

In defense of a dialect-contact scenario of the Central Franconian tonogenesis

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1 Introduction

One of the most intriguing phenomena in the phonology of continental West Germanic occurs, or in some cases occurred until recently, in a group of Central Franconian dialects, which include Limburgish as spoken in Belgium and the Netherlands as well as Luxembourgish. This is the lexical tone opposition known as Accent 1 vs. Accent 2.¹ There have been suggestions that its origin lies in a tonal reinterpretation of allophonic pitch variation as conditioned by consonants or vowels. Against these purely phonetically motivated segmental accounts, Gussenhoven (2000), henceforth G2000, proposed a morphological origin due to dialect contact. This contribution defends that account against a number of objections that have been raised against it. In section 2, we restate it and add a paragraph on the probable sociolinguistic context of the dialect contact. Section 3 lists five objections that have been raised against it and attempts to show that their validity is low or non-existent. Next, section 4 addresses a potentially lethal objection raised by Paul Boersma (2013). In a critical evaluation, his alternative account is argued to have four implausible implications for the sound changes that need to be assumed. Section 5 then argues that the Boersma data can be explained by assuming different expansion rates of two phonological innovations emanating from Cologne. Finally, section 6 concludes that G2000 remains a plausible reconstruction of the tonogenesis and that the solution to Boersma's data additionally explains the well-known distribution of the tone contrast given by Wiesinger (1975), including the existence of his *Regel A2* isogloss.

2 G2000

Section 2.1 presents the sound changes assumed by G2000 in 13th-century Cologne before and after the tonogenesis. Following an observation about the lack of social perspective in G2000 by Schmidt (2002), it addresses the hypothesized sociolinguistic setting of the dialect contact. Section 2.3 outlines the two ways, one phonetic and one morphological, in which the tone distributed itself over the lexicons of the dialects to which it spread.

¹See for instance Jongen 1972; Schmidt 1986; Hermans 1994; Gilles 1999; de Vaan 1999; Gussenhoven and van der Vliet 1999; Gussenhoven and Peters 2004; de Vaan 2006; Peters 2008; Werth 2011; Köhnlein 2011. I am ignoring alternative terminology as well as alternative conceptions of what this phonological contrast consists of.

2.1 A linguistic predicament created by dialect contact

The crucial circumstance triggering the tonogenesis was the simultaneous presence of two systematic forms in the linguistic environment in 13th-century Cologne. One was provided in the local dialect by a set of apocopated monosyllabic plural forms of words like ‘way’, ‘path’ and ‘day’, masculine *a*-stems, which had arisen after their vowels had been lengthened through Open Syllable Lengthening (OSL; Lahiri and Dresher 1999) at a time when they were followed by an unstressed word-final vowel. The long-voweled monosyllabic form is the plural (Table 1a). The other was the existence of long-voweled monosyllabic forms for the *singulars* of those same nouns in a different dialect. These forms had arisen as a result of a regularization of the nominal number paradigm after the lengthening of vowels in plural forms due to OSL, as illustrated by the current standard German forms /veek/ SG - /veegə/ PL ‘road - roads’, originally /weg(ə)/. This development is referred to as Analogical Lengthening (AL) (Table 1b). A confrontation between these two dialects would focus on the conspicuous use of phonetic forms like /wεεx/, i.e. [wεix] for the singular by one group and for the plural by another. Adjustments in speaker behaviour that would avoid the conflict could either lead to the reinstatement of the short-voweled singular form /wεx/ in the immigrant dialect or to the adoption of novel lengthened singular forms in the local dialect. Neither development is without its problems. If short-voweled singulars were to be reinstated, the immigrant speakers may well have felt that they were adopting old-fashioned, non-prestige forms, still in use perhaps by older speakers of their dialect. The problem for the second scenario, whereby the local population adopts a lengthened singular form, is that this monosyllabic form was in use as the plural of those same nouns.

Table 1: The development of a monosyllabic long-voweled form for the plural in Cologne (Table 1a) and the singular in the immigrant group (Table 1b). OSL: Open Syllable Lengthening; AL: Analogical Lengthening.

	Pre-OSL	OSL	Apocope
a. Cologne	/wεx/ SG - /wεγə/ PL	/wεεx/ - /wεεγə/	/wεεx/ - /wεεεx/
	Pre-OSL	OSL	AL
b. Immigrants	/wεx/ SG - /wεγə/ PL	/wεεx/ - /wεεγə/	/wεεεx/ - /wεεεγə/

It was the local population that gave way. The escape amounted to a *phonetic lengthening* of short-voweled singulars, which in that pronunciation would no longer deviate from the long-voweled singulars of the immigrant group. The phonetic stretching of the short vowels must have created long high-pitched vowels, which retained the truncated pitch fall.² These stretched, high-pitched syllables

²For such truncation of falls on short vowels in German, see Grabe (1998)).

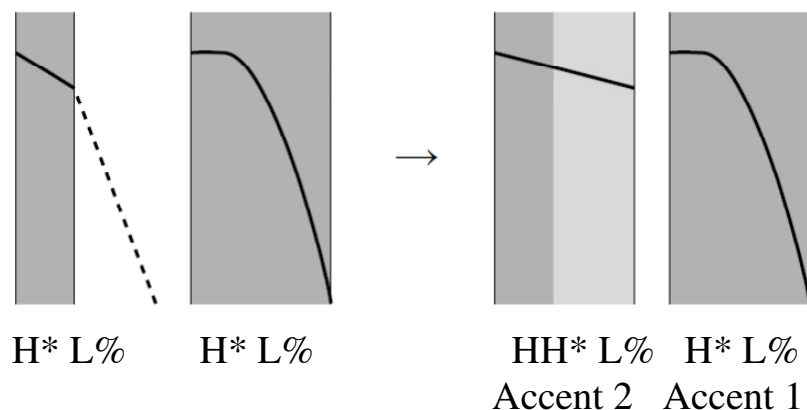


Figure 1: The pre-tonogenesis contrast between short-voweled singular and long-voweled plural monosyllabic forms in final position in the intonational phrase (to the left of arrow) and the post-tonogenesis contrast between long syllables with and without a privative lexical H-tone (to the right of the arrow). The phonological change occurred as a result of a phonetic lengthening of singular noun stems, indicated by the light grey portion of the box on the left.

were distinct from long-voweled plurals. Phonologically, they still had short vowels during the earliest stages of the new phonetic behaviour, which were subsequently interpreted in terms of a tone on a bimoraic vowel. On the surface, a sequence of two H-tones came to contrast with a single H-tone. In final pitch accented syllables of the intonational phrase, the most salient position, these were followed by the boundary L% of declarative intonation. The earlier short-long contrast was thus reinterpreted as a privative tone contrast on long vowels, H on the singulars and no tone on the plurals, once the intonational tones are abstracted away, as shown in Fig. 1.³ Later changes led to final rises for Accent 2 and rising-falling contours for Accent 1 in the interrogative intonation (G2000: 241, 245).

³The analysis of the tone strings assigns the first H to the lexical tone, which leaves the intonational melody intact. *Contra* this, G2000 provisionally assumed that the second of the two H-tones was the lexical tone, i.e., H*H. This choice was based on the analysis of the current situation in the Roermond and Venlo dialects. However, Gussenhoven and Peters(2004) and Peters (2008) show that in Hasselt and Cologne the lexical tone *precedes* the intonational tone. Gussenhoven (2013) argues that the initial state was as in Fig. 1, and that the reversal of the tone sequence occurred in dialects that developed a final rise for Accent 2, like Roermond Dutch.

2.2 A sociolinguistic setting

The account in section 2.1 implies that, at the time of the tonogenesis, there was sustained contact between the local Cologne population and a group of speakers whose dialects had undergone Analogical Lengthening. This group must moreover at least in part have consisted of prestigious individuals, such that local short-voweled singular forms for words like ‘way’ and ‘day’ were competing with long-voweled forms in the pronunciation of their social superiors. At the same time, there would have to be some pressure on monosyllabic plural forms like /wɛɛx/ in favour of disyllabic /wɛɛγə/. This predicts variation in the Cologne dialect between /wɛɛx/ and /wɛɛγə/ for the plurals and between stretched and unstretched forms for the singulars. This phonetic variation for the singular forms might have been particularly likely if exposure to the prestige immigrant dialect were to be restricted to part of the population, such that these speakers were caught between short-voweled singulars in conversations with members of the local community and more stretched vowels in their contacts with their immigrant superiors. Since the stretched singulars remained distinct from the long-voweled monosyllabic plurals, a tonal interpretation was virtually inevitable. The only conceivable rival development was a reinterpretation of the stretched vowels in the singular as trimoraic, which would have implied a reversal of the quantity relation between the vowels in singular and plural forms from shorter-longer to longer-shorter.

A social situation of exactly this kind is likely to have arisen as a result of the construction of the Cologne cathedral, which was started in 1248. It was to be the largest structure in Europe north of the Alps, and the initial work will easily have involved more than a thousand men, among whom there were strict hierarchical relations. Many of them are likely to have been master craftsmen recruited from outside the city supervising local apprentice craftsmen (Davis 2006, ch. 2).⁴ Since this date is a fairly uncontroversial estimate of the time of the tonogenesis, it is reasonable to see the building of the Cologne cathedral as its sociolinguistic context.

2.3 Two ways in which the tone contrast spread

From its limited distribution in a number of morphological forms, the lexical tone contrast became a more general feature of the Central Franconian dialects. There are two paths that this propagation took. The first is segmentally motivated: the H-tone got to be placed in syllables that naturally had high pitch in the location of the most salient contrast, the end of the sonorant portion of the syllable with primary stress. The second is as a marker of the number contrast.

⁴The medieval archives of the cathedral were taken to Paris by the French in 1794, where they have since been lost.

2.3.1 Propagation to phonetically natural locations

In the segmental structure, high vowels and voiceless obstruents are the prime causes of increased vocal fold vibration. The explanation of raised f_0 in high vowels (‘intrinsic f_0 ’) is not uncontroversial, but is plausibly attributed to tensing of the vocal folds due to the raised and forward hyoid and tongue. Accordingly, Accent 2 would be expected to find its way to stressed syllables with high monophthongs and closing diphthongs (Hombert 1978; Ohala 1978; Laver 1994: 45; Kingston 2007). The explanation of raised f_0 immediately before and after voiceless obstruents relative to voiced obstruents and sonorants is the tensing of the vocal folds required for their opening, which ensures a voiceless escape of the airstream (Löfqvist et al. 1989). For present-day German, the perceptual effect of raised f_0 before voiceless obstruents was demonstrated by Kohler (1990). We might therefore expect Accent 2 to show up in stressed syllables with high vowels before voiceless obstruents. Both expectations are in part met by the distributional patterns that have been reported, starting with Nörrenberg (1884) for the dialect of Dormagen.⁵ The distribution given by Wiesinger (1975) for the central area is that Accent 1 is found (i) in stressed syllables with non-high long vowels ([a: æ: e: ø: o:]) and centring diphthongs ([iə yə uə]); (ii) in stressed syllables with high long vowels ([i: y: u:]), closing diphthongs ([ei øy ou] (all IPA translations of Wiesinger’s symbols) and any vowels arising from Open Syllable Lengthening (OSL), if a voiced obstruent followed. This distribution was referred to as *Regel A* by Wiesinger (1970: 65). In a peripheral area, Accent 1 fails to appear in words in which schwa was preserved, termed *Regel A2* by Schmidt (1986). I will return to this distributional issue at various points in the remainder of this chapter.

The clearest effect of the segmental factors is found in the assignment of Accent 2 to syllables which combine both conditions, long high vowels and closing diphthongs followed by voiceless obstruent in the coda, as in Limburgish /liist²/ ‘list’, /lyy²stər/ ‘splendour’, /knɔp²/ ‘button’, quite in line with the expected segmental effects on f_0 . The same high-ending vowels attracted Accent 2 before sonorants, but less consistently. This joint action by the two segmental factors is reminiscent of the rather complex series of changes in the Mon-Khmer language U (Svantesson 1989). Tones originally arose on vowels as a result of a merger of following nasals, which denasalized, and voiceless stops. Depending on vowel length, this led to high or rising tone before original voiceless stops and low or falling tone before original nasals. In a later development, high tones in open syllables were lowered if the vowel was non-high. These segmental effects may in part still be active in the Franconian dialects, as suggested by data in Hermans (2012), who observes that trochaic loans in the dialect of Maasbracht (Netherlands) have Accent 2 if the word ends in /i/, as in /’ɔ:²li/ ‘oil’, /’dæn²di/ ‘dandy’, /ko’lo:²ni/ ‘colony’, but Accent 1 if they end in /a/, as in /’dra:¹ma/ ‘drama’, /’so:¹fa/ ‘sofa’,

⁵Engelmann (1910) mentions Hardt (1843) as the first author to write about the tone contrast.

/a'yæn¹da/ 'agenda'. Strikingly, if the penult is closed and the final syllable begins with a voiceless obstruent, Accent 2 occurs even if the word ends in /a/, as in /'al²fa/ 'alpha' /'sɪr²ka/ 'circa', /'ɪŋ²ka/ 'Inca'. Hermans (2012) uses these and similar facts to argue that the tonal distinction is underlyingly represented as a difference in foot structure, but to us these facts indicate the correctness of the view that 'once the tone contrast had arisen, it acquired a natural distribution as determined by the microprosody' (G2000: 226).⁶

2.3.2 Propagation as a number marker

The second way in which the tone contrast spread was as a number marker. Monosyllabic syllables with Accent 2 were used to mark singular forms that contrasted with monosyllabic plurals, regardless of the phonological history of the words involved. Today, this can be seen in the sets of tonal minimal pairs for the number distinction in the dialects. For instance, the dialect of Maastricht has hundreds of minimal word pairs, including inflected forms, of which nineteen are SG-PL pairs which show that the analogical process was to a considerable extent driven by an identity of the segmental rime structure, as pointed out by Roger Weijenberg, who identified these forms (starred items have alternative plural forms with suffix [-ə]): [ærm] 'arm', [bein] 'leg', [bærx] 'mountain', [bærm] 'verge', [dærm] 'intestines', [dwærx] 'dwarf', [ærf] 'yard', [kœrf] 'basket', [pɛrt] 'horse', *[slœrf] 'elephant's trunk', [stœrm] 'storm', *[ʃærm] 'screen' [stɛin] 'stone', [vœrm] 'form', *[wærf] 'shipyard', [wɛx] 'road', [wœrm] 'worm', [zwærm] 'flight of e.g. birds', *[zweert] 'sword'. Only the word for 'road' here is an original masculine *a*-stem.

Central Franconian is not the only German dialect group to develop a novel phonological feature to combat a potential neutralization of the number distinction. In Dingeldein's (1983) list of 'secondary differentiations' that took over the number marking after the loss of final schwa, the Franconian tone is listed first (as '*Schärfung*'). Other types are generalized umlauted plurals (*tag* - *täg* 'day'), reverse umlauted singulars (*fuš* vs. *fiš* 'fish'), frication (*berg* vs *berx* 'mountain') and postnasal stop deletion (*hoy* vs. *hoyk* 'dog'). We know of no reports on dialects that neutralized the distinction across the board, even though individual words may end up without plural marker, as noted by Dingeldein (1983) for parts of Central Hessian. Neither is the Cologne tone contrast the only example of morphologically induced tonogenesis in Europe. Another case concerns a number marker which developed in a dialect of Occitan, where word-final [s] was debuccalized to [h]. The low pitch associated with breathy voice led to the development of a L-tone suffix for the plural forms with simultaneous loss of [h], which L-tone contrasts with H-toned singulars (Sauzet 2012).

⁶There is no implication that laryngeal specification of consonant *cannot* be the source of a tonogenesis (see e.g. Kingston 2011). Vowel height as the source of tonogenesis is either rare or non-existent.

3 Five objections

The first of five objections to G2000 amounts to a claim that the scenario inappropriately presupposes speaker awareness. The second concerns claims that specific forms are counterexamples to the account. The third and fourth objections are that G2000 failed to observe the correct chronology of events, while the fifth concerns a lacuna in the account.

3.1 The role of speaker awareness

In a review of Lahiri (2000), Angus (2002) characterized the G2000 account as implausible on the grounds that it presupposes conscious pronunciation tactics.

This explanation [*sc.* of the tonogenesis] is far-fetched at best. Even if the supposition of prestige association with the speech feature in question is so, conscious imitation of a feature perceived as prestige produces at best stylistic variation []’.

G2000 was couched in terms of speaker control (Kingston and Diehl 1994) and thus assumed non-automatic phonetic implementation, whereby speakers bring social factors and considerations of contrast maintenance to bear on their performance, much in the way a dolphin is in control of its actions when jumping through a hoop (cf. Gussenhoven 2004: 60). Awareness was never intended as an ingredient. A marginal role of awareness in language variation arises from prescriptive impositions of language forms, as happens in schools, which famously fail to have much of an effect on language development.

Rather, ‘Neo-grammarian’ phonological change was seen as driven by phonetic adjustments that are subsequently interpreted representationally by a new generation of speakers. The linguist’s task is to determine the motivation for the phonetic adjustments and to justify the phonological interpretation of the new language forms. In addition, some account of the social motivation behind the novel speaker behaviour is called for. Neither the phonetic adjustment nor their phonological interpretation either excludes or presupposes speaker awareness. The description in G2000 was perhaps unfortunately graphic in places, and characterized the crucial process as ‘fake analogical lengthening’, which may well have caused the misinterpretation of a conscious procedure.

3.2 Two putative counterexamples

Two types of counterexamples have been presented. They are dealt with in separate subsections.

3.2.1 Plural /va:t²/

Roos (2009: 88) observes that

‘[G2000] not only predicts singulars with Accent 2 and plurals with Accent 1 for original short *a*-stems like [da:x²] - [da:x¹] with an underlying voiced final consonant (/da:ɣ/), but also [va:t²] ‘cask’ - [va:t¹] ‘casks’ with an underlying voiceless segment (/va:t/). This is not borne out by the facts. From the GTRP database [the morphological dialect atlas of the Meertens Instituut (van den Berg 2003) (CG)], it appears that all Limburgian dialects in which *vat* ‘cask’ has a suffixless plural (i.e. Grote Brogel L356p, Bree L360p and Opglabbeek L416p) have [da:x²] - [da:x¹] but [va:t²] [va:t²] (G2000).

Two further cases of plural /va:t²/ for the Netherlands can be added (Epen Q207p and Brunssum Q035p). For the record, a claim that monosyllabic plural forms always have Accent 1 was never in fact made. The inspiration for G2000 was the observation in Grootaers and Grauls (1930) that all Hasselt Limburgish cognates of the approximately 30 Dutch nouns with short vowels in the singular and long vowels in the plural (e.g., /wɛx/ - /weeɣə/ (Lahiri and Drescher 1999)), have Accent 2 in long-voweled singulars.⁷ G2000 showed that the correspondence is exceptionless for two further dialects, Roermond in the Netherlands and Tongeren in Belgium. However, the plural forms vary widely.

The plural forms have by and large lost their uninflected forms, and only ‘day’ and ‘way’ are now unadulterated minimal pairs [in Roermond and Tongeren]. For the rest, a wide variety of largely a-historical forms have arisen [...] In almost all [of these cases], Accent 2 has been generalized to the plural in one of the two dialects; in seven [of these 31] instances, the dialects diverge here, with one of them retaining the older Accent 1 (G2000).

Roos’s observation that the tones in the plural forms /daa¹/ and /vaat²/ are rather determined by the voicing of the following obstruent and not by the hypothetical process depicted in Fig. 1 points to a generalization which does require an explanation. Why do monosyllabic plural forms with Accent 1 with monosyllabic singular forms with Accent 2 (i.e., the Grootaers-Grauls set) have an etymologically voiced final consonant? The explanation may lie in the fact that in the dialect spoken by the German immigrants of 1248, OSL never applied to vowels in words that had a post-vocalic voiceless plosive in the Cologne cognates, thus bleeding out any singular forms with AL, the relevant context for the tonogenesis. In the immigrant dialects, OSL had been pre-empted by the High German Consonant Shift (HGCS), which had turned post-vocalic voiceless plosives into affricates

⁷All of the 57 entries for the singular have Accent 2. For one location, Eijsden, one of the two transcribers gives both Accent 1 and Accent 2.

or fricatives, crucially closing the stressed syllable, as in the case of /wa.tər/ → /was.sər/, cf. Limburgish/Dutch /waa.tər/; German *Affen, machen* ‘monkeys, make’, Limburgish/Dutch *apen, maken* /aa.pə(n), maa.kə(n)/). Roos’ generalization may thus be seen as a tell-tale address label of the immigrant dialects involved in the tonogenesis: Middle High German (henceforth MHG). This explanation would appear to predict that the regularity is more consistent in Cologne than in the peripheral areas. On the tonal discrepancy between the Cologne forms and the Limburgish cognates areas, see section 5.

3.2.2 Central Franconian as a model for Limburgish

Goossens (2009) observes that the number of forms that underwent AL in German and Central Franconian is smaller than the number of Limburgish long-voweled singular forms that are presumably attributable to AL. As explained in section 2.3.2, the tone spread in part as a nominal number marker, as evidenced by the nouns with this pattern to which AL could never have applied, a view echoed in Roos (2009: 87). Goossens observes that also adjectives may show the pattern, such as /laam²/ ‘lame’ (earlier */lam/), with unapocopated inflected /laa¹mə/. While the tonogenesis account centered on the nominal number distinction, G2000 in fact noted that the same development caused singular dative forms, which had a final schwa that was presumably apocopated just as in plurals, to have Accent 1. The tone of the non-dative singular forms (Accent 2) has now been extended to the dative forms in Cologne, but Wiesinger (1970) indicates the presence of Accent 1 in datives in related dialects. These additional alternations, where they exist, cannot be seen as counterexamples to the G2000 account, but rather show that the process depicted in Fig 1 was not restricted to short-voweled nominative singular forms.

3.3 The order of the sound changes

Schmidt (2002) observes that the order of the sound changes assumed in G2000 is not supported by what is known about the historical phonology of German.

The scenario itself is however not readily compatible with informed chronological conjectures of historical phonology. It takes Open Syllable Lengthening in Low Franconian as its starting point and places it early, in any event before Apocope. The reverse order of events assumed by G2000 for Analogical Lengthening after Apocope (“coming in from the German heartland” (G2000:232)) has so far not been attested.⁸

⁸Das Szenario selbst ist allerdings nicht ganz einfach mit den Zeitanätzen der historischen Grammatik in Einklang zu bringen. Hiernach dürfte die Dehnung in offener Tonsilbe im Niederfränkischen ihren Ausgangspunkt haben und gerade im fraglichen Raum früh, jedenfalls deutlich vor der Apokope erfolgt sein. Die von Gussenhoven vorausgesetzte

Local population:	OSL	Apocope	[lengthened SG]	/H/
			↑	
Immigrant population:	OSL		AL	(Apocope)

Table 2: Order of events in 13th c. Cologne for two groups of speakers with the moment of dialect contact indicated by the upward arrow. OSL = Open Syllable Lengthening, AL= Analogical Lengthening, lengthened SG = phonetically lengthened singular forms, /H/ = interpretation as lexical H-tone.

Schmidt (2002)’s observation that Apocope applied after AL in MHG is in full agreement with our scenario in Fig. 1. My claim was that in Cologne Apocope applied *without* a follow-up application of AL, and that what looks like the result of AL in fact resulted from dialect contact with speakers of MHG. As noted in section 3.2, Standard Dutch lacks AL entirely, retaining some 30 now exceptional SG-PL pairs in which the singular has a short vowel and the affixed plural a long one. For Ripuarian and Moselle Franconian dialects, Goossens (2009: 104) reports apocopated as well as non-apocopated plural forms with Accent 1 whose monosyllabic long-voweled singulars have Accent 2.

3.4 The tone contrast on short vowels before obstruents

Goossens (2009) claims that the tonogenesis cannot have preceded AL, because dialects in Belgium have it on word-final stressed rhymes with a short vowel and a voiceless obstruent, as in the Hasselt Limburgish pair /bəs¹/ ‘forest’ vs. /bəs²/ ‘wallet’ (cf. Grootaers & Grauls 1930; Peters 2008). Similar contrasts occur in Moresnet (Jongen 1972), Tongeren (Stevens 1986) and Borgloon (Peters 2007). For this to be a problem for G2000, Goossens assumes, following Grootaers & Grauls (1930: 94), that these forms had tone *before* innovative long vowels arose through AL, at the same time renouncing an earlier assumption that involved a generalization of the tone contrast from long vowels to short vowels followed by obstruents (Goossens and Cajot 2009). The Grootaers-Grauls assumption implies that the medieval Cologne dialect had the tone contrast on all segmental syllable types, which propagated in that form so as to reach Hasselt and Moresnet in the west and Arzbach in the east. An argument against this scenario is that the present-day dialects have moraic associations in the area where the the tone contrast is confined to long syllables, while the dialects in Belgium have syllabic associations, as argued by Peters (2007; 2008), quite independently of the tonogenesis issue. If those dialects are relic areas, the core area must have developed

gegenläufige Ausbreitung der Analogiedehnung nach der Apokope “coming in from the German heartland” (2000: 232)) ist bisher nicht belegt.

moraic associations after the tone contrast had established itself on all syllable types, while also relieving the phonetic complexity of the contrast on short rhymes by ditching the contrast there. The alternative scenario is that moraic association, a uniquely Central Franconian feature within West Germanic, arose *as a result of the tone contrast*, which arose on long sonorant rhymes. The most common realizations for Accent 1 and Accent 2 are falling vs high pitch (in declaratives) and rising vs low pitch (in interrogatives), whereby the tone on the first mora could be the same and that on the second different (HL vs HH in declaratives and LH vs LL in interrogatives), representations that strongly suggest moraic association. A motivation for the West Limburgish expansion of the tone contrast to short vowels before obstruents can be found in the extreme rightward displacement of the pitch configurations for Accent 1 and 2 in the dialects in that area, which moved it phonetically to post-stressed syllables.⁹

3.5 The tone contrast on short vowels before sonorants

In his *Additional Material*, Köhnlein (2015) points out that G2000 has no explanation for the distribution of Accent 1 and Accent 2 in stressed syllables containing a short vowel followed by a sonorant consonant. There are in fact two generalizations. They were not included in Wiesinger (1970, 1975), but have been widely discussed (Nörrenberg 1884; Engelmann 1910; Hermans 1996; de Vaan 1999; Schmidt 2002; Werth 2011: 69; Köhnlein 2011). They can be stated as follows (V=short vowel; R=sonorant consonant; T=voiceless obstruent; D=voiced obstruent).

1. VRT vs. VRD: Short vowels followed by a sonorant consonant have Accent 2 before a voiceless obstruent and Accent 1 before a voiced obstruent in the same or a following syllable.
2. VR# vs. VRV: Short vowels have Accent 2 when followed by a tautosyllabic sonorant consonant and Accent 1 when followed by a heterosyllabic sonorant consonant.

The first generalization puts VR on a par with long high vowels, closing diphthongs, and long vowels arising from OSL (see Wiesinger’s generalization (ii) in section 2.3.1): Accent 1 when followed by a voiced obstruent, Accent 2 when followed by a voiceless one. So why is vowel height is no longer a condition for Accent 2 to appear when a short vowel combines with a sonorant consonant? If the promotion of high f₀ is due to pre-obstruent tongue raising for high vowels and diphthongs (see section 2.3.1), it is conceivable that the tongue body raising for coronal sonorants has a similar effect, just enough to cause VR to join high vowels

⁹A shift from moraic to syllabic association occurred in the periphery without an expansion of the distribution of the contrast to short rimes in the eastern peripheral dialect of Arzbach (Köhnlein 2011) as a result of extreme truncation in sentence-final position (Gussenhoven 2013).

and closing diphthongs. An argument for this tentative explanation may be found in feature analyses that collapse coronal articulation with high vowel articulation, like Government Phonology (Kaye et al. 1985, 1990) and Lahiri and Evers (1991). For this explanation to go through, the tongue-articulated sonorants /n ɲ r l/ must have been the driving force behind the effect, which should have generalized to short vowels followed by labial /m/.

G2000 also ignored the second generalization, the more direct object of the criticism in Köhnlein (2015), who gives /fal²/ *Fall* ‘fall’ and /falə/ *Falle* ‘trap’ as an example, currently /fal²/ vs. /fal¹/, respectively, in the Cologne dialect Bhatt and Herrwegen 2005. Under our assumptions, the second word would not be eligible for the tone contrast in the core area (see section 3.4). Once Apocope applies to it, the assignment to Accent 1 follows, which could be motivated both on the basis of the open vowel, the absence of voiceless consonant, or the retention of the falling pattern of the disyllable. The existence of Accent 2 in the VR# cases must have predated the development of Accent 1 in the VRV-cases. To explain it, another appeal could be made to the presumed effect of tongue raising tentatively proposed for the VRT-cases above.

4 Boersma’s objection

Boersma (2013) observes that in the dialect of Geleen (Netherlands), long vowels that arose from OSL have Accent 2, regardless of the voicing of the post-vocalic vowel, while original non-high long vowels have Accent 1. Therefore, any theory that assumes that the lexical tone contrast arose after OSL had taken place, like G2000, will need to explain how the two historical sets of [–high] long vowels systematically came to have different lexical tones. If, by contrast, it is assumed that the tone arose *before* OSL, or arose, as assumed by Boersma (2013), while OSL was taking place, the distribution of Accent 1 in original long vowels and Accent 2 in the new long vowels is easy to understand. To quote Boersma (2013):

The fundamental insight of the present paper can be told in a couple of sentences. Around the year 1100, Franconian had no tone contrast, but it did have a short-long vowel contrast in open syllables: /.ma.kən./ ‘make’ versus /.slɑɑ.pən./ ‘sleep’ (where ‘.’ stands for a syllable boundary). In sentence-internal focus position, these words were all accented on their first mora, i.e. realized as [mákən, sláɹpən] in declarative sentences or [màkən, slàɹpən] in interrogative sentences. Subsequently, the common process of *open syllable lengthening* lengthened the vowel, **and lengthened the tone with it**, yielding the present-day contrast, which is [máákən] versus [sláɹpən] in declarative sentences and [mààkən] versus [slùáɹpən] in interrogative sentences.

Short vowels that were lengthened before voiceless obstruents, as in the above

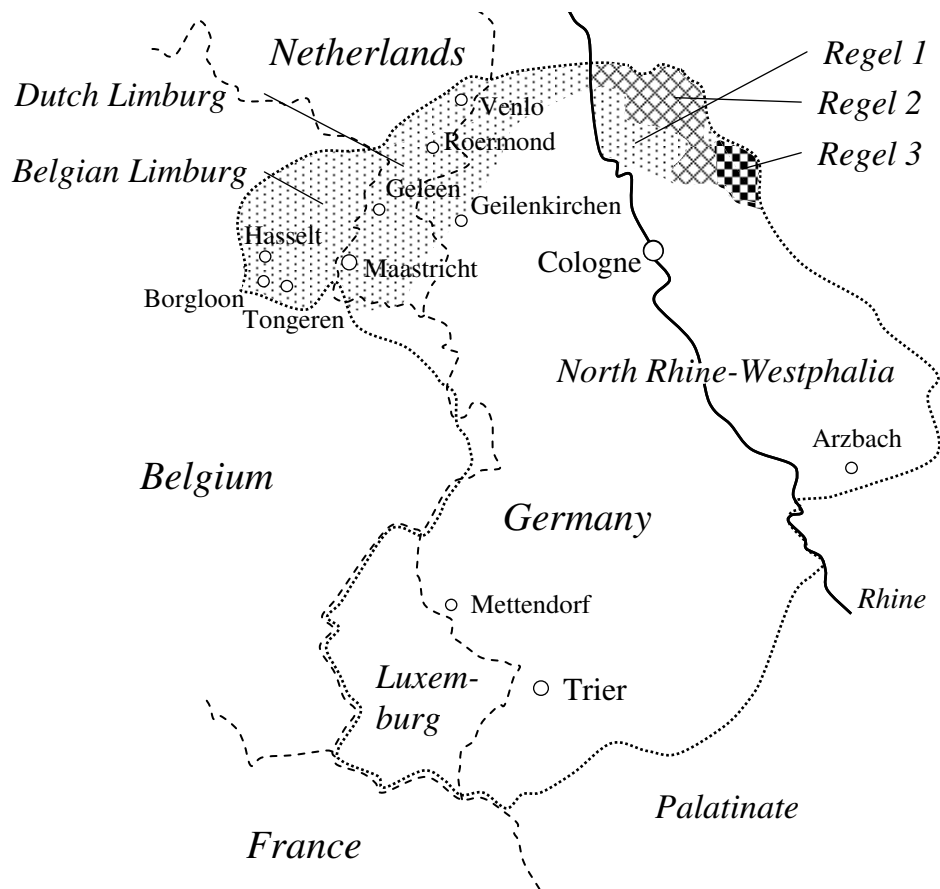


Figure 2: Map with the tonal area (dotted line) and Wiesinger’s *Regel 1*, *2* and *3* areas. The unshaded central area is known as *Regel A*. The *Regel 1* area is part of a wider peripheral zone termed *Regel A2*. Geilenkirchen lies on the isogloss between *Regel A* and *Regel A2*.

examples, are distinct from originally long vowels in the entire tonal area. In Geleen, the distinction also applies to vowels before voiced consonants. Thus, /waa².ɣə/ ‘waggon’, earlier /wa.ɣə/ is distinct from /waa¹.ɣə/ ‘dare’ in Geleen, while these words are homophones in Cologne, /vaa¹.ɤə/ (Bhatt and Herrwegen 2005). Boersma’s account, which has been included in a discussion of the Central Franconian tonogenesis in Kingston (2011), has four implications that call for critical consideration. First, there is the assumption of a tonogenesis based on the lengthening of a short vowel in IP-penultimate position. Second, there is the implication of a tone merger in a salient position in the Franconian heartland. Third, there is the implication that the merger was towards Accent 1. Fourth, there is the implication of a tone merger in monosyllables in the entire tonal area.

4.1 IP-medial vowel lengthening as a tonogenesis mechanism?

The creation of a high-pitched vowel from a lengthened short vowel in penultimate position, unlike that in final position as assumed in Figure 1, is not an obviously natural process. In the present-day toneless varieties of German and Dutch, the falling section of a word-medial (rising-)falling declarative pitch accent is located partly after the accented syllable, even when the vowel is long. Lengthening the high target would not lead to a clearly different pitch contour from that which is present by default on long vowels.¹⁰ The timing of the accented fall may admittedly have been earlier at the time of the tonogenesis. Peters et al. (2015) show that the fall is significantly later in the west and north of the Netherlands than in the south-west and north-western Germany. Since the west is a high-prestige area, it is reasonable to infer that there has been a rightward shift of the f_0 peak of declarative pitch accents. Still, the earliest alignment in their data, that for Low Saxon, is around 50% of the sonorant rime, with the end of the fall coming after the accented syllable. To get the distinguishing phonetic effect of the early, intrasyllabic fall in original long vowels, Boersma (2013) assumes that the tones of the pre-OSL fall associated to moras, as opposed to syllables, an unprecedented assumption for non-tonal West Germanic. That is, OSL as the cause behind this particular case of tonogenesis may seem less probable than suggested by the quotation at the start of section 4.

4.2 A merger in a salient position?

As was seen in section 2.3.1, in the heartland there is no tonal distinction between long vowels from OSL and original long vowels before voiced consonants, both having Accent 1, while in Geleen these are distinct, with Accent 1 only occurring in original long vowels. Boersma (2013) therefore needs to explain how somehow a merger of Accent 1 and Accent 2 occurred in the case of [–high] vowels before voiced consonants in the more central area. In Table 3, the panel on the left gives the Geleen distribution, while the righthand panel is the Central Franconian distribution (*Regel A*). An initially plausible scenario here is that the merger took place in the prestige area and that the western edge is a relic area, for which reason Boersma refers to the Geleen dialect as conservative, a view he shares with de Vaan (1999).¹¹ The problem with this specific merger is that the pitch contours at issue distinguish words in focus position in declarative sentences. In this position, the contrast is very salient and unlikely to be lost, as established

¹⁰The well-known description of Dutch by 't Hart et al. (1990) may suggest that the standard location of the falling section of a 'pointed hat' is early in the syllable, but this is not in fact the most common variant.

¹¹De Vaan's (1999) account of the tonogenesis differs both from Boersma (2013) and G2000.

for the dialects of Venlo by Fournier and Gussenhoven (2012) and Roermond by Fournier et al. (2006). In these dialects, the contrast is in fact neutralized in *non-focus positions* in non-final syllables in the intonational phrase. The dialect of Cologne, where the merger must have taken place under this scenario, will have a similar salience profile for the different sentence-prosodic contexts, but here the contrast is maintained even in non-final, non-focus positions, in both interrogative and declarative sentences. It would seem improbable therefore that, at some earlier stage, the Cologne dialect merged the tone contrast in a salient position before voiced obstruents, while leaving it intact in less salient positions.

Table 3: Segmentally determined distribution of Accent 1 and Accent 2 in the western periphery including Geleen and the (putatively innovative) distribution in Central Franconian (*Regel A*), with circled ‘1’ indicating the innovative merger with original long vowels according to Boersma. VV = long vowel, V: = short vowel lengthened by Open Syllable Lengthening, t = voiceless obstruent, d = voiced obstruent or sonorant consonant, +high = high vowel or closing diphthong, –high = non-high vowel or centring diphthong. NB. There are no high vowels from OSL in Geleen.

Geleen	+high	–high	<i>Regel A</i>	+high	–high
VVdə	1, 2	1	VVdə	1	1
VVtə	2	1	VVtə	2	1
V:də	∅	2	V:də	1	①
V:tə	∅	2	V:tə	2	2

4.3 A merger to Accent 1?

A second reason why this specific merger is improbable is that attested neutralizations around the periphery are consistently towards Accent 2 (‘non-distinctive accent’). For the western edge, Peters (2010) reports intonation contours in a non-tonal dialect which resemble the Accent 2 contours of neighbouring Hasselt and Borgloon. The toneless *Kleverländisch* dialect to the north-west of the area has been widely associated with a default Accent-2 type of accentuation since Ramisch (1908). Schmidt and Künzel (2006) describe that contour as a slow fall with the duration of Accent 2, as opposed to the sharply falling short contour of Accent 1. To lay observers, this pronunciation sounds like the Accent 2 of the tonal dialects. de Vaan (1999) cites descriptions of 20th-century Luxembourgeois showing that Accent 1 only ever occurred on word-final stressed syllables, effectively monosyllabic words, meaning that phrase-internal contrasts merged to Accent 2. Brunssum, an area in the Netherlands just east of Geleen, would appear to be a

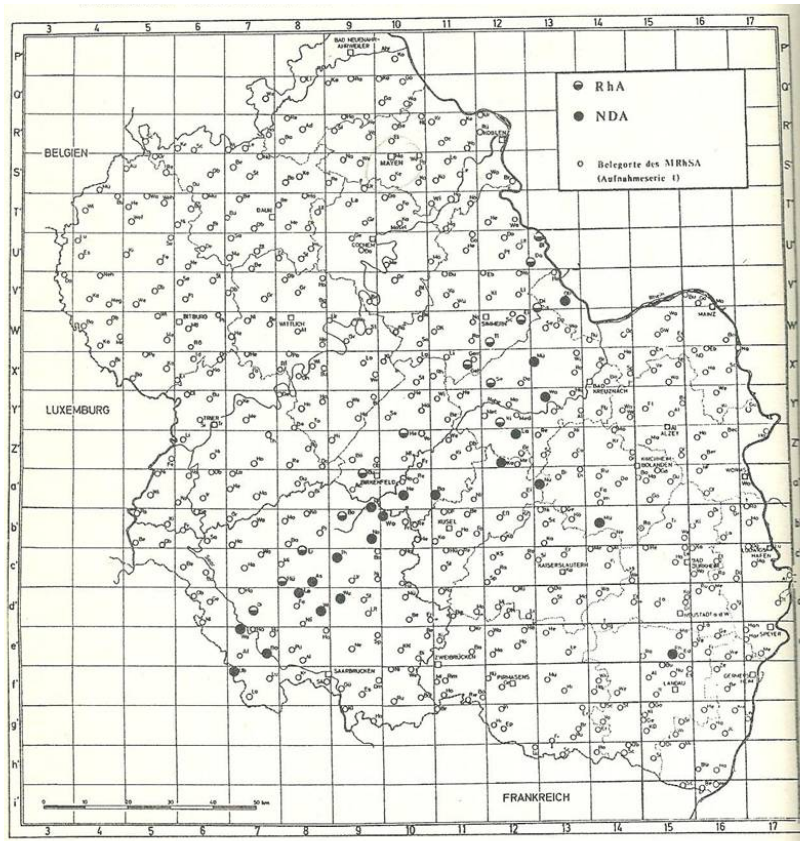


Figure 3: Locations with the tone contrast (black-white dots) and non-distinctive Accent 2 (black dots) along the southern tonal isogloss. From Schmidt 1986.

toneless enclave where Accent 2 has been generalized across the lexicon. For the southern isogloss, Schmidt (1986) reports non-distinctive accent along the entire stretch in Germany (see Fig 3). Therefore, neutralizations in salient positions show up as Accent 2.

There are two cases which may appear to run counter to this generalization. First, Westphalia, on the eastern periphery, has been singled out as exceptional in this respect. To quote Wiesinger (1975):

While Low Franconian only has the phonologically non-distinctive ‘drawing’ accent (*Trägheitsakzent*) as a special intonational feature of long vowels and diphthongs, Westphalian has no such accentual feature.¹²

The exception made by Wiesinger for peripheral Westphalia may be due to a phonological change which caused Accent 2 to resemble the typical contour for Accent 1 phonetically. There have been reports from the eastern periphery that the distribution of Accent 1 and Accent 2 was reversed, most famously Bach (1921) for the Franconian dialect of Arzbach. Köhnlein (2011) has shown that the ‘reversal’ applies to the declarative intonation contour, thus leaving the interrogative contour unchanged, and argues convincingly that this was a straightforward phonological change. When Accent 2 came to resemble the pitch contour of Accent 1 of the central area, the declarative contour of Arzbach Accent 1 seemed to be more similar to that of Accent 2 of the central area. Areas with this feature were said to have *Regel B* by Wiesinger (1970). Gussenhoven (2013) argues that the change resulted from extreme truncation, more drastic than already occurred in a larger group of dialects in the central area. Bayer (2008) reports this type of change for a western location, Mettendorf.

Another potential counterexample is referred to by Boersma (2013) when he observes that ‘[w]e know that there are neighbouring non-tonal dialects [i.e., near Geleen, CG] that invariably have an acute in all long vowels’. The observation most probably concerns the dialect of Weert, which has in part reinterpreted the tonal contrast as a quantity contrast and which indeed has falling intonational pitch accents in short-voweled syllables which resemble Accent 1 (Heijmans 2003). However, long-voweled reflexes, which go back to words with Accent 2, resemble Accent 2 more than Accent 1. In fact, the local community considers the two durations to be equivalent to the tone contrast of dialects in the neighbouring tonal area. Generally, therefore, it can be maintained that neutralizations are in the direction of Accent 2.

¹²Während das Niederrheinische nur den phonologisch nicht relevanten Trägheitsakzent als besondere Intonationseigenheit der Langvokale und Diphthonge aufweist, verfügt das Westphälische über keine derartige Akzentuierung.

4.4 A shift from Accent 2 to Accent 1 in monosyllables?

On Boersma's (2013) account, OSL lengthened all short vowels in open syllables, regardless of the voicing of the post-vocalic consonant, creating contrastive Accent 2. In present-day non-apocopated words, we find Accent 2 before a voiceless consonant in the central area as well as in Geleen (cf section 2.3.1), while before a voiced consonant we have Accent 2 in Geleen, but Accent 1 in the central area. In the previous subsection, we have seen how this motivated Boersma (2013) to postulate a change of Accent 2 to Accent 1 in the central area before voiced consonants. Now, in present-day *apocopated* words which had a voiced consonant after the lengthened vowel, Accent 1 occurs *throughout the area*. For instance, etymons of Geleen /wɛɛk²/ 'week' (from earlier */wɛ.kə/) have Accent 2 everywhere, while /nɔɔm¹/ 'name' (from earlier */na.mə/), /maax¹/ 'stomach' (*/ma.ɣə/) and /bɔɔɣ¹/ 'bow (Noun)' (*/bɔ.ɣə/) have Accent 1 everywhere, just like original long vowels (e.g. /piin¹/ 'pain', */piin/; /ɣrɔɔf¹/, */ɣrɑɑ.və/). A final issue therefore concerns Boersma's (2013) assumption that a replacement of Accent 2 with Accent 1 in penultimate syllables with long vowels from OSL before voiced consonants in the central area was accompanied by the same change in final syllables in the central area *as well as in the periphery*. Boersma (2013) writes:

The change from circumflex (*sc.* Accent 2) to acute (*sc.* Accent 1) in voiced environments [...] was conditioned by a drop of schwa in the next syllable. In the larger part of the present tone area, however, this change was not conditioned by schwa drop: it occurred as well in words that stayed disyllabic, such as **léɛvən** 'to live' and **káamər** 'room'. In this area, then, all disyllabic forms with voiced intervocalic consonants have an acute, and **bəlɔɔvən** 'to promise', from ***bəlɔvən**, rhymes with **ɟrɔɔvən** 'to punish', from ***ɟtraɑvən**.

The putative change must under this scenario have begun in the central area and been extended to the periphery in apocopated cases only, leaving the distinction in the periphery just in case a schwa followed. Table 4 gives these presumed innovations. Understandably, Boersma places the phonological change in words like [maax¹] 'stomach' as beginning before the devoicing of final [ɣ] to [x], since the voiced obstruent is the distinguishing context for the change of Accent 2 to Accent 1, but after the disappearance of schwa, the rationale would be to keep the geographical distribution of apocopated forms (Accent 1 everywhere) distinct from the non-apocopated ones (Accent 2 in the periphery, Accent 1 in the central area). The form in which the general change from Accent 2 to Accent 1 must have occurred is therefore something like [ma:ɣə], a form between [ma:x] and [ma:ɣə].

There is no doubt that German dialects interpreted such forms phonologically in a number of dialects, like Prussian, Yiddish and North Low Saxon

(Wiesinger 1983: 829; Prehn 2012). In fact, Gress-Wright (2010) argues on the basis of 14th-century and 15th-century manuscripts that Apocope caused Final Devoicing to be suspended more generally, being reinstated later, leaving only some dialects without it. That is, the postulation of forms like [ma:y̥] (from [ma:y̥ə], earlier [ma:y̥ə], [may̥ə]), whose final consonant contrasted with voiceless obstruents (/maay/ vs. a hypothetical /maax/), is in itself quite plausible. However, the assumption that all of these words started out with Accent 2 and changed over to Accent 1 throughout the tonal area is less plausible. The motivation that caused words with final schwa to make the same change from Accent 2 to Accent 1 is rather different from the motivation that caused forms that had undergone Apocope to make that change. Inevitably, the question arises if all these words might not have had Accent 1 to begin with, and that in the western periphery Accent 2 was assigned to long vowels arising from OSL. This view of events is explored in the next section.

Table 4: Phonological mergers of Accent 1 with Accent 2 in the north-western periphery including Geleen and the central area according to Boersma 2013. See Table 3 for legends.

Geleen	+high	–high	<i>Regel A</i>	+high	–high
VVdə	1, 2	1	VVdə	1	1
VVtə	2	1	VVtə	2	1
V:də	∅	2	V:də	1	①
V:tə	∅	2	V:tə	2	2
VVd∅	1	1	VVd∅	1	1
VVt∅	2	1	VVt∅	2	1
V:d∅	∅	①	V:d∅	1	①
V:t∅	∅	2	V:t∅	2	2

5 An alternative account of the Boersma data

Let’s begin our alternative account with the observation that as one approaches a tonal isogloss from within an area with lexical tone, there will be an expectation of contrast erosion. The neutralizations in non-salient positions in the sentence (see section 4.2) justify this expectation: it is given up in phonologically weak positions near the isogloss. Equally, we might expect a similar gradual disappearance of the contrast from other positions, smoothing out the difference with the toneless areas. Wiesinger (1975: 23) gives detailed information on this point for the north-eastern corner of the tonal area.

Like all peripheral zones of the Rhenish tonal area, also the Bergisches Land is characterized by a progressive diminution in the distribution of Accent 1 in three steps towards the north and east and thus to a gradual transition to the (non-contrastive) dialects of Low Franconian and Westphalian.¹³

Again, the neutralizations are towards Accent 2, never to Accent 1. In Table 5, the four tables are arranged by geographical distance from the isogloss. The bottom right table represents the non-distinctive accent on the non-tonal side of the isogloss, while the top right table represents the *Regel A*, the heartland. Top right and bottom left are intermediate dialects. Innovations are circled. The Geleen dialect represents a stage between *Regel 1* and *Regel 2*, because it has both Accent 1 and Accent 2 on originally long [+high] vowels in unapocopated words, as shown in the lefthand table of Table 3.

Evidently, these facts do not show a periphery lagging behind in the implementation of tone mergers, as assumed by the ‘relic area’ hypothesis. We will see how the contribution of the Boersma data to the gradual increase in the distribution of Accent 2 towards the tonal isogloss is not in fact explained by any mergers or splits. To see this, we will consider the question posed by Boersma under two subquestions:

1. How did Geleen, like so many areas along the north-western section of the isogloss, come to have a distinction between original long vowels (Accent 1) and long vowels arising from OSL (Accent 2) before voiced consonants (cf. /kee¹.zə/ ‘choose’ vs. /lɛɛ².zə/ ‘read’)?
2. How did the central area as well as the north-western periphery come to have a distinction between original long vowels (Accent 1) and long vowels arising from OSL in positions before a voiceless obstruent (cf. /slaa¹.pə/ ‘sleep’ vs. /maa².kə/ ‘make’)?

As for the first question, observe that this distribution would arise if the tone contrast were already present in Geleen by the time that OSL took place. Boersma’s (2013) account of a sharp fall in original long vowels with Accent 1 would immediately make sense, because by and large those vowels would at that time already have *had* Accent 1. The new long vowels in penultimate stressed syllables arising from OSL would naturally be assigned to the existing category of Accent 2, since the lengthening implied a retention of the high pitch late in the

¹³Wie in allen Randgebieten der rheinischen Akzentuierung so beobachtet man auch im Bergischen ein kontinuierliches Nachlassen des Stoßtones in 3 Stufen nach Norden und Osten und damit den allmählichen akzentuellen Übergang zum Niederrheinischen und Westphälischen.

Table 5: Gradual mergers towards Accent 2 in the north-east corner of the tonal area (the Bergisches Land) according to Wiesinger (1975). *Regel 1* is closest to the Franconian heartland (for which see Table 3, righthand table (*Regel A*)) and *Regel 3* is closest to the isogloss. VVC=long vowel with coda C; see also Table 3.

<i>Regel 1</i>	+high	−high	<i>Regel 2</i>	+high	−high
VVC	2	1	VVC	2	1
VVdə	1	1	VVdə	②	1
VVtə	2	1	VVtə	2	1
V:də	②	②	V:də	2	2
V:tə	2	2	V:tə	2	2
V:dø	1	1	V:dø	1	1
V:tø	2	2	V:tø	2	2
<i>Regel 3</i>	+high	−high	<i>Atonal</i>	+high	−high
VVC	2	②	VVC	2	2
VVdə	2	②	VVdə	2	2
VVtə	2	②	VVtə	2	2
V:də	2	2	V:də	2	2
V:tə	2	2	V:tə	2	2
V:dø	1	1	V:dø	②	②
V:tø	2	2	V:tø	2	2

syllable (see section 4.1), in a situation in which there already were syllable rimes containing contrastive high level pitch, i.e., Accent 2.

Then how could OSL have preceded the tonogenesis in Cologne, as assumed by G2000, but followed the arrival of the tone contrast in Geleen? It must be because the tone contrast spread faster from Cologne to the surrounding areas than OSL.¹⁴ Fig. 4 shows this assumption graphically. The different propagation

¹⁴A reasonable estimate of the time of arrival of OSL and Apocope in the province of Limburg is 1320. In general, OSL, AL and Apocope will have been active over longer time spans. Morphemic schwa will have been more resistant to Apocope than non-suffixal schwas. Limburgish dialects were affected by OSL and Apocope sooner than more western dialects. For Apocope, there were two prestige centres from which Apocope spread, Cologne and Holland in the west (van Reenen and Mulder 2003). The whole of the province of Limburg and parts of eastern Brabant had apocopated forms for *zoon* ‘son’ (from *[zo:nə], earlier *[sunə]) as a result of the innovation from the east (Cologne) by 1330, based on municipal archives. Apocope in the spoken language must have existed before that, say 1320. Against this, however, Jürgen Erich Schmidt points out in a personal communication (16 November 2015) that Birkenes (2014), which I have not consulted, puts

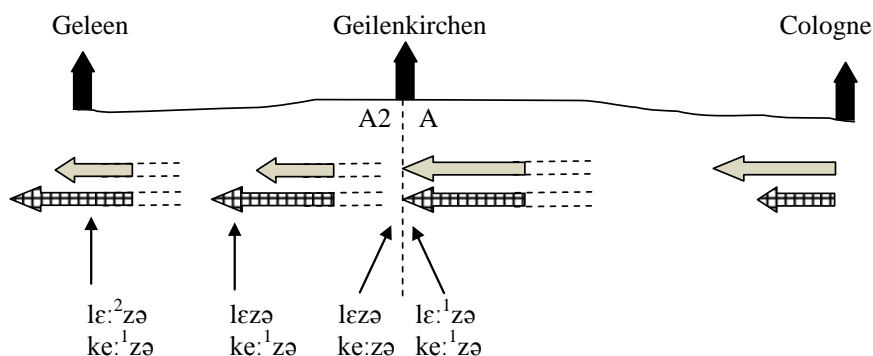


Figure 4: Furthest extents of the geographical propagation of Open Syllable Lengthening (lightgrey arrows) and the tone contrast (chequered arrows) at four moments in time. First shortly after the tonogenesis in Cologne, next at the moment of Open Syllable Lengthening and the tone contrast have travelled equal distances from Cologne, the ‘catch-up point’, next at a later point at which tone has been assigned to long vowels, and latest there arrival in Geleen, with hypothetical transcriptions of present-day Geleen [lɛ:²zə] ‘read’ and [kɛ:¹zə] ‘choose’. The ‘catch-up point’ (labelled ‘Geilenkirchen’, a town on the line Cologne-Geleen near that isogloss) is the boundary between the areas for *Regel A* and *Regel A2*.

rates predict that from the location where the tone contrast caught up with OSL, given as Geilenkirchen, all long vowels from OSL in non-apocoped words have Accent 2. Before that point, long vowels by OSL have Accent 1 when followed by a voiced obstruent or sonorant consonant, just like original long vowels, ultimately causing ‘waggon’ and ‘dare’ to be homophones in Cologne (/vaa¹.ɛə/), but a tonal minimal pair in Geleen (/waa².ɣə/ vs /waa¹.ɣə/, respectively).

Apocope at a much later date, 1550 (p. 136) on the basis of written sources. As for OSL, there are similar indications that Limburg was earlier than the area to the west. Boersma (2013) notes that OSL must have been present in Limburg (Venlo) by 1320, with reference to van der Meer (1949). OSL in Brabantine Dutch (probably Antwerp) must have been complete by 1375 on the basis of work by Sytsema and Lahiri (2013) on a manuscript of *Coninc Saladijn* produced around that date. Unlike a manuscript of the *Life of St Lutgart*, which is probably from the same area and dates from 1275-1300, it rhymes original long vowels and vowels in the context for OSL, and does not systematically distinguish the two classes of vowels in the spelling (Fikkert 2000). OSL in Brabantine Dutch therefore occurred somewhere between 1300 and 1375, while in Limburg it must have occurred by 1320. This suggests that OSL and Apocope were around in the same period in the province of Limburg.

The second question concerns the occurrence of Accent 2 in long vowels followed by voiceless obstruents, which are distinct from original long vowels, which have Accent 1 *on both sides of the A2 isogloss*. This could be because OSL generally lagged behind in the case of vowels before voiceless obstruents, compared to vowels before voiced consonants. Before voiceless consonants, vowels tend to be shorter, even when the consonant is heterosyllabic (cf. Maddieson 1985). That is, OSL may have applied in pre-voiced contexts before the tonogenesis and in pre-voiceless contexts after, creating the situation before voiceless consonants in the *Regel A* area which obtained before all consonants in the *Regel A2* area. At this point, the answer to a third question may be clear, which concerns the Geleen-like behaviour of Cologne in monosyllabic forms.

3. Why do original long vowels and vowels lengthened by OSL have Accent 1 on both sides of the A2 isogloss in the case of apocoped words with a voiced consonant after the vowel?

Table 6: Chronology of sound changes in *Regel A* and A2 areas. The dot indicates a syllable boundary in /ma.ɣə/ ‘stomach’, /da.ɣə/ ‘stomach’, /lɛ.zə/ ‘read’, /kee.zən/ ‘choose’, /sa.kə/ ‘property, case’, /ʃɔp/ ‘sheep’, /a.pən/ ‘monkeys’, /slɑɑ.pən/ ‘sleep’.

	<i>Regel A</i>	<i>Regel A2</i>
Minkova-OSL voiced	/ma.ɣə/ → /maay/	
	/da.ɣə → daay/	
OSL voiced	/lɛ.zən/ → /lɛɛ.zən/	
	(cf. /kee.zən/)	
Tonogenesis (A)	Acc1 vs Acc2	Acc1 vs Acc2
Tone (A2)	/lɛɛ ¹ .zən, kee ¹ .zən/	/kee ¹ .zən/
	/maay ¹ , daay ¹ /	/maay ¹ , daay ¹ /
OSL voiced		/lɛ.zən/ → /lɛɛ ² .zən/
		(cf. /kee ¹ .zən/)
Minkova-OSL voiceless	/sa.kə/ → /saak ² /	
	(cf. /ʃɔp ¹ /)	
OSL voiceless	/a.pən/ → /aa ² .pən/	
	(cf. /slɑɑ ¹ .pən/)	

Disyllabic words like /mayə/ ‘stomach’ must have been the earliest targets of OSL, which can be explained by the voiced nature of post-stress consonant, the status of the final schwa as part of the stem, and to the absence of a consonant after schwa, all three of the OSL-promoting conditions. Quite probably, OSL and

Apocope applied as a package deal, as described for English by Minkova (1982), creating forms like /ma:y/, as described by Boersma (2013). These early targets of OSL differed from non-apocoped words, which often had a consonant after schwa, as in Geleen /kaa².mər/ ‘chamber’ or an infinitive ending, as in /lɛɛ².zən/ ‘read’, in which final /n/ was arguably still maintained. The tonogenesis next occurred in words like /day+ə/ ‘days’, minimally different from /maɣə/ in the status of the final schwa, and just a little less likely to undergo OSL. Words with a voiceless consonant after the stressed vowel lagged behind the tonogenesis, just as they occurred later than the introduction of the tone contrast in the *Regel A2* area, and so have Accent 2 in both areas (/saa.kə/ ‘case’, /aa.pən/ ‘monkeys’). It is the intermediate group, Geleen /kaa².mər/ ‘chamber’ and /lɛɛ².zən/ ‘read’, which preceded the tonogenesis in Cologne and lagged the introduction of the tonal contrast in the area west of Geilenkirchen, giving the different tones as documented in Figure 4.¹⁵ Table 6 attempts to summarize this hypothesis by showing comparative chronologies for the *Regel A* and *Regel A2* areas.

6 Conclusions

This chapter evaluated a number of objections that have been raised against the scenario of the Central Franconian tonogenesis proposed in Gussenhoven (2000) (G2000). All except one of these could be neutralized by arguing that they do not present crucially negative evidence against it. One objection was dealt with more extensively, because at first sight it represents a definitive argument against G2000. It was raised by Boersma (2013), who pointed out that in Limburgish, a dialect zone along the north-western periphery of the tonal area, long vowels that arose from Open Syllable Lengthening (OSL) have Accent 2 before all types of consonant (e.g. /waa².ɣən/ ‘waggon’, /aa².pən/ ‘monkeys’), while original long vowels in the same context have Accent 1 (e.g. /waa¹.ɣən/ ‘dare’, /slaa¹.pən/ ‘sleep’, with transcriptions following Boersma’s (2013) reconstructed forms; the modern Geleen forms lost final /n/ and merged /ɑɑ/ and /aa/). Crucially, the fact that the two classes of long vowels have different tones implies that OSL cannot have preceded the tonogenesis, one of the assumptions in G2000. Boersma (2013) presents an alternative tonogenesis account on the basis of the assumption that the lengthening of vowels in open syllables caused them to have high pitch throughout, thus *creating* an Accent 2 that contrasted with Accent 1, a high fall in the syllable

¹⁵There may be more effects of such interacting sound changes. The timing of OSL before voiceless consonants relative to HGCS must have been after HGCS affected /t/, but before it affected /p/, while in the case of /k/ a simultaneous application must be assumed, as shown by /aa².pə/ ‘monkeys’, /was.sər/ ‘water’ and /maa².xə/ ‘make’, all with original short /a/ before heterosyllabic /p t k/ (Bhatt and Herrwegen 2005). There will therefore most probably be an intermediate area between Cologne and Geilenkirchen where OSL additionally affected short vowels before /t/, and /waa².tər/ is found alongside /waa¹.ɣə/ ‘waggon’.

containing a long vowel. Since the new contour corresponds phonetically with that for Accent 2 in the phonological position concerned (IP-medial, focused position), Boersma takes OSL to be the source of the tone contrast.

A consideration of Boersma's proposal led to the identification of four implications which were characterized as questionable in a critical discussion. In an attempt to salvage the original account, this chapter proposed that OSL and the tone contrast both emanated from Cologne, and that OSL started its expansion earlier, before the tonogenesis had occurred there. However, when the tone contrast arose, it propagated from Cologne at a faster speed than OSL, at some point overtaking it. The geographical frontier at which this happened is reflected in the isogloss known as the boundary between *Regel A*, the core area which includes Cologne, and *Regel A2*, the area to its west and north. This isogloss and the tonal distributions of either side of it have been widely discussed, but never been explained as resulting from a single factor, in our case the staggered application of OSL as a function of segmental conditions. Our response to Boersma's challenge, therefore, not only answers his objection, but offers an explanation of the distributions of the tone contrast in the two areas as a welcome by-product.

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