ‘I look at a *leg*, and then I go away’

g) [ðaʊf^{c1}] ‘pigeon’ / [ðaʊf^{c2}] ‘baptism’

Declaration, non-final	Sie hat eine *Taube* gesehen. ‘She has seen a *pigeon*’	Sie hat eine *Taufe* gesehen. ‘She has seen a *baptism*’
Declaration, final	Sie sieht eine *Taube*. ‘She sees a *pigeon*’	Sie sieht eine *Taufe*. ‘She sees a *baptism*’
Interrogation, non-final	Hat sie eine *Taube* gesehen? ‘Did she see a *pigeon*?’	Hat sie eine *Taufe* gesehen? ‘Did she see a *baptism*?’
Interrogation, final	Sieht sie eine *Taube*? ‘Does she see a *pigeon*?’	Sieht sie eine *Taufe*? ‘Does she see a *baptism*?’
Continuation, non-final	Wenn ich eine *Taube* betrachte, dann sag ich dir Bescheid. ‘When I look at a *pigeon*, I will let you know’	Wenn ich eine *Taufe* betrachte, dann sag ich dir Bescheid. ‘When I look at a *baptism*, I will let you know’
Continuation, final	Ich sehe eine *Taube*, und dann gehe ich weg. ‘I look at a *pigeon*, and then I go away’	Ich sehe einen *Taufe*, und dann gehe ich weg. ‘I look at a *baptism*, and then I go away’

h) [ðiːɐ^{c1}] ‘animal’ / [ðiːɐ^{c2}] ‘door’

Declaration, non-final	Sie hat ein *Tier* gesehen. ‘She has seen an *animal*’	Sie hat eine *Tür* gesehen. ‘She has seen a *door*’
Declaration, final	Sie sieht ein *Tier*. ‘She sees an *animal*’	Sie sieht eine *Tür*. ‘She sees a *door*’
Interrogation, non-final	Hat sie ein *Tier* gesehen? ‘Did she see an *animal*?’	Hat sie eine *Tür* gesehen? ‘Did she see a *door*?’
Interrogation, final	Sieht sie ein *Tier*? ‘Does she see an *animal*?’	Sieht sie eine *Tür*? ‘Does she see a *door*?’
Continuation, non-final	Wenn ich ein Tier betrachte, dann sag ich dir Bescheid. ‘When I look at an animal, I will let you know’	Wenn ich eine Tür betrachte, dann sag ich dir Bescheid. ‘When I look at a door, I will let you know’
Continuation, final	Ich sehe ein Tier, und dann gehe ich weg. ‘I look at an animal, and then I go away’	Ich sehe eine Tür, und dann gehe ich weg. ‘I look at a door, and then I go away’

i) [ðaʊ^{c1}və] ‘pigeon-pl.’ / [ðaʊ^{c1}və] ‘baptism-pl.’

Declaration, non-final	Das sind *Tauben* gewesen. ‘These have been *pigeons*’	Das sind *Taufen* gewesen. ‘These have been *baptisms*’
Declaration, final	Das sind *Tauben*. ‘These are *pigeons*’	Das sind *Taufen*. ‘These are *baptisms*’
Interrogation, non-final	Sind das *Tauben* gewesen? ‘Have these been *pigeons*?’	Sind das *Taufen* gewesen? ‘Have these been *baptisms*?’
Interrogation, final	Sind das *Tauben*? ‘Are these *pigeons*?’	Sind das *Taufen*? ‘Are these *baptisms*?’

Focus position with multiple post-focal stressed syllables

Declaration	
Ein *Korb* soll das gewesen sein. ‘This has been supposed to be a *basket*’	Ein *Mann* soll das gewesen sein. ‘This has been supposed to be a *man*’
Die *Sonne* soll das gewesen sein. ‘This has been supposed to be the *sun*’	Ein *Sohn* soll das gewesen sein. ‘This has been supposed to be a *son*’
Eine *Falle* soll das gewesen sein. ‘This has been supposed to be a *trap*’	Ein *Fall* soll das gewesen sein. ‘This has been supposed to be a *case*’
Eine *Taube* soll das gewesen sein. ‘This has been supposed to be a *pigeon*’	Eine *Taufe* soll das gewesen sein. ‘This has been supposed to be a *baptism*’
Eine *Tür* soll das gewesen sein. ‘This has been supposed to be a *door*’	Ein *Tier* soll das gewesen sein. ‘This has been supposed to be an *animal*’
Interrogation	
Ein *Korb* soll das gewesen sein? ‘This has been supposed to be a *basket*?’	Ein *Mann* soll das gewesen sein? ‘This has been supposed to be a *man*?’
Die *Sonne* soll das gewesen sein? ‘This has been supposed to be the *sun*?’	Ein *Sohn* soll das gewesen sein? ‘This has been supposed to be a *son*?’
Eine *Falle* soll das gewesen sein? ‘This has been supposed to be a *trap*?’	Ein *Fall* soll das gewesen sein? ‘This has been supposed to be a *case*?’
Eine *Taube* soll das gewesen sein? ‘This has been supposed to be a *pigeon*?’	Eine *Taufe* soll das gewesen sein? ‘This has been supposed to be a *baptism*?’
Eine *Tür* soll das gewesen sein? ‘This has been supposed to be a *door*?’	Ein *Tier* soll das gewesen sein? ‘This has been supposed to be an *animal*?’

Non-focus position

a) [aːjɐman^{c1}] ‘basket for eggs’ / [aːjɐman^{c1}] ‘man selling eggs’

Declaration, post-focal non-final	Das ist ein *Eierkorb* gewesen. ‘This has been a *basket for eggs*’	Das ist ein *Eiermann* gewesen. ‘This has been a *man selling eggs’*
Declaration, post-focal final	Das ist ein *Eierkorb*. ‘This is a *basket for eggs*’	Das ist ein *Eiermann*. ‘This is a *man selling eggs*’
Declaration, pre-focal	Ein Eierkorb kann *ganz* schön groß sein. ‘A basket for eggs can be *quite* big’	Ein Eiermann kann *ganz* schön groß sein. ‘A man selling eggs can be *quite* tall’
Interrogation, post-focal non-final	Ist das ein *Eierkorb* gewesen? ‘Has this been a *basket for eggs*?’	Ist das ein *Eiermann* gewesen? ‘Has this been a *man selling eggs*?’
Interrogation, post-focal, final	Ist das ein *Eierkorb*? ‘Is this a *basket for eggs*?’	Ist das ein *Eiermann*? ‘Is this a *man selling eggs*?’
Interrogation, pre-focal	Ist ein Eierkorb eigentlich *immer* so groß? ‘Is a basket for eggs *always* that big?’	Ist ein Eierkorb eigentlich *immer* so groß? ‘Is a man selling eggs *always* that tall?’

b) [aːjɐðaʊf^{c1}] ‘pigeon carrying eggs’ / [aːjɐðaʊf^{c1}] ‘baptism with eggs’

Declaration, post-focal, non-final	Das ist eine *Eiertaube* gewesen. ‘This has been a *pigeon carrying eggs*’	Das ist eine *Eiertaufe* gewesen. ‘This has been a *baptism with eggs*’
Declaration, post-focal final	Das ist eine *Eiertaube*. ‘This is a *pigeon carrying eggs*’	Das ist eine *Eiertaufe*. ‘This is a *baptism with eggs*’
Declaration, pre-focal	Die Eiertaube ist *schön* gewesen. ‘The pigeon carrying eggs has been *beautiful*’	Die Eiertaufe ist *schön* gewesen. ‘The baptism with eggs has been *beautiful*’
Interrogation, post-focal non-final	Ist das eine *Eiertaube* gewesen? ‘Has this been a *pigeon carrying eggs*?’	Ist das eine *Eiertaufe* gewesen? ‘Has this been a *baptism with eggs*?’
Interrogation, post-focal, final	Ist das eine *Eiertaube*? ‘Is this a *pigeon carrying eggs*?’	Ist das eine *Eiertaufe*? ‘Is this a *baptism with eggs*?’

Interrogation, pre-focal	Die Eiertaube ist *schön* gewesen? 'The pigeon carrying eggs has been *beautiful*?'	Die Eiertaufe ist *schön* gewesen? 'The baptism with eggs has been *beautiful*?'

c) [haʊsd̥aʊfᵋ¹] 'domestic pigeon' / [haʊsd̥aʊfᵋ²] 'baptism at home'

Declaration, post-focal, non-final	Das ist eine *Haustaube* gewesen. 'This has been a *domestic pigeon*'	Das ist eine *Haustaufe* gewesen. 'This has been a *baptism at home'*
Declaration, post-focal final	Das ist eine *Haustaube*. 'This is a *domestic pigeon*'	Das ist eine *Haustaufe*. 'This is a *baptism at home*'
Declaration, pre-focal	Eine Haustaube ist doch was *Schreckliches*. 'A domestic pigeon is *horrible*'	Eine Haustaufe ist doch was *Schreckliches*. 'A baptism at home is *horrible*'
Interrogation, post-focal non-final	Ist das eine *Haustaube* gewesen? 'Has this been a *domestic pigeon*?'	Ist das eine *Haustaufe* gewesen? 'Has this been a *baptism at home*?'
Interrogation, post-focal, final	Ist das eine *Haustaube*? 'Is this a *domestic pigeon*?'	Ist das eine *Haustaufe*? 'Is this a *baptism at home*?'
Interrogation, pre-focal	Die Haustaube ist *schön* gewesen? 'The domestic pigeon has been *beautiful*?'	Die Haustaufe ist *schön* gewesen? 'The baptism at home has been *beautiful*?'

Summary in Dutch

Deze proefschrift houdt zich bezig met de fonetiek, de synchrone fonologie en de diachrone ontwikkeling van *Regel B* in het Frankonische toonaccentgebied. Gebaseerd op de beschrijvingen van Bach (1921) voor de Arzbach dialect wordt Regel B traditioneel bekeken als een tonale omkering van de woordmelodieën in vergelijking met de rest van het gebied (Regel A).

Mijn onderzoek focuste op drie aspecten: a) een exacte fonetische beschrijving van de toonaccenten in Arzbach en analysen van de relatie tussen Regel B en Regel A, zowel van een b) synchrone als ook van c) een diachrone perspectief. Onderstaand geef ik een samenvatting van de meest belangrijke resultaten en implicaties van mijn onderzoek:

a) Empirie

Geen volledige omkeer van tonale melodieën. De toonaccenten in Regel B hebben geen volledige omkering van de melodieën in Regel A, als is tot heden aangenomen: alleen maar de declaratieve contouren zijn omgedraaid, terwijl de contouren van Regel A en Regel B in interrogatie op elkaar lijken. De tonale melodieën zijn dus alleen maar *half-omgekeerd*.

b) Synchronie

De representatie van de toonaccent oppositie. De oppositie tussen de twee Frankonische toonaccenten is het resultaat van een structurele contrast (en niet van een lexicalische toon op een van de accenten). Klaas 1 en Klaas 2 verschillen in hun voet structuur: Klaas 1 heeft een syllabische trocheus, Klaas 2 heeft een moraische trocheus. Dit leidt toe naar verschillende *head domains* voor de twee accenten. de contrastieve melodieën ontstaan vanwege de associatie van intonatie tonen met deze verschillende structuren.

Tonal mapping in verschillenden frankonischen dialecten. Verschillende franconische dialecten – inclusieve de oppositie tussen Regel A en Regel B – kunnen worden beschreven met dezelfde fundamentele contrast en hetzelfde inventaris van regels (‘constraints’) die de associatie van tonen met prosodische structuur bepalen: dit betekent dat de fundamentele verschillen tussen Regel A en Regel B niet tot stand komen door verschillende onderliggende representaties van de accenten maar door kleine verschillen in de grammatica’s van Regel A and Regel B (‘constraint ranking’). Verdere inter-dialectale verschillen tussen Frankonische dialecten ontstaan door a) verschillende inonatie-melodieën en b) het ranking van constraints.

c) Diachronie

De ontwikkeling van de oppositie tussen Regel B en Regel A. Huidige Frankonische dialecten zijn ontstaan uit een gemeenschappelijke voorganger. Archaïsche melodieën zijn te vinden aan het rand van het toonaccentgebied: de Limburgse Hasselt dialect (aan de noord-westelijke grens van het gebied liggend) lijkt closely op het voorgestelde originele systeem (Regel O). Regel A(2) en Regel B zijn ontstaan op basis van dit originele systeem. De twee dialect gebieden systemen adopteerden declaratie melodieën van niet-accent dialecten, echter met verschillenden strategieën. Deze verschillen lijden tot de half-omgekeerde tonale melodieën.

Summary in English

This dissertation deals with the phonetics, the synchronic phonology, and the diachronic development of *Rule B* in the Franconian tone accent area. Based on descriptions by Bach (1921) for the Arzbach dialect, Rule B is traditionally recognized as having reversed tonal melodies in comparison with the rest of the area (Rule A).

My research was concerned with the following aspects: a) to provide an exact phonetic description of the tone accents in Arzbach and to analyze the relation between Rule B and Rule A, from b) a synchronic as well as c) from a diachronic perspective. Below, I summarize the major findings of my studies:

a) Empiricism

No complete tonal reversal in Rule B. The tone accents in Rule B (Arzbach) do not display a full reversal of those in Rule A, as has been assumed to date: only the declaration contours are reversed, whereas the tonal contours in interrogation resemble each other in Rule B and Rule A.

b) Synchrony

The nature of the tone accent opposition. The opposition between the two Franconian tone accents is the result of a structural contrast (and not due to the presence of lexical tones). Class 1 and 2 contrast in foot structure: Class 1 is footed as a syllabic trochee, Class 2 as a moraic trochee. This leads to different *head domains* for both accents. The contrastive tonal contours arise from associating intonational melodies to these diverse structures.

Tonal mapping in different Franconian dialects. Different Franconian dialects – including the opposition between Rule A and Rule B – can be described with the same basic contrast and the same set of phonological principles ('constraints') regulating how tones become associated with structure: as a consequence, the partially reversed tonal contours in Rule B are not due to different underlying representations of the accents but can rather be attributed to small differences in the grammars of Rule B and Rule A. Further inter-dialectal differences between different Franconian dialects arise from a) diverse intonational melodies and b) the ranking of constraints.

c) Diachrony

The development of the opposition between Rule B and Rule A. Recent Franconian dialects arose from one common predecessor; archaic melodies are found at the periphery of the tone accent area: the Limburgian dialect of Hasselt (located at the north western border of the area) closely resembles the proposed original system. Other Rule-A(2) dialects as well as Rule B emerged from this system via adaptation of surrounding declaration melodies, though with different adaptation strategies.

Curriculum Vitae

Björn Köhnlein was born on 14 August 1977 in Darmstadt, Germany. He finished secondary school in 1997 and started studying at the Philipps-Universität in Marburg in 1998. In 2005, he received his M.A. degree (German language and literature, minors: psychology and science of media). In the same year, the Deutscher Sprachatlas in Marburg (DSA) employed him for the project Digitaler Wenker-Atlas (*www.diwa.info*). At the DSA, he also started carrying out the research that resulted in this dissertation. From 2007 to 2009, he continued his research as a PhD student at the Meertens Institute in Amsterdam in the NWO-project "Tone and Intrasegmental Structure in West Germanic dialects". Since August 2009, he is working as a lecturer at the University of Leiden. Next to his occupation in Leiden, he is participating in the NWO-project "Taalportaal Nederlands-Fries" since January 2011, working on the implementation of phonology into an online grammar of Dutch and Frisian.