1. Project title

Tone and Intrasegmental Structure in West-Germanic Dialects

2. Applicants

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3. Subprojects

1) *Tone-vowel interaction in Franconian dialects*
   PhD position, Onderzoeksgroep Variatielinguïstiek, Meertens Instituut/KNAW
2) *Consonant-tone interactions in Franconian dialects*
   PhD position, Onderzoeksgroep Variatielinguïstiek, Meertens Instituut/KNAW
3) *The ontogenesis of the Franconian tones*
   Post-doc position, Projectgroep Fonetiek, ACLC, University of Amsterdam

4. Period

1 September 2005 – 1 September 2009 (PhD positions)
1 January 2006 – 1 January 2009 (post-doc position)

5. Advisory group

core:

Carlos Gussenhoven (Nijmegen)
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6. General project description

Typology. The dialects of the borderland of Germany, the Netherlands, Belgium and Luxemburg share an interesting phonological feature: they have a lexical tone contrast, i.e., a word can mean different things depending on which of two tones it contains. Consider the following two words from Roermond (Kats 1985), both of which are usually written as *leuter*:

(1) *A minimal pair*
[løː$^{H:}$tər] 'to twaddle'
[løː^{HL}tər] 'soap suds'

Pronounced in isolation, the first vowel of the first *leuter* is realized with a high level pitch; this tone, which we write here as "H:", has traditionally been called *Schleifton*, *sleeptoon*, *circumflex*, *dragging tone* or *Accent 2*. The first vowel of the second *leuter* is realized with a sharply falling pitch; this tone, which we write as "HL", is traditionally called *Schärfung*, *stoottoon*, *acute*, *falling tone*, or *Accent 1*.

The tonal dialects are divided into two main groups (Frings 1916): South-East-Low Franconian (Belgian Limburg, Dutch Limburg, Dülken region), and Central Franconian, which is divided into Ripuarian (Aachen and Cologne; Kerkrade region), and Moselle-Franconian (a large area with Trier in the centre). From a typological point of view they can be classified as 'restricted tone languages' (Yip 2002): tone can only occur on long vowels, on diphthongs, and on short vowels followed by a sonorant consonant (i.e. [n], [m], [ŋ], [ɲ], [l], or [r]) within the same syllable. Restricted tone languages are attested on all continents. In Europe, other examples are Lithuanian, Latvian, Čakavian and Kashubian. We can say, then, that in some respects the Franconian dialects fit nicely into the typology of tone languages. In this sense they are well understood.

In many other respects, however, tonal Franconian does not fit with what is known about tone languages. The tonal dialects even contradict two universals that have been proposed in the literature:

(2) *Alleged universals of tone systems*
a) Vowels and tones cannot determine each other's quality (Hombert 1977, 1978; Hombert, Ohala & Ewan 1979).
b) A consonant's laryngeal features cannot determine the tone of a segment on its left (Maddieson 1978, 1997).

Both universals seem to be contradicted by dialects of the Franconian polytonic area. Consider first the universal in (2a). In Sittard (Dutch Limburg), earlier long mid vowels became closing diphthongs, but only if they have the falling tone (Dols 1953):

(3) *Sittard diphthongization*

	Roermond	Sittard	
falling tone:	[keː^{HL}zəl]	[kɛi^{HL}zəl]	'gravel'
	[voː^{HL}t]	[vɔu^{HL}t]	'foot'
level tone:	[beː$^{H:}$t]	[beː$^{H:}$t]	'bite'
	[noː$^{H:}$t]	[noː$^{H:}$t]	'nut'

Likewise, Maastricht (Endepols 1955) diphthongizes high vowels if they carry a falling tone:

(4) *Maastricht diphthongization*

	Roermond/Sittard	Maastricht	
falling tone:	[ʃtiː^{HL}və(n)]	[ʃtɛi^{HL}və(n)]	'stiff-MASCSG'
	[bruː^{HL}nə(n)]	[brɔu^{HL}nə(n)]	'brown-MASCSG'
level tone:	[priː$^{H:}$s]	[priː$^{H:}$s]	'price'
	[vuː$^{H:}$s]	[vuː$^{H:}$s]	'fist'

In Dülken, closing diphthongs are monophthongized, but only under a level tone (Frings 1913):

(5) *Dülken monophthongization*

	Roermond/Sittard	Dülken	
level tone:	[ʃwɛi$^{H:}$t]	[ʃweː$^{H:}$t]	'sweat'
	[dɔu$^{H:}$f]	[doː$^{H:}$f]	'deaf'
falling tone:	[klɛi^{HL}n]	[klɛi^{HL}n]	'small'
	[wɛi^{HL}]	[wɛi^{HL}]	'meadow'

The facts presented in (3) to (5) suggest the following generalizations:

(6) *Tone-vowel interaction in Modern Franconian*
   a) A falling tone prefers a closing diphthong (Sittard, Maastricht).
   b) A level tone prefers a monophthong (Dülken).

Not only do these two generalizations contradict universal (2a), they may even go directly against a universal phonetic trend, discussed in Lehiste (1970):

(7) *Alleged universal phonetic trend*
   The closer a vowel's constriction is, the higher its intrinsic pitch.

The second part of a falling tone has a low pitch, but the second part of a closing diphthong can be seen as a high vowel. Given this, the Franconian generalizations in (6) directly go against the phonetic universal in (7).

Let us now consider the universal in (2b). In Roermond, words with a short vowel followed by a sonorant consonant and another voiced consonant allow a tonal contrast:

(8) *Roermond contrast in voiced environment*

Falling tone:		Level tone:	
[bæn^{HL}də(n)]	'gang'	[dʊn$^{H:}$dər]	'thunder'
[hær^{HL}dər]	'shepherd'	[mær$^{H:}$ɣəl]	'marl'

If the last consonant of this sequence is voiceless, however, only the level tone is allowed:

(9) *Roermond gap in voiceless environment*

Falling tone:	Level tone:	
(missing)	[pɪm$^{H:}$pəl]	‘booze’
(missing)	[hær$^{H:}$səs]	‘brains’

The gap in (9) suggests the following generalization:

(10) *Consonant-tone interaction in Roermond*

A voiceless consonant disprefers a low tone on a consonant at its left.

This generalization shows that in Roermond a voiceless consonant is capable of determining the tone of the segment on its left, contrary to what (2b) dictates.

From a typological view, the tendencies in (6) and (10) are intriguing, since they show that the principles underlying the proposed universals in (2a), (7) and (2b) must somehow be inactive or overruled in some of the Franconian dialects.

History. The fact that tones and vowels do determine each other’s quality in Franconian dialects, and voicing does determine the tone to its left is by no means an accidental fact of a few isolated dialects. In fact, these relations have always played a key role in the historical development of the tones.

Nearly all scholars agree that at the initial stage of tonogenesis, vowels ending in low sonority (long high vowels and closing diphthongs) received a level tone whereas long monophthongal non-high vowels received a falling tone (Schmidt 1986 and De Vaan 1999 discuss the literature). In (11) we illustrate this with current data from Maasbracht. The table also shows how originally short vowels that were lengthened in open syllables received the level tone. This process of Open Syllable Lengthening may well have created the (near) minimal pairs visible in (11), thus causing the phonologization of the tone contrast.

(11) *Relation between tone and original vowels*

	West Germanic	Early Middle E. Low Franconian	present-day Maasbracht
a) Closing diphthongs:	ai	[hɛit]	[hɛi$^{H:}$t] ‘hot’
	au	[bɔum]	[bɔu$^{H:}$m] ‘tree’
	+ *umlaut*	[drœymən]	[drœi$^{H:}$mə(n)] ‘dream’
b) Long high: monophthongs:	i:	[wi:n]	[wi:$^{H:}$n] ‘wine’
	u:	[hu:s]	[hu:$^{H:}$s] ‘house’
	+ *umlaut*	[vy:r]	[vy:$^{H:}$r] ‘fire’
c) Long non-high monophthongs:	io,e:$_2$	[ke:zən]	[ke:^{HL}zə(n)] ‘choose’
	o:	[bo:k]	[bo:^{HL}k] ‘book’
	+ *umlaut*	[vø:lən]	[vø:^{HL}lə(n)] ‘feel’
	ai/_{h,w,#,r}	[zɛ:]	[ziə^{HL}] ‘sea’
	au/_{h,w,#,cor}	[ɣrɔ:t]	[ɣruə^{HL}t] ‘great’
	a:	[slɑ:pən]	[ʃlɔ:^{HL}pə(n)] ‘sleep’
	+ *umlaut*	[jæ:mərən]	[jiə^{HL}mərə(n)] ‘lament’

d) Lengthening	i	[hɪməl]	[he:$^{H:}$məl] ‘heaven’
in open syllable:	u	[zʊmər]	[zo:$^{H:}$mər] ‘Summer’
	+ *umlaut*	[mʏlənə]	[mø:$^{H:}$lə(n)] ‘mill’
	e	[lɛvən]	[lɛ:$^{H:}$və(n)] ‘live’
	o	[hɔpən]	[hɔ:$^{H:}$pə(n)] ‘hope’
	a	[makən]	[ma:$^{H:}$kə(n)] ‘make’

The tone-vowel relations exemplified in (11) suggest that closing diphthongs prefer the level tone, a preference that contrasts starkly with the more recent preferences summarized in (6). This suggests that something happened in the development of Franconian, such that the principle leading to the effects listed in (6) was not yet active at the initial stage of the tonogenesis.

Consonant voicing, too, has played a very important role at various stages in the development of the Franconian dialects, and always with regard to the vowel on the left. First, forms that lost their schwa turned their level tone into a falling tone, but only if the intervening consonant was originally voiced:

(12) *Dependence of tone on consonant voicing*

	Early E.L.F.	Late E.L.F.	present-day Maasbracht
a) Voiced	[ɔuɣə]	[ɔu$^{H:}$ɣə]	[ɔu^{HL}x] ‘eye’
consonant:	[druːvə]	[druː$^{H:}$və]	[druː^{HL}f] ‘grape’
	[namə]	[na:$^{H:}$mə]	[na:^{HL}m] ‘name’
b) Voiceless	[zɛipə]	[zɛi$^{H:}$pə]	[zɛi$^{H:}$p] ‘soap’
consonant:	[zakə]	[za:$^{H:}$kə]	[za:$^{H:}$k] ‘business’

In the Southern and Eastern parts of the polytonic area this change was not conditioned by schwa drop: it happened before *every* voiced consonant. Here are examples from Eupen, in the transition area between Low-Franconian and Ripuarian (Welter 1929):

(13) *Change of level to falling tone*

	Modern German	Roermond	Eupen	
a) Voiced consonant:	Kammer	[ka:$^{H:}$mər]	[ka:^{HL}mər]	‘room’
	tragen	[dra:$^{H:}$ɣə(n)]	[dra:^{HL}ɣə(n)]	‘carry’
b) Voiceless consonant:	gaffen	[ɣa:$^{H:}$pə(n)]	[ɣa:$^{H:}$pə(n)]	‘yawn’
	krachen	[kra:$^{H:}$kə(n)]	[kra:$^{H:}$kə(n)]	‘crack’

The third example demonstrating the importance of the voicing of the postvocalic consonant in the evolution of Franconian is again from Roermond, where historically long vowels tend to replace the falling tone with the level tone in polysyllabic words, but only if the intervocalic consonant is voiced:

(14) *Change of falling to level tone in disyllabic words*

a) Voiced consonant:	[bloː$^{H:}$mə(n)]	'flower-PLUR'	[bloː^{HL}m]	'flower-SG'
	[mɔː$^{H:}$nə(n)]	'moon-PLUR'	[mɔː^{HL}n]	'moon-SG'
b) Voiceless consonant:	[reː^{HL}kə(n)]	'pitchfork-PLUR'	[reː^{HL}k]	'pitchfork-SG'
	[ʃlɔː^{HL}pə(n)]	'sleep-1/3PLUR'	[ʃlɔː^{HL}p]	'sleep-1SG'

At first sight, this change is the reverse from the rule in (13).

A further characterization of the research proposal

Even our brief overview shows that the problem of Franconian tone is extremely complicated: the generalizations contradict typological theory, or they contradict each other across dialect groups or over time. It is the **objective of the current proposal** to solve the numerous problems of Franconian tonology and to integrate Franconian into the typology of tone languages. To the extent that this goal can be reached, our knowledge of three areas of phonology will be significantly improved. These are: the historical phonology of West Germanic; the structure of segments and tone; the interface between tones and segments. This constitutes the **scientific importance** of the current proposal.

The proposal consists of three projects: 1) a project studying tone-vowel interactions; 2) a project studying consonant-tone interactions; 3) a project studying the historical development of the tones. The first two projects attempt to develop a typology of two distinct segment-tone interactions by comparing different dialects on a synchronic basis. The third project focuses on both types of interactions, but from a diachronic point of view. This **internal coherence** of the three projects creates a situation in which the results of the first two projects are highly relevant for the third, and vice versa. Together, then, the three projects will be able to construct a new model of segment structure that is able to account for consonant-tone interaction and consonant-vowel interaction, both at the synchronic and diachronic level. It is this property of the proposal in particular that constitutes the most important aspect of the **innovative character** of the proposal.

In order to develop an adequate **theoretical framework** the three projects will put to work insights of modern phonology and phonetics and combine them with the techniques of classical dialectology. Among the senior researchers involved in these projects are scholars who are working on abstract models of phonology as well as scholars who have proposed more 'functionalist' views. Precisely this cooperation can be seen as one of the strong points in favour of the current proposal. This is true also for the **research method**, which will consist of a mixture of modern fieldwork, study of typological, diachronic and language acquisition studies and construction of theoretical models. The fieldwork (which is to be carried out by the PhD students under the guidance of the postdoc and the senior researchers) will concentrate on native speakers of dialects of the Dutch province of Limburg, but subsidiary fieldwork will take place in the Ripuarian area and the Moselle-Franconian area.

Limburg Dutch dialects have been the topic of a body of **prior work.** Apart from the work of the applicants, which deals directly with the topics involved, and from the studies already mentioned, we should mention the VNC project *Tonal Dialects in Dutch* (Nijmegen/Tilburg/Antwerp), which concentrates mainly on intonational aspects. The

VNC project and the one presented here are therefore complementary in scope, but collaboration between researchers of both groups is foreseen and will certainly bring profit to both projects.

The project presented here, finally, fits very well within the **research environment** of Tilburg University, the University of Amsterdam and the Meertens Institute. Tilburg University is the only university in the southern provinces of the Netherlands that hosts a full-blown linguistics department, and has a tradition in the theoretical study of the phonology of Southern Dutch dialects. The phonetics department of the University of Amsterdam is widely known for its research in the realms of instrumental, acoustic, and perceptual phonetics, language acquisition and the connection between phonology and phonetics. The Meertens Institute, finally, is one of the most important centers of study and documentation of language variation within the Netherlands, both from a traditional point of view and with a more modern outlook.

Detailed description of the three projects

Project 1: Tone-vowel interactions in Franconian dialects

The most prominent cases of vowel-tone interaction in Franconian dialects involve diphthongization under a falling tone – e.g. long /eː/ or /iː/ turning into [ɛi] – and monophthongization under a level high tone – e.g. /ɛi/ turning into [eː]. Other cases involve lowering of diphthongs and mid vowels under a falling tone – e.g. /ɛi/ changing to [ɑi], and long /eː/ to [ɛː] – and raising of mid vowels under a level high tone – changing e.g. long /ɛː/ to [eː] (Verstegen 1996).

These processes indicate that tones and segmental properties of vowels are capable of influencing each other. In particular aperture features seem to favour certain vowel features, and vice versa. The question that this project seeks to answer is what the origin is of this mutual attraction. It is sometimes stated that there can be no direct link between vowel quality and lexical tone in human language (Hombert 1977, 1978; Hombert et al. 1979; Peeters & Schouten 1989; Gussenhoven & Driessen 2004). A conservative approach thus holds that the relevant connection should be indirect, and mediated by some other property that interacts with both tone and vocalic structure. This project will attempt such an approach, trying to embed the Franconian facts into what is already known about linguistic universals.

One possible approach would be rooted in perceptual phonetics. It is known that high vowels are articulated shorter than low vowels (Lehiste 1970). Gussenhoven & Driessen (2004) show that hearers tend to take this difference into account, and therefore tend to hear e.g. an /i/ of a certain duration as appreciably longer than an /a/ of the same absolute length. On the other hand, so they claim, diphthongs are often perceived as shorter than monophthongs, regardless of their 'objective' length. The reason for this is that the second part of the diphthong is often analysed by speakers as consonantal. According to Gussenhoven (2000) and others (e.g. Silverman 1987), there is also a connection between tone and length: level high-toned syllables tend to be perceived as longer than syllables without a level high tone. If level high tones and monophthongs are both associated to long duration, they are also associated to each other by transitivity. In this approach duration intermediates between vowel quality and tonal quality.

Although quite promising, this approach is not without its problems. For instance, it has to be assumed that reversal of perception takes place in the case of vowel length, even though it is well known that articulatory preferences sometimes also influence phonetics directly (Maddieson 1997). It is an important research question in this project why the type of reversal observed by Gussenhoven & Driessen takes place in some cases, but not in others.

At least one alternative account can also be constructed from the recent literature. In this account the mediation is provided by prosodic structure. In general terms the approach is as follows: certain aperture features favour certain types of syllable structure (and vice versa); likewise, certain tone features favour certain types of syllable structure (and vice versa). It is thus syllable structure that regulates tone, and separately from that, aperture as well. The fundamentals of this approach have been developed in two publications by Paul de Lacy. In (2002a) De Lacy argues that the positioning of aperture is determined by head/non-head structure of prosodic constituents. The non-head of a foot, for instance, favours higher vowels (and vice versa) and the head of a foot favours lower vowels (and vice versa). In (2002b) he shows that similar relations hold between tone and prosodic structure: the head of a foot favours a higher tone (and vice versa) and the non-head favours a lower tone (and vice versa). Applying De Lacy's principles at the syllable level, then, we discover that level tones favour long vowels, whereas falling tones favour diphthongs. We thus expect monophthongization to be blocked by falling tones and, conversely, diphthongization to be blocked by level high tones.

This approach is not unproblematic either. For instance, it is hard to see how it can be extended to the dialects in which the falling tone is linked to more open vowels and the level high tone favours more closed vowels; a separate hypothesis seems to be needed to explain these relations.

Even though there are quite a few suggestions in the literature as to how we could partially explain the phenomena at hand, no approach seems to be fully satisfactory. In the current project the hypotheses of the two approaches mentioned here will be tested against a complete typology of vowel-tone interactions in Franconian dialects. The most likely outcome seems to be that an approach will be found which reconciles the two hypotheses just sketched. This constitutes the core of the present project.

Project 2: Consonant-tone interactions in Franconian dialects

Cross-linguistically, two types of interactions between voicing and low tone are particularly frequent. First, voiceless consonants tend to have a raising effect on the tone of the next vowel, whereas voiced consonants tend to have a lowering effect on the following vowel. In Suma (Bradshaw 1999), for instance, imperfective verbs start with a High tone (*éé* 'leave behind', *kírí* 'look for'), except when they begin with a voiced obstruent, in which case the first tone is rising (i.e. Low-High: *bŭsi* 'be bland'). Diachronically, the effect is known as well from other tone languages, where voicing contrasts on onset consonants turn into tone contrasts on following vowels. A second type of interaction is that the spreading of a high tone is blocked by an intervening voiced obstruent and the spreading of a low tone is blocked by an intervening voiceless obstruent (Hyman & Schuh 1974). Botswana Kalang'a (Bradshaw 1999) is a language where the former process applies. In this language high tones normally spread to

toneless (i.e. phonetically low-toned) syllables in a following word (/tʃipó + tʃipó/ → [tʃipótʃípó] 'your gift'), except if a voiced obstruent intervenes (/zwipó + zwipó/ → [zwipózwipó] 'your (pl.) gifts'). In all known cases, it is the *following* vowel that is affected by the consonant (see Odden 2002 for one potential counterexample).

There are quite a few consonant-tone interactions in Franconian dialects that at first sight do not fit into this typology. One of them we have already described in (8)–(10): in Roermond Dutch a falling tone cannot occur in VC-rhymes before a voiceless obstruent. It thus seems to be the *following* obstruent rather than the preceding one that affects the vowel. While this might be a curious phenomenon from the point of view of the typology of tone, it has a striking parallel in certain aspects of voice assimilation. According to some proposals (e.g. Ito 1986), one of the constraints playing a role in voice assimilation requires the feature Voice to occupy an onset. If this is not possible, because there is no onset, or because a voiceless consonant in the onset may not be changed to a voiced consonant, the feature Voice must be deleted from the coda. The Roermond data suggest a similar approach; the L-tone must be attached to the onset. Assuming that this is not possible in Roermond, L must be deleted from a consonant in rhyme position. This explains the systematic absence of a falling tone in a syllable ending in consonant followed by a voiceless consonant. Of course, an approach along these lines is only possible if Voice and L are instances of the same phonological feature, as has already been proposed elsewhere (e.g. Kaye, Lowenstam & Vergnaud 1987; Bradshaw 1999). The idea is that L is an abstract feature that is realized phonetically as a low tone when it is linked to a vowel, but as voicing when it is linked to a consonant.

Another interesting phenomenon that can perhaps also be explained along these lines occurs in the dialect of Moresnet. Normally in Franconian dialects, a short vowel followed by an obstruent has a predictable level tone. In Moresnet, however, according to Jongen (1972), a short vowel has a falling tone if it is followed by voiced obstruent, but a level tone if followed by a voiceless obstruent. Thus, in a word like *bɛdə* 'bed-PL' the first vowel has a falling tone, whereas in words like *tɛpəx* 'carpet' and *kes* 'casket' it is level.

Interestingly, words that are devoiced by Final Devoicing have a falling tone, according to Jongen. Thus, *bɛt* 'bed-SG' has a falling tone. This seems to suggest that the tone of the short vowel is determined at the underlying level. That is, since *bed* has a voiced consonant underlyingly, the vowel preceding it has a falling tone, even at the surface level. This can be understood if we accept the hypothesis that Low and Voice are instances of the same feature. To explain the situation holding in Moresnet we would have to say that in Moresnet it is impossible to delete this feature; final devoicing would be able to remove it from the laryngeal node, but not from the segment as a whole. It would therefore move to the tonal node, accounting for the falling tone on a short vowel followed by an underlyingly voiced consonant.

This project will start out exploring consonant-tone interactions from this perspective, without neglecting some obvious problems. It is not entirely clear, for instance, how the type of consonant-tone correlation that interacted with schwa apocope, as in (12), can be explained. Furthermore, the hypothesis that low tone and voice are representationally the same object is certainly not uncontroversial. Potential competing alternatives (which could perhaps be more phonetically based) should

obviously also be explored.

Project 3: The ontogenesis of the Franconian tones

Two major historical phenomena are to be accounted for: an observational *length reversal*, related to the origination of the tone system and to tone-vowel interaction, and a *tone change*, related to the loss of final schwa and to consonant-vowel interaction.

The observational length reversal is the remarkable fact that originally short vowels are nowadays longer than the originally long vowels. Thus, early Middle Franconian had short vowels in (11d), e.g. [hɪməl], and corresponding long vowels in (11c), e.g. [keːzən] 'choose', whereas present-day central Limburgian has phonetically overlong level tones in (11d), e.g. [heːˑ$^{H:}$məl], and phonetically shorter moving (or falling) tones in (11c), e.g. [keːˑ^{HL}zə(n)]. We feel that once this reversal, which took almost a millennium to complete, is explained, Franconian tonogenesis will have been explained as well. An explanatory chronology could include: a phonetically level tone on short vowels and a phonetically falling tone on long vowels (i.e. [hɪ^{H}məl] and [keːˑ^{HL}zən], both consistent with stress on the first mora), lengthening of short vowels in open syllable with concomitant lengthening of its level tone ([heːˑ$^{H:}$məl]), reinterpretation by learners of the original length difference as a tonal difference, and the establishment of a large phonetic duration as the perceptual enhancement of a level tone. Explaining the reinterpretation step involves creating a synchronic phonology for the historical situation. Were the lengthening syllables originally interpreted as monomoraic, and did a further lengthening cause them to be reinterpreted as bimoraic? And did this bimoraic reanalysis necessitate a tonal interpretation of the previously phonetic H-HL contrast? And in the light of vowel-tone interaction, why did originally long [iː, uː, ɛi, ɔu] not get a falling tone, as (11ab) shows? Perhaps they were represented, as Liberman (2003) has argued, as the VC syllables [ij, uw, ɛj, ɔw] (like [ɑl, ʊm], and so on, which also received the level tone). In that case, they could have been monomoraic, since there are languages in which long vowels are bimoraic but VC rhymes are not. A reverse proposal, relevant in the light of the correlation mentioned above in (7), would be that the originally long (nonhigh) vowels were at some point opening diphthongs, as some of them are in some present-day dialects (cf. [iə] and [uə] in 11c). A relation of tonogenesis to monophthongality and diphthongality is also relevant to the discussion of the original geographical extent of the tonal contrast. While the earliest consensus was that the level tone originated on all lengthened vowels throughout the Middle High German area (e.g. Michels 1912: 86), present-day researchers are much more cautious, perhaps because the current distribution of the tonal dialects excludes the larger area in which open-syllable-lengthening did not occur before voiceless consonants (cf. German *machen*, *essen*, *hoffen*) and excludes the larger area in which the West-Germanic *io*/*eː*$_2$ and *oː* (see 11c) were diphthongized to Old and Middle High German *ie* and *uo*. In any case, one of the major problems that have to be solved in this project concerns the change from the Middle Franconian type of vowel-tone interaction, as in (11), to the one found in the modern dialects, as in (6).

The second explanandum is the tone change that occurred when final schwa was lost. If the consonant or consonant cluster before this schwa was voiced, any level tone on the previous syllable was changed to a moving (falling) tone. Thus, the level tones on the originally long high vowels and diphthongs in [druːˑ$^{H:}$və] 'grape', [wiːˑ$^{H:}$zə]

'melody', [yː$^{H:}$lə] 'owl', [duː$^{H:}$mə] 'thumb', [ɔuː$^{H:}$ɣə] 'eye', [wʊnː$^{H:}$də] 'wound', [bærː$^{H:}$ɣə] 'mountains', [vɑlː$^{H:(?)}$lə] 'trap', and on the lengthened originally short vowels in [daːː$^{H:}$ɣə] 'days', [lɛːː$^{H:}$və] 'live-1sg', [kɔːː$^{H:}$lə] 'coal', [bøːː$^{H:}$dəl] 'hangman', [stoːː$^{H:}$və] 'stove', turned into moving tones in [druː^{HL}f, wiː^{HL}s, yː^{HL}l, duː^{HL}m, ɔu^{HL}x, wʊɲ^{HL}, bær^{HL}x, vɑl^{HL}, daː^{HL}x, lɛː^{HL}f, kɔː^{HL}l, bøː^{HL}l, ʃtoː^{HL}f]. Was this change really due to an affinity between high tones and voiceless consonants, as was proposed by Boersma (2002) and Hermans (2003)? In present-day Limburgian, and quite possibly in much older stages as well, level tones are HH or LL depending on their position in the sentence, and moving tones are either falling (HL) or rising (LH), again depending on their position in the sentence. Could it be the case that the tone change is due to the capability of voiced consonants to licence *any* tone? Answering these questions again involves a detailed reconstruction of the synchronic adult phonological system at the time and of the children's reanalysis.

This project has to be executed by a post-doc. Any advances in our knowledge about the history of the Franconian tone systems require a thorough understanding not only of the typology of tone-vowel interaction (Project 1) and tone-consonant interaction (Project 2), but also a thorough knowledge of the historical developments in the phonology of the dialects at hand and possible the surrounding Middle High German area.

7. Work programme

Project 1 + Project 2
Year 1: Study of the literature on dialectology and theoretical linguistics: 10 months (holiday 1 month; courses 1 month).
Year 2: Work with informants: 5 months in Limburg, 5 months in Ripuarian area (holiday 1 month; courses 1 month).
Year 3: Working out analyses: 10 months (holiday 1 month; course 1 month).
Year 4: Writing of thesis: 10 months (holiday 1 month; courses 1 month).

Project 3
Year 1: Study of the literature on historical phonology, dialectology, language acquisition and theoretical linguistics: 5 months; additional work with informants: 2 months in Limburg; supervision of projects 1 and 2: 1 month each; developing analyses: 2 months; (holiday 1 month).
Year 2: Additional work with informants: 2 months in Ripuarian area, 2 months in Moselle-Franconian area; developing analyses: 7 months (holiday 1 month).
Year 3: Writing of monograph: 11 months (holiday 1 month).

8. Planned deliverables

It is the intention of the three proponents to write a monograph together with the postdoc in which the three subtopics will be brought together. The two projects that are carried out by PhD students will each produce a doctoral thesis. Altogether this will therefore lead to a series of three books that will give in-depth insight into the phonological and phonetic mechanisms involved. In addition, each project will produce two articles, to be published in an international journal. Finally, the two graduate

students and the postdoc will be encouraged to make extended visits to the experts on dialectology, phonology and phonetics with whom the current proposal is closely associated. Also, near the end of the project an international conference will be organized, featuring several of these experts as keynote speakers.

9. Summary for non-specialists

In één opzicht lijken de Limburgse dialecten meer op het Chinees dan op de Nederlandse standaardtaal: ze gebruiken toonhoogteverschillen om betekenis tussen woorden uit te drukken. De woorden *bij* (het insekt) en *bij* (het voorzetsel, 'bij het huis') klinken in het Standaardnederlands bijvoorbeeld precies hetzelfde; in het Limburgs hoor je een onderscheid omdat ze op verschillende toonhoogtes worden uitgesproken. Op precies dezelfde manier verschillen de aangrenzende dialecten in Duitsland en Luxemburg ook van het Standaardduits.

Het wonderlijke verschijnsel van deze toonverschillen in een betrekkelijk klein gebied heeft vooral in de twintigste eeuw de aandacht getrokken van onderzoekers. Zij maakten nauwkeurige beschrijvingen van de verschijnselen in individuele dialecten of gaven overzichten waar in het gebied welke toon voor welk woord gebruikt werd. Enkele fundamentele taalkundige kwesties bleven daarbij echter tot nu toe onderbelicht. Hoe zijn die toonverschillen ooit ontstaan? Waarom hebben woorden die op bepaalde medeklinkers eindigen nooit een van de twee gebruikte tonen? Waarom zijn klinkers als *ee* en *oo* in enkele dialecten in de loop van de tijd veranderd in *ei* en *ou*, maar alleen als ze met een bepaalde toon werden uitgesproken? En waarom verschillen de Limburgse dialecten zo van allerlei andere bekende talen in deze relaties? Deze vragen worden in dit project in hun onderlinge samenhang bestudeerd.

Er zijn in de Limburgse dialecten twee tonen in het geding, die meestal *sleeptoon* en *stoottoon* worden genoemd. Verschillende dialecten drukken die tonen op verschillende manieren uit, en bovendien klinken de tonen anders in bijvoorbeeld een vraagzin dan in een stellende zin, maar globaal kunnen we zeggen dat de sleeptoon als een langdurige hoge toon klinkt, en de stoottoon als een vallende, d.w.z. die hoog begint en laag eindigt.

Als we nu naar de relatie van toon met klinkers kijken, merken we dat hier iets heel onverwachts aan de hand is. Op zich is het vanuit een taalkundig perspectief gezien al vreemd dat er zo'n relatie is, want in andere talen die toonverschillen kennen, kan over het algemeen elke klinker elke toon dragen. Het verschil tussen *ee* en *ei* (of tussen *oo* en *ou*) is dat bij de uitspraak van de eerste de mond tamelijk stabiel blijft, terwijl voor de tweeklank *ei* de kaak een beweging maakt van een relatief open naar een relatief gesloten stand. Nu weten we ook dat het bij een relatief gesloten mond (iets) makkelijker is om een hoge toon te maken dan om een lage toon te maken. Voor zover taalverandering dus wordt bepaald door uitspraakgemak, zouden we dus verwachten dat het einde van de *ei* zal samengaan met een hoogblijvende toon (een sleeptoon) en de *ee* juist met een vallende toon (een stoottoon). Opvallend genoeg is die relatie in de Limburgse dialecten echter altijd precies omgekeerd: in sommige dialecten kan de stoottoon een *ee* in een *ei* veranderen, en in sommige andere dialecten kan de sleeptoon een *ei* in een *ee* veranderen. Het was dus al opmerkelijk dat het Limburgs überhaupt een relatie legt tussen het soort klinker en het soort toon, maar het is nog opmerkelijker dat het dat doet in een tegendraadse richting.

Ook de relatie van toon met medeklinkers is opmerkelijk in het Limburgs. Waar we zulke relaties vinden in de talen van de wereld, wordt de toon meestal laag na een stemhebbende medeklinker (zoals *b, z, d*: de stembanden trillen tijdens het uitspreken) en hoog na een stemloze medeklinker (zoals *p, s, t*: de stembanden trillen niet). Dat komt doordat de bouw en ophanging van ons strottenhoofd ervoor zorgen dat stemloze medeklinkers een volgende klinker vanzelf altijd een klein beetje hoger maken. Dat geldt zelfs voor talen zoals het Standaardnederlands, waarin die toonhoogte geen enkele betekenis heeft (en dus ook niet wordt opgemerkt). In een groot aantal talen, zowel in Afrika als in Amerika en in Oost-Azië, is die relatie echter zodanig uitvergroot dat het belangrijkste verschil tussen *ba* en *pa* niet meer het stemhebbendheidsverschil is (*b* stemhebbend, *p* stemloos), maar het toonhoogteverschil (*ba* laag, *pa* hoog). In het Limburgs vinden we zo'n soort relatie ook, maar merkwaardigerwijs (en daarin lijkt het Limburgs uniek in de wereld) werkt de medeklinker hier niet in op de *volgende* klinker, maar op de *voorafgaande*; de stemloze *t* maakt bijvoorbeeld een voorafgaande *an* hoog (alle woorden die eindigen op *ant* hebben een sleeptoon). Maar sommige klinkers, zoals *ee*, zijn ongevoelig voor zo'n volgende *t* en kunnen dan ook beide tonen hebben: *reet* betekent 'riet' als het een vallende toon heeft en 'reet' als het een hoogblijvende toon heeft.

Zoals uit het voorafgaande blijkt, stelt het Limburgs iedereen voor raadsels die ervan uitgaat dat alle talen in grote lijnen zijn samengesteld uit dezelfde bouwstenen. Het lijkt een redelijke veronderstelling dat een en ander te maken heeft met de manier waarop de tonen vroeg in de middeleeuwen een rol zijn gaan spelen in de Limburgse dialecten. Vrijwel zeker houdt het verband met het wegvallen van de stomme *e* aan het eind van veel woorden: *zonne* werd *zon*. Het lijkt net alsof de toon die de stomme *e* van nature al had (meegekregen van de voorafgaande medeklinker) onder sommige omstandigheden werd overgedragen op de klinker die nog wel overbleef. Die aanname kan misschien al iets verklaren over de 'verkeerde' richting van de invloed in de huidige dialecten. Maar er zijn op dit moment op dit punt meer vragen dan antwoorden. Dat is dan ook precies de reden waarom dit project nu wordt aangevraagd.

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