4. Late medieval Frisian as a tonal language

In previous sections, reference is made to the possibility that Frisian possessed phonologically contrasting tone contours. In the first section of this chapter, an overview of developments that may be linked with contrasting tone contours is given.

The next section offers a brief typological search through Germanic languages, especially East Frisian and North Germanic, revealing the distributional link between tonal oppositions and previously highlighted phonological developments.

In § 4.3 the tonal system of North Germanic languages is outlined briefly, followed by an explanation of the prominence of unstressed /a/ in Old Frisian in § 4.4. Quantitative and qualitative effects of contrasting tone contours in Frisian are assessed in § 4.5 and § 4.6. In § 4.7 an attempt is made to explain how tone contour became a distinguishing phonological feature of Middle Frisian in the 15th century. Section § 4.8 deals with the typical dialect-geographical character of the region of Wûnseradiel.

4.1 The heavy impact of Old Frisian /a/

The suggestion that a contrasting tone contour, or something similar, might be present arises in the following contexts:

- The Old Frisian protected /a/ was reduced to [o] in the early 15th century. This new [o] behaves differently to the [a] which represented historical /a/ in processes such as syncope, apocope and Vowel Harmony:
  - The historical /a/ was not reduced to o, even when the gradual erosion of unstressed vowels predicted a complete elimination of the vowel (§ 3.4), for example:
    Old Frisian *keran(e) ‘to choose (gerund)’ > Middle Frisian /kærən/;
    Old Frisian *keren ‘chosen’ > Middle Frisian /kærən/ or /kærən/;
  - The historical /a/, even when realised as [o] remained connected with Vowel Harmony of the root vowel: [e] > [æ]. The original root vowel [e] of the words was generally restored, although the actual cause of the harmony, a subsequent [a] had already disappeared. (§ 2.6.3 / 3.4), for example:
    Old Frisian *wesan(e) ‘to be (gerund)’ > Middle Frisian [væzən] > early Modern Frisian /væzən/, not */væzən/, cf. Modern Frisian /vætər/ < Old Frisian weter without Vowel Harmony;
The historical, unstressed /a/ had a great influence on the quantitative development of root vowels:

- Open Syllable Lengthening generally does not take place when the vowel of the next syllable is an Old Frisian /a/ (§ 2.3.3.1 / 2.3.3.2), for example:
  Old Frisian *dor* 'door' > Middle Frisian /dɔx/;
  Old Frisian *dor* 'doors' > Middle Frisian /dɔra/;

- In language from the south and west of Fryslân, there are also indications of vowel lengthening before the subsequent /a/, but these contexts show frequent application of the statistically marked spelling sequence <VVCC> (§ 2.3.3.3, type 1), for example:
  Old Frisian *klaγere* 'complainer' > Middle Frisian <clαγer> /kla:γar/;
  Old Frisian *bitalad* 'paid' > Middle Frisian <bytaellit> /bītālēt/;

- In particular in the language from the north-east and also Wûnseradiel, shortening of historically long vowels sometimes appears when this vowel is followed by an /a/ in the next syllable (§ 2.3.4), for example:
  Old Frisian *mōnan dei* 'Monday' > Middle Frisian NE: <mo nendey>;
  Old Frisian *mōnan dei* > Middle Frisian SW: <monendei>;

- In the same regions, the spelling sequence <VVCC> sometimes appears in words with historically long vowels when followed by unstressed /a/ (§ 2.3.3.3, type 2), for example:
  Old Frisian *kāpad* 'bought' > Middle Frisian NE: <kαppet>;
  Old Frisian *kāpad* > Middle Frisian rest: <ca(e)pet>;

- There are several cases of accent shift from the root to the initially unstressed /a/ in the second syllable, as several place names and the word for ‘Sunday’ (§ 2.4.3.2) show:
  Old Frisian *sunndei* 'Sunday' > Middle Frisian <snande>;
  Old Frisian *Tunawert* place name > Modern Frisian *Ter naard*.

The distribution of this phenomenon is closely linked to the historical presence of unstressed /a/, but at crucial points, the developments could be independent of the actual realisation as [a], as in missing syncope. The Vowel Harmony illustrates that at the initial stage, the actual quality of the [a] was a prerequisite for the process, but at the final stage, the actual [a] was no longer needed to mark the (historical) Vowel Harmony in specific words.

The sometimes loose association between historical /a/ and the aforementioned phenomenon is also demonstrated in examples which used to have an historical
An interesting example of this is the word *abbate*, whose unstressed /a/ remained immune to syncope in the late 14th century, but was subject to complete syncope in the 15th century, with different routings in the north-east and the south-west. The plural form *dagen* 'days' shows Vowel Harmony at an early stage, but after the reduction of the ending -*an* from [an] > [on] the marking of the word as a product of Vowel Harmony was apparently lost, and the root vowel became [a] in several dialects. Otherwise, the root vowel was restored to [ε] *deggen*, as was the case in *wesse* 'to be' (Modern Frisian *wéze*).

These developments support the hypothesis that Old Frisian unstressed /a/ bore an extra phonetic marker: a pitch peak (indicated with ‘U’). This automatically followed the /a/ in Old Frisian, for example, /vεs‘anθ/ ‘to be’ (gerund). In Middle Frisian, it was generally preserved on the vowel, irrespective of the realisation as [a] or [ε], for example, /vεs’an/ or /vεs’on/ as the form of the gerund, contrasting with Middle Frisian /vεs’θn/ ‘been’ (past. part.) < Old Frisian /vεs’on/. The following sections explore in more detail the hypothesis that this extra marker was a relatively late pitch peak on the unstressed syllable.

126 Note that this sign was hitherto used to mark the intensity stress.
4.2 Finding typological parallels

Features connected with unstressed /a/ or its specific tone contour are most prominent in the centre and north-east of Fryslân. Several of these features, such as Vowel Harmony and Accent Shift, are well known in the Weser Frisian group of East Frisian dialects. Vowel Balance, in Frisian linguistics discussed only in the context of Riustringen Old Frisian, appears to be a prominent feature in late mediaeval West Frisian. Subsequently, explanations considered for the Weser Frisian data are also worth considering for West Frisian. A relatively late pitch peak in words with a short root syllable has recently been suggested as an explanation for

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Accent Shift and Vowel Harmony in early Modern Weser Frisian dialects (Smith & Van Leyden 2007, 45 ff).

In Scandinavia, several dialects show one or more of the following phenomena: Vowel Harmony, Vowel Balance and an absence of Open Syllable Lengthening (map 4.1). It is remarkable that the languages of the Faroe Islands and Iceland, known for their archaic linguistic character, do not show traces of these phenomena. There is no Vowel Harmony¹²⁷ nor Vowel Balance, and a rigid application of Open Syllable Lengthening. After Icelandic, Álvdalsk, the Swedish dialect from the Dalarna region, is probably the most archaic form of North Germanic. It does display the expected phenomena. Compare the following examples in table 4.1 an 4.2 (Álvdalsk here and later after Levander 1909):

<table>
<thead>
<tr>
<th>Meaning</th>
<th>Icelandic</th>
<th>Álvdalsk</th>
</tr>
</thead>
<tbody>
<tr>
<td>to taste</td>
<td>smella [smɛtlja]</td>
<td>smella [smɛtlɑ]</td>
</tr>
<tr>
<td>to steal</td>
<td>stela [stɛ:la]</td>
<td>stjälo [stjælɔ]</td>
</tr>
</tbody>
</table>

Table 4.1: Vowel Balance in Álvdalsk and Open Syllable Lengthening in Icelandic.

Icelandic has Open Syllable Lengthening in the word stela, the consistent application of Open Syllable Lengthening in Icelandic makes every root syllable long, i.e. [smɛtl]- (sic!) and [stɛ:]-. The subsequent infinitive marker is always an [a]. Álvdalsk has no Open Syllable Lengthening and keeps the difference between long [smɛtl:] and short [stjæl:]. Following the long root syllable, Álvdalsk has an [ɑ], the modern equivalent of Old Nordic short /a/ in closed syllables. After a short root syllable, the qualitative equivalent of an Old Nordic /a:/ appears.¹²⁸ Álvdalsk shows an historical balance between a long root ~ Old Nordic short /a/ and a short root ~ Old Nordic /a:/.

¹²⁷ Icelandic shows æ- and ø-mutation, which are cases of backward Vowel Harmony (cf. table 2.24). Vowel Harmony and Vowel Balance seem to be closely linked to short syllables. It might be argued that the general application of Open Syllable Lengthening in Icelandic excludes the possibility of Vowel Harmony and Vowel Balance. However tempting this may appear from a modern point of view, it does not hold in an historical reconstruction, as Vowel Harmony and Vowel Balance features are older in North Germanic languages (13th-/14th centuries) than Open Syllable Lengthening in Icelandic (16th century, Haugen 1984, 263/327)

¹²⁸ Note that it is a ‘short version’ of the modern representation of Old Nordic /ɛ/, which is long [ɛ] in Álvdalsk in stressed syllables. Quantitative contrasts do not appear in unstressed syllables in any modern Germanic dialect, cf. § 2.4.1. In structuralist terms, it could be said that [ɔ] is the realisation of ‘underlying’ /ɛ/ in unstressed position (cf. for a discussion of this phenomenon Bye, 2004b).
As in the other example from table 4.1, Icelandic has Open Syllable Lengthening. Álvdalsk has no Open Syllable Lengthening. The Old Nordic root vowel /a/ is realised as [a] before the subsequent open back vowel [a] but as [o] before fronted [i] in Álvdalsk. This is an example of ‘Seesaw’ accommodation, as mentioned in §2.6.2.

In some Scandinavian dialects, more extreme examples of Vowel Harmony can be found, for example, in Vemdalsk (Norway, cf. Bye 2004b, 13):

[kɔmːa] ‘to come’< Old Nordic koma
[laːvæ] ‘to live’< Old Nordic leva

Álvdalsk, Vemdalsk and most of the other North Germanic dialects with Vowel Harmony, Vowel Balance, and a sometimes omitted Open Syllable Lengthening, are found within the region that exhibits two contrasting tone contours, the so-called Scandinavian Accent I and II (cf. graph 4.1 in the next section).

The Swedish dialects spoken in Finland that do not have contrasting tone contours can be linked to relative recent influence from Finnish (Bye 2004a, 7). The typological parallels between the Scandinavian situation and the depicted phenomena in late mediaeval West Frisian suggest the possibility of contrasting tone contours in Frisian as well. This indication is only the first step in the reconstruction of the phonological events in late mediaeval West Frisian. Co-occurrence is not the same as a causal relationship. Even when the former has been concluded, the latter is open to further investigation.

It is important to note that the situation as found in the modern Scandinavian dialects is lexicalised and petrified. The distribution of the phenomena in the language reflects historical phonological and phonetic contexts. In modern language, things are no longer predictable as allophonic phenomena, nor do they match the original phonetic rationale.

A good example of this is Vowel Balance in Álvdalsk. The phonetic rationale of Vowel Balance is one of a spread of speech energy, compatible with the duration

effect with *word isochrony*. In Älvdalsk, a short root is followed by an [ə], which is perhaps no more centralised, but certainly less open than the vowel following a long root, [o]. If Vowel Balance were an active phonetic process in Modern Älvdalsk, the reverse distribution of [ə] and [o] is expected. This confirms the statement in § 2.6.1 that many of these originally phonetically-induced phenomena are petrified structures which could develop independently of their original phonetic logic.

In addition, the distribution of the contrasting tone contours has been lexicalised in Scandinavian dialects, where they started as a predictable and redundant phonetic pattern (cf. § 4.3). Map 4.1 also illustrates that there are many dialects with contrasting tone contours, with none of the above-mentioned features of Vowel Harmony etc.

The conclusion from this typological comparison is that North Germanic dialects can provide an explanation for phonological phenomena of 15th century West Frisian, but modern dialects cannot be taken as a direct parallel of the Frisian situation in the 15th century.
4.3 The character of tonal contrasts in Scandinavian dialects

Norwegian and Swedish have two contrasting tone contours, regularly referred to as Accent I and Accent II (cf. Bye 2004a, 6 as the source for the following description). Accent I is the ‘default’ accent, which corresponds to the regular one in most West Germanic languages. In languages such as Modern Frisian, Dutch, English and German it is applied at the beginning of the root syllable, as in type 1A, Accent I (left column) in graph 4.1. It is important to note that the phonetic realisations of the two accents can be quite different. The realisation of Accent II in the dialect of Gotland for example, (graph 1.4, 1B right) is identical to the realisation of Accent I in Standard Swedish (graph 1.4, 2A left). All dialects share one characteristic: Accent I has only one pitch peak in every dialect while Accent II is characterised by a late or double pitch peak.

Graph 4.1: Accent realisations in Scandinavian dialects; left column: Accent I right column: Accent II (Bye 2004a, 6). Stockholm has 2A, Oslo has 2B.

<table>
<thead>
<tr>
<th></th>
<th>One peak</th>
<th>One peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>early in stressed syllable</td>
<td>late in stressed syllable</td>
</tr>
<tr>
<td>1A</td>
<td></td>
<td>South Sweden, West Norway</td>
</tr>
<tr>
<td>1B</td>
<td>late in stressed syllable</td>
<td>early in post-stress syllable</td>
</tr>
<tr>
<td></td>
<td>Gotland, Bergslagen (Sweden)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>One peak</th>
<th>Two peaks</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>late in stressed syllable</td>
<td>one in each syllable</td>
</tr>
<tr>
<td>2A</td>
<td></td>
<td>Central Sweden, West Nyland, Southwest Norway</td>
</tr>
<tr>
<td>2B</td>
<td>in post-stress syllable</td>
<td>one in each syllable</td>
</tr>
<tr>
<td></td>
<td>Göta, East Norway</td>
<td></td>
</tr>
</tbody>
</table>

129 In Danish, words that have Accent I in Norwegian and Swedish have the Danish ‘stød’, Accent II words have a ‘normal’ stress pattern. From a structural point of view, Danish resembles other Scandinavian languages in its contrasting ‘accents’.
The origin of the Scandinavian tone contrast lies in Old Nordic.\textsuperscript{130} Accent I becomes a default in monosyllabic words. Accent II is found in hisyllabic Old Nordic words:

\begin{verbatim}
Old Nordic arm  > Modern Norwegian 'arm' 'arm'
Old Nordic armar > Modern Norwegian arm'er 'arms'
Old Nordic arm hinn > Modern Norwegian armen 'the arm'
\end{verbatim}

The bisyllabic Modern Norwegian word armen, with the clitical definite article, has Accent I, because it originates from two separate Old Nordic words which merged into one at a later stage. This is an example where the situation in modern Scandinavian languages has been lexicalised and has deviated from the original process that led to it.

In the framework of the Old Nordic hypothesis, type 1A in graph 4.1 is the archetypical realisation. In an Old Nordic context, it is a 100% predictable, seemingly redundant\textsuperscript{131}, phonetic phenomenon, where the tone contour is spread evenly over the word. In a monosyllabic word, the pitch peak lies at the beginning. In a bisyllabic word, the pitch peak moves towards the middle of the word, following the distribution of the speech energy over multiple syllables.

According to Bye (2004a), types 1B, 2A and 2B are the result of a gradual peak delay. The pitch peak shifts gradually to the right, while new peaks are inserted in instances of extreme positioning on the right of the word in the Types 2A and B. These are specific later Scandinavian developments and are not relevant for the Frisian case.

There is an important category 1A sub-type involving words with a short root syllable (Bye 2004a, 14, note 6 / 2004b, 2). In type 1A, the pitch peak is on the first syllable, both in Accent I and Accent II, even though it is somewhat later in Accent II. When the first syllable is short, an alternative situation emerges, where the peak delay in Accent II matches the length of the entire first, short syllable, creating a situation where the peak is not reached before the beginning of the second syllable.

\begin{footnotes}
\item[130] There is a competing theory, namely the Proto-Nordic theory, where pitch peaks are linked to Proto-Nordic long syllables. The Old Nordic theory seems more plausible. For recent evaluation of the two theories see Bye 2004a, 37-40.
\item[131] It is dangerous to call linguistic features ‘redundant’. In a deterministic dynamic system, governed by self-organisation, apparently redundant features may be essential cues for the listener to overcome ambiguities.
\end{footnotes}
This implies that Accent II, type 1B (cf. graph 4.1) was applied to short-rooted words, whereas long-rooted words exhibited pattern 1A. This is a subtle process. A shift in timing can result in an acoustic impression of Level Stress. The intensity stress (loudness) is concentrated on the first syllable, while the pitch peak is concentrated on the (beginning) of the second syllable.

In the framework of the Old Nordic hypothesis, all these variations are completely redundant, predictable from the syllable structure and moreover, gradual. This archaic situation forms the starting point for the reconstruction of Frisian developments in the 15th century.

The following sections deal with the following topics:

- Why do only bisyllabic words with an /a/ in the second syllable have Accent II in Old Frisian?
- Contrasting tone contours and quantitative effects: The non-presence of Open Syllable Lengthening and the shortening of root vowels before unstressed /a/ against a background of dialectal diversity in 15th century West Frisian;
- Contrasting tone contours and ‘qualitative’ effects: Vowel Harmony and Accent Shift;
- Lexicalisation of tone contour contrast in the 15th century;
- The special position of the dialect of Wünsendarp in the early 15th century.
4.4 The prominence of unstressed /a/

In Proto-Germanic, intensity stress and pitch accent are independent. In most Modern West Germanic languages they are closely related: Pitch accent can only be realised when a syllable bears an intensity stress. In Proto-Frisian (± 1000?) the Old Nordic situation is assumed, where the tone contour stretched over the word syllables. The tone contour was phonetically predictable. In bisyllabic words, the pitch peak is found somewhere in the middle of the word. Due to individual variations in focus, the pitch peak may end up somewhere on the end of the first syllable or the beginning of the second syllable. This is a case of Level Stress. The latter situation is more likely in words with a short first root. All this is completely predictable from the word structure. Small differences in timing may affect the later developments.\(^{132}\)

The default tone contour on a bisyllabic word such as dora 'doors' is illustrated in graph 4.2. In the plural form of the word 'door' /dora/, the tone contour follows the duration contour of the word, with the peak somewhere in the middle. Note, the width of the 'letter boxes' and the positioning of the peak are meant as models and do not represent absolute values. The importance of graph 4.2 and 4.3 lies in the depiction of a shift in relative values. Proto-Frisian has several full vowels in unstressed syllables and there is no reason to assume a different contour for the plural dora than for the singular *doru.\(^{133}\) A pitch peak later on in the word is no protection against vowel reduction, as can be seen in the Scandinavian languages. Before the 12\(^{th}\) century, all unstressed vowels other than /a/ were reduced to /ə/.

---

\(^{132}\) Bye (2004a, 47): “[...] multidimensional discrete phonological variations may emerge from adjustments on a small number of continuous phonetic parameters. The engine of variation is phonetic.”

\(^{133}\) Leaving aside the question of Vowel Harmony, so durn versus dorn.

in Old Frisian.\textsuperscript{134} This reduction had serious consequences for the location of the pitch peak.

Graph 4.3 (1) shows the original length configuration for \textipa{/dɔru/} and graph 4.3 (2) the application of the default tone contour. In Old West Frisian, the unstressed \textipa{/u/} was reduced to \textipa{/ə/}. This had an automatic consequence for its duration: \textipa{[ə]} is shorter than any full vowel. The new configuration is shown in graph 4.3 (3). Stretching the default tone contour over this shorter word with the pitch peak in the middle of the prosodic word duration, the peak is situated more to the left in structure than it is in the previous form \textipa{/dɔru/} or the plural \textipa{/dɔra/}, see graph 4.3 (4).

Graph 4.3 (4) is drawn in grey, because it is not a stable situation. The reduction of vowel duration in the final syllable and the subsequent shift of the pitch peak to the left, automatically causes another phonetic effect: stress invokes duration.

\textsuperscript{134} The oldest preserved Frisian text, the psalmglosses of the 12\textsuperscript{th} century, has only an \textipa{<a> \,(=/a/)} and an \textipa{<e> \,(=/a/)} in unstressed syllables, with the exception of \textipa{<um>} in the dative plural. The Weser Frisian group with \textipa{/i/ \,~=/a/ \,~=/u/} is an exception in this respect.
A stressed /œ/ is phonetically longer than an unstressed /ə/. A late pitch peak counteracts this effect, as the relative (and absolute) length of root syllables in words with a relatively late pitch peak, shown in graph 4.3 (2), is shorter than in words with an early pitch peak (Van Leyden 2004, 68).\(^{135}\) When the pitch peak shifts towards the beginning of the word, thanks to the relatively short [ə], as depicted in graph 4.3 (4), the root syllable is freer to exhibit stress-enforced phonetic lengthening. The result is shown in graph 4.3 (5). In graph 4.3 (6) the default tone contour is applied to this new configuration of duration elements. The peak of the tone contour has shifted relatively towards the beginning of the word. Therefore, reduction of an unstressed vowel [u] to an [ə] automatically leads to an earlier pitch peak in /dəə/ than in /dəə/.

This contrast in tone contours becomes even stronger when Open Syllable Lengthening is phonologised, and becomes imperative when the final schwa is dropped. But these developments are not prerequisites for the phonologisation of Accent I. Accent I is also found in bisyllabic words without Open Vowel Lengthening and without apocope/syncope. For example:

\[
\begin{align*}
\text{wessen} & \quad /\text{we}-\text{son}/ & \text{no Vowel Harmony} & \text{Accent I} & \text{‘been’ (past. part.)} \\
\text{lassen} & \quad /\text{we}^\text{’}-\text{san}(\text{ə})/ & \text{Vowel Harmony} & \text{Accent II} & \text{‘to be’ (gerund)} \\
\text{or:} \\
\text{keren} & \quad /\text{kə}-\text{ron}/ & \text{occasional /ə/-syncope} & \text{Accent I} & \text{‘chosen’ (past. part.)} \\
\text{keren} & \quad /\text{kə}^\text{’}-\text{ran}(\text{ə})/ & \text{without syncope} & \text{Accent II} & \text{‘to choose’ (gerund)}
\end{align*}
\]

In graph 4.3 (6), stress cues for intensity, duration and pitch peak are aligned with the first syllable, even if the exact positioning of the pitch peak is slightly later than in usual Accent I words. The sound [ə] in the second syllable is found solely in unstressed syllables, and gives an additional negative cue for the positioning of stress in the second syllable. The listener receives cues for the positioning of stress in the word that shows similarity with the cues for Accent I. The similarity in cues may help explain the identification of short-rooted words with /ə/ in the second syllable with Accent I words.

\(^{135}\) The shortening effect due to a late pitch peak can be calculated from data provided by Van Leyden at approximately 10 to 20%.
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This whole explanation is valid in a context of the standard tone contour following the length configuration of the word. This differs from Scandinavian languages and Riustringen Old Frisian, where lexicalisation / morphologisation of tone contours precedes vowel reduction.

These developments had important consequences for the phonetic marking of unstressed /a/ in Old (West) Frisian. In a language with almost only /a/ and /o/ in unstressed syllables (other full vowels had already been reduced to /o/ by that time\(^{136}\)), where words with an /o/ in unstressed position were excluded from Accent II for purely phonetic reasons, Accent II became a unique and significant marker of words containing unstressed /a/.

Section summary:

- After the reduction of other full vowels in unstressed position to /o/, the vowel /a/ was marked with an originally redundant tone contour;
- This additional tone contour is probably the reason for the large qualitative and quantitative impact it had on its phonological surroundings.

\(^{136}\) Apart from affixes such as bi- and -lik, as well as [u] in the dative plural -um. The length contrast between [u] and [o] is far less than between [a] and [o] (De Graaf 1986, 5; there the length of [u] and [o] are the same.). This short [u] also appeared in protected position ([um]), making it even shorter. The shift of the pitch peak, as demonstrated in graph 4.3, was a quantity induced process. So, the protected [u] in the dative plural followed the same fate as [o]. The realisation as [u] in the sequence [um] (instead of [um]) may be of the same nature as /o/, appearing as [i] and [y] in Dutch koning ‘king’ and zwaluw ‘swallow’ (cf. § 3.6).
4.5 Contrasting tone contours and quantitative effects
There are three quantitative effects of unstressed /a/:

• An absence of Open Syllable Lengthening;
• Occasional shortening of root vowels before unstressed /a/;
• Neither syncope nor apocope, but the preservation of [ø] < /a/.

All these trends are more profound in the north-eastern half of Fryslân.

The following section looks firstly at the fundamental causal relationship between the three phenomena and a late pitch peak. Then, the actual appearances of the effects with their geographical variations is addressed. The <VVCC> spelling (§ 2.3.3.3), showing significant geographical variation, is discussed in 4.5.2.

For a proper understanding of these developments, the four features of stress (Smith and Van Leyden 2007, 36) should be considered:

1. intensity/loudness
2. pitch
3. duration
4. vowel quality

The first two are primary stress markers. In modern West Germanic languages, such as Frisian, English and Dutch, intensity stress and pitch accent are closely linked. The features three and four are the two spontaneous side effects of stress.

The relationship between intensity (1) and duration (3):

• Stressed vowels last longer, and conversely a longer duration evokes the suggestion of stress to the listener;
• Unstressed vowels show less absolute duration contrasts than stressed vowels. The absence of duration oppositions in unstressed syllables in modern Germanic languages is a logical consequence of this fact.

The relationship between intensity (1) and quality (4):

• Stressed vowels show more contrast in their formant pattern. Inventories of vowels in unstressed syllables are usually more limited, /ø/ being the most profound marker of an absence of stress.
4.5.1 Stress and duration

Open Syllable Lengthening in for example, *dore*, and the absence of it in for example, *dora*, is the first item for discussion. Both are bisyllabic, and both have short vowels in open syllables: /dɔ-ʁa/, /dɔ-ʁa/. Syllable structure does not present a quantitative contrast. There are two differences, however:

- *dore* has Accent I, with intensity stress and pitch accent on the first syllable, while *dora* has a pitch accent on the second syllable (Level Stress);
- *dore* has /ɔ/ in the second syllable, being a cue for unstressed syllables, while the /a/ of *dora* is part of the inventory of stressed syllables. The root vowel inventory of Old Frisian words which could be subject to Open Syllable Lengthening consist of short monophthongs only. The /a/ is one of these.

The contrast between Accent I and II has an automatic quantitative side effect. When the pitch accent is not on the root syllable, the root is about 10 to 20% shorter than when both pitch accent and intensity stress are aligned on the root (Van Leyden 2004, 68). This duration contrast is enforced by perceptive stress cues. In *dore*, all four stress cues are aligned to the root syllable:

- The root bears the intensity stress;
- The pitch accent is aligned with the intensity stress;
- The root vowel quality /ɔ/ contrasts with the unstressed vowel /ə/;
- Duration differs from the *dora* case, even though the purely phonetic duration increase of approximately 10 to 20% is not enough to make the originally ‘short’ vowel ‘long’.

The combination of a real, albeit limited, difference in duration between the root vowels of *dora* and *dore*, is enforced by the accumulation of stress cues. This may lead to a reinterpretation of the root vowel of *dore* as a long vowel, rather than as a short one in a phonological sense, as duration is the only missing stress marker on *dore*, so /dɔrə/ > /dɔrə/. It could be argued that the listener is deceived when he hears *dore* with a relatively long ‘short’ vowel plus a series of listener cues that are regularly associated with long root vowels.

In words such as *dora*, the absolute length of the /ɔ/ does not provoke any suggestion of lengthening, nor do the other stress cues. Level Stress, with intensity stress on the first, and pitch accent on the second syllable, provides ‘contradicting’ stress cues, as does the quality of the vowel /a/, belonging to the vowel inventory of short, stressed syllables. All this implies is that there is no objective acoustic signal, nor any perceptive suggestion of an additional duration for either of the two syllables.
The second quantitative effect of unstressed /a/ is the occasional shortening of a long root vowel. In the pair mônā/mônath ~ fôren, the /ɔː/ in the former is phonetically shorter than the vowel in fôren, due to the same duration impact of Accent II compared to Accent I. But this difference was usually not enough to cause a total reinterpretation of the long vowel as short. In a multisyllabic word such as mônandeis, the absolute duration effects are even stronger, due to the word isochrony effect (cf. Nooteboom 1995, 168). Apparently, this was sufficient in some dialects to cross the threshold of vowel quantity reinterpretation. Shortening of an uncompounded word is found in the plural of fôt ‘foot’. The shortened form <fotten> is only found in the north-east (cf. § 2.3.4.1) in a region smaller than is the case with the shortening in mônandeis ‘Monday’ (cf. map 2.5 and 2.6). There is also a word isochrony effect between the singular fôt and the plural fôtan. Together with the duration impact of the accent contrast, this was apparently enough to cause a categorical reinterpretation of the original /ɔː:/ in the plural form from long to short in some dialects.137

Finally, there is the blocking of syncope and apocope of unstressed /a/. This could be a case of quantitative signal intensity, perceptual suggestion and interpretation. A vowel bearing a pitch accent is, per definition, not an unstressed syllable, influencing both its objective acoustic features and its subjective perception. This combination of factors is probably the reason for the retention of pitch-bearing Old Frisian /a/ as [ɔ] in Middle and early-Modern Frisian.

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137 Unpublished studies on the morphological shortening process in Modern Frisian of the so-called ‘West Frisian Breaking’ (for example, Modern Frisian sg. [fu.ɔː], pl. [fwotɔːn], cf. Hoekstra 2001a, 730) suggest that bare word frequency is an additional factor here. Highly-frequent words are pronounced faster, hence shorter, than low-frequent words. The word ‘foot’ is relatively frequent as a lemma, and the plural is relatively frequent compared with the singular form.
Section summary:

• The cumulative impact of physical and perceptual stress cues favours the reinterpretation of the root vowel of, for example, *dore*, as long;

• The cumulative impact of physical and perceptual stress cues confirms the interpretation of the root vowel of, for example, *dora*, as short;

• The cumulative impact of physical and perceptual stress cues in for example, *môna* can evoke a reinterpretation of the quantity of the root vowel as short, when placed in additionally shortening contexts, such as compounds;

• The /a/ in a non-root syllable, bearing pitch accent, was probably not subject to syncope or apocope because it was stricto sensu not unstressed.
4.5.2 Regional diversity in quantitative effects

Regional diversity in quantitative developments connected with the special status of an /a/ is found in the following phenomena:

• The limitation of occasional shortening of long vowels before unstressed /a/ to the north-east (and Wûnseradiel) and a frequent appearance of <VVCC> spelling in words with originally long vowels in the same regions (VVCC type 2, § 2.3.3.3);
• A reluctant Open Syllable Lengthening before unstressed /a/, accompanied by a relative frequent appearance of the <VVCC> spelling, type 1 in the south-west, cf. map 2.3 and 2.4.

The regional variation is best understood when a gradual increasing pitch peak delay is assumed with a minimum shift in the south-west and a maximum one in the north-east of the West Frisian language area in the late-Middle Ages. The types in table 4.3 refer to graph 4.1:

<table>
<thead>
<tr>
<th>Type 1A: limited peak delay</th>
<th>Type 1A + Level Stress in short roots</th>
<th>Type 1B: strong peak delay in Accent II</th>
</tr>
</thead>
<tbody>
<tr>
<td>South-west</td>
<td>Centre</td>
<td>North-east</td>
</tr>
<tr>
<td><strong>dora</strong></td>
<td>[dɔ’ɾa] acc. II</td>
<td>[dɔ’ɾa] acc. II + l.s.</td>
</tr>
<tr>
<td><strong>bitaľad</strong></td>
<td>[bitaľad] acc. II</td>
<td>[bitaľad] acc. II + l.s.</td>
</tr>
<tr>
<td><strong>kâpad</strong></td>
<td>[kaː’pad] acc. II</td>
<td>[kaːp’ad] acc. II + l.s.</td>
</tr>
<tr>
<td><strong>fôta</strong></td>
<td>[foː’ta] acc. II</td>
<td>[foː’ta] acc. II + l.s.</td>
</tr>
</tbody>
</table>

Table 4.3: Gradually differing types of tone contours in 15th century West Frisian. **bold** = intensity stress; ’ = pitch peak; l.s. = Level Stress.

In a model with gradual quantity scales, it is logical that the quantitative impact of a strong pitch peak delay is larger than that of a moderate pitch peak delay. In the same framework of gradual duration contrasts, it should not be forgotten that the duration reduction factor which keeps a short vowel 'short' is not automatically sufficient to make a long vowel sound 'short'. For example: A duration effect of Level Stress in *dora*, causing the retention of the short /a/, in opposition to /dɔːrə/ < *dore*, is not automatically enough to make the root vowel of *kâpad* sound short.
The combination of these two aspects is sufficient to explain the whole picture:

1) **Bitalad**: the peak delay on short-rooted words is relatively strong, both in the central and north-eastern regions (Level Stress) and more or less sufficient to prevent the lengthening of vowels in open syllables. In the south-west, the peak delay is less, and the acoustic and perceptual duration contrast with other vowels in open syllables is only limited. Therefore, Open Syllable Lengthening may eventually occur in words such as *bitalad* in the south-west. The intermediate position between complete lengthening and remaining totally short is expressed by the <VVCC> spelling. A spelling such as <bitaellet> shows that the /a/ is perceived as longer than in the /a/ in <falla> ‘to fall’, but shorter than the /a:/ in <haelen> ‘half’. The <VVCC> spelling in words such as *bitalad* are well represented in the south-west (§ 2.3.3.3, type I; map 2.3).

2) **Kâpad**: only in the north-east, with its strong peak delay, the quantitative impact of this late pitch accent can reach a level where long vowels can be perceived as short. The primary stage of this is an intermediate half-long perception, expressed by <VVCC> spelling. This spelling is relatively well represented in the east in words such as *kâpad*. Complete shortening of long vowels is found in the *mônande*, with further shortening in the long compound (word isochrony), and in occasional instances of *kâpia* as *<keppet>* in Leeuwarden, and the word *fôta* as *<fotta>* in the north-east.

The modern dialect of *Schiermonnikoog*, in the far north-east, exhibits even more examples of shortening of long vowels before the Old Frisian masculine plural ending -en, as in *priem* - *primmen* ‘needle(s), bait - betten ‘boot(s), cf. § 2.3.4.1. Also, in *Wânsraddiel*, in the western part of the province, shortened forms appear such as *<cappet>* ‘bought’ and *<burren>* ‘neighbours/neighbourhood’. The exact conditioning for shortening of long vowels remains open here. The limited frequency of the examples proves an incidental transition of the perceptual duration threshold.

Differences in pitch peak delay between the south-west and the north-east may shed new light on the case of the levelling of the plural marker *-en* towards the feminine nouns.
From this perspective, it is no surprise that the vast majority of feminine words with a plural ending -e in the Schiermonnikoog dialect are monosyllabic in the singular, hence bisyllabic in the plural. For example, *daar* - *dare* 'door(s)' (Fokkema 1969, 16-17). The prominent impact of Level Stress is more prevalent in bisyllabic words than in words with three or more syllables. In 20th century mainland West Frisian dialects, a plural -e was retained in only two nouns *bean* 'bean' and *eart* 'pea'; *beane, earte*.

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Section summary:

- Given that south-western dialects show fewer features which are typologically connected with pitch peak delay, it may be assumed that peak delay was weaker here than in the north-east;

- The translation of the different levels of peak delay into phonetic cues matches the details of the actual quantitative developments, i.e. the typological assumption is supported by a phonetic interpretation.
4.6 Qualitative impact of unstressed /a/

There are two qualitative phenomena in Middle Frisian connected to unstressed /a/:

- Marking of Vowel Harmony, also after the reduction of Old Frisian /a/ from [a] > [ə];
- Accent Shift in *sonnandei*.

### 4.6.1 Vowel Harmony and Accent II

Section 3.4 concludes that an ‘underlying /a/’ was still ‘controlling’ the Vowel Harmony. In § 3.5, this abstract, ‘underlying /a/’ is found to be basically an historical Old Frisian /a/ which could be realised in Middle Frisian either as [a] or, in the majority of instances, as [ə]. The correlation between the historical Old Frisian /a/ and the Middle Frisian Vowel Harmony does not imply that an abstract Middle Frisian ‘underlying /a/’ was still the cause of the Vowel Harmony. In § 2.6, a distinction is made between Vowel Harmony as a phonetic process and the petrified phonological template. The latter may cause ‘Vowel Harmony’ by analogy, but not by its phonetic impact. These two aspects become very clear in the rise and fall of Vowel Harmony in Middle Frisian.

Vowel Harmony as a phonetic process is strictly limited to the presence of a realised [a]. Both for the Weser Frisian dialects with Vowel Harmony and for the North Germanic dialects, there is a distributional overlap between Vowel Harmony and Level Stress situations. Therefore, there are sufficient indications that Level Stress is at least a factor facilitating Vowel Harmony. Phonetic Vowel Harmony caused allophonic distributional patterns (the realisation of the root vowel as [æ] instead of [a] is an assumption; it was regularly spelled <a>, cf. § 2.6.3):

- Gerund: Accent II /vɛ-ən/ ⇒ [vɛzən], later [vɛzən]
- Past part.: Accent I /vɛ-ən/ ⇒ [vɛzən]

The rendering of an allophonic feature in spelling may depend on several factors such as the realisation of /ɛ/ and /a/ in other contexts. Map 2.16 (Vowel Harmony in *seka* and *wesa*) reveals two core regions of Vowel Harmony in spelling. These are the eastern half of the province and the region of *Wûnserdiep* in the west. The long-lasting unambiguous realisation of /a/ as [a] in the north-east may account for the limited spelled representation of Vowel Harmony effects in the far north-east. Where the phonetic context is unspoiled, there may be less awareness of allophonic realisations. Towards the central region, the /a/ was subject to reduction earlier and was less marked with a late pitch peak, so the automatic allophonic character of the [æ] in words with Vowel Harmony was less obvious. This could give rise to the explicit spelling of the allophone. In the far south-west, the weak Level Stress may...
have been the reason Vowel Harmony did not occur at all.

In the beginning of the 15\textsuperscript{th} century, when an unstressed /a/ in protected position evolves into an [ə] with a late pitch peak, the following allophonic template emerges:

\begin{itemize}
\item With Accent I: [ɛ-ə]
\item With Accent II: [æ-ə]
\end{itemize}

Vowels [æ] and [ɛ] were in paradigmatic alternation in verbs such as \textit{lesa}, with [ɛ] in present singular and past participle and [æ] in the infinitive and gerund, or in words such as \textit{seke} with [ɛ] in the singular and genitive and dative plural, but [æ] in the nominative and accusative plural. Why the [ɛ] is restored in the second half of the 15\textsuperscript{th} century is unknown for this study, but paradigmatic relations and the allophonic template with an accent contrast enabled speakers of the time to identify both [ɛ] and [æ] as allophones of /ɛ/.

The reverse of the root vowel to [ɛ] fails in the plural form \textit{dagen}. In § 4.1, the assumption is made that this is due to the loss of Accent II. That implies that somewhere in the late 14\textsuperscript{th} century or early 15\textsuperscript{th} century the following change took place, for example, in the plural of \textit{dei}:

\[ [dæg'ən] \Rightarrow [d'ægən], \text{perhaps even} [d'æ.ɡən] \]

The first element of the sound pattern [æ-ə] could no longer be identified with the allophonic realisation of /ɛ/ in Accent II. The sounds [æ] or [æ] rather resemble the realisation of Middle Frisian /æ/.

\begin{footnotesize}
139 There are two Old Frisian sounds which contributed to a Middle Frisian long /æ/: Old Frisian /æ/, for example in \textit{rād} \textit{red}, and Old Frisian /a/ in open syllables which was lengthened, for example \textit{mager} \textit{meagre}. Depending on the lemma and region, these two /a/ sounds could blend together or remain separated. In general, the historical long /æ/ shifts towards a more palatal realisation in the late Middle Ages: [æ] or even [ɛ]. In the western part of Frisian, this tendency yields both an Old Frisian /æ/ and a lengthened /a/ in open syllables. This can be seen in the rendering of the plural of \textit{dēj} \textit{day} in several sources from the 17\textsuperscript{th} to the 19\textsuperscript{th} centuries, all from the western part of the province: J. van Hichtum \textit{(Hichtum)} <\textit{dagen}>; Gysbert Japicx \textit{(Bokward)} and Durk Lenige \textit{(Makkum)} <\textit{deagen}>; \textit{Workum}; 1681 <\textit{dagin}>; ± 1850 <\textit{deagen}>, corresponding to a modern not attested *\textit{deagen} [dʌ.ɡən]. The Modern Frisian form is \textit{dagen} [dʌ.ɡən]; cf. \textit{weagen} [vʌ.ɡən] < OF \textit{wāgen} \textit{waves}.
\end{footnotesize}
Section summary:

- Vowel Harmony must be split into two stages: Firstly, a phonetic origin (14th century), based on the presence of the subsequent [a], probably facilitated by the effect of Level Stress, and secondly, a phonological template relying on the tonal contrast (15th century);

- Differing developments in accent types due to morphological levelling, for example, explains the variance in development of words with historical Vowel Harmony.
4.6.2 Accent Shift

Smith & Van Leyden (2007) advocate that the Level Stress in Riutringen Old Frisian was the cause of the accent shift (oxytonisation) in the East Frisian dialect of Land Wursten. They provide an impression of what might have happened in the interaction between speaker and listener:

“When there is poor perceptibility of first-syllabic stress cues like duration, intensity and pitch excursion, the second syllable tone patterns may be reinterpreted as signalling stress.” (Smith & Van Leyden 2007, 56).

It should be noted that accent shift is a limited phenomenon in West Frisian, while it is a regular process in historically bisyllabic short-rooted words in the Frisian dialect of Land Wursten. The instances in West Frisian are found in trisyllabic words:

- Place names, such as ‘Elawerth > *Elawerd > Hi’laard’;
- Family names: Bu’walda;
- A trisyllabic word with an /a/ in the second syllable, sonnande ‘Sunday’.

In the place names, /a/ merged with the subsequent /w/ (or /v/) into a diphthong [au]. In the word ‘Sunday’, the /a/ developed a diphthong [ai] or [au] before /nd/.

This suggests that the stress cue of pitch accent was enforced by the duration cue of the new diphthong.\(^{140}\)

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\(^{140}\) The pitch accent on the /a/ is possibly helpful, but not always necessary to cause an accent shift. The word *ierdappel* ‘potato’, shows an accent shift to [jačrapl] in the northern part of the Modern Frisian language area (Hoekstra e.a. 1994, 293 ff.). The potato was introduced into the Netherlands in the 17th century, but did not become a popular vegetable before the 18th century. The oldest attestation in early-Modern Frisian is from 1774. The authors suggest the syllable quantity as a cue for the attraction of the primary stress.

Studies by the author on the dialect of *Schiermonnikoog* and early-Modern Frisian suggest that Accent II disappears from the language not before the 18th century, at least in the north. Therefore, the existence of an Accent II and accent shift in the word for ‘potato’ might still come together somehow.

A very old case of accent shift in Old Frisian is the word *wrald* ‘world’ < *wraeld*. The accent shift precedes the written attestation to Frisian, so must be from before 1250. The cluster /ld/ causes lengthening of the preceding vowel in all Frisian dialects, but its dating is problematic as *<wraeld>* or similar forms are not attested in Old Frisian sources; the oldest indication of vowel length in the charters is from 1473 (OFO I-238): <wraeldsch>. As the accent shift in *wrald* took place at a time where tone contours were not automatically aligned with the intensity stress, it is difficult to identify the impact of the sole prominence of the open /a/, the additional cue from a tone contour and possibly an initial lengthening or diphthongisation before /ld/. Both in *ierdappel* and *wrald*, the /a/ is the attraction point.
Both cases illustrate that the ‘normal’ situation of Level Stress did not provide so many stress cues linked to the second syllable that listeners would identify the second syllable as the bearer of the primary stress. The extra duration of the new diphthong could cause a shift in the listener’s interpretation of primary stress.

Section summary:

- As pitch is one of the stress cues, a pitch peak is a prerequisite for attracting intensity stress;
- When a pitch peak bearing syllable developed a phonetic diphthong, creating extra vowel duration, the total of stress cues could cross the perceptual threshold to attract the intensity stress.
4.7 The phonologisation of tone contours

While the prosodic, redundant nature of the tone contour was a necessary prerequisite for the formation of an outstanding tone contour on words with unstressed /a/, the 15th century shows a change. The reduction of /a/ > [ə] is not followed by the automatic transition of the pitch peak to the first syllable in the way described in § 4.4.

In other West Germanic languages, intensity stress and pitch accent were aligned on the same syllable: The stressed root. 15th century West Frisian developed the possibility of having those two stress markers on different syllables, independent of the quality of the second syllable. Minimal pairs developed, such as *wezen* with Accent II in the gerund but with Accent I in the past participle. The tone contour became an independent marker of semantic and morphological functions. The tone contour was no longer purely predictable from the syllable structure and new speakers had to learn it by lemma or at least by morphological category. There was a similar development in North Germanic languages, although there the fixation of the pitch peak took place before the reduction of most unstressed syllables to /ə/.

At this stage of research, it is hard to say anything definitive about the cause of the phonologisation of tone contours in West Frisian. One reason may be language contact, as the neighbouring languages did not have the option of pitch peak delay. Facing this limitation, the options were either to copy the tonal system from the neighbouring languages, or lexicalise the tone contours. The functional load of these contrasts in the relatively archaic morphology of early-15th-century West Frisian may constitute a reason for the course of the developments. It is not possible to provide a final answer to this ‘why’ question here.

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141 From the data presented in this study, combined with data from studies on early-Modern Frisian, it is possible to conclude that the following morphological categories preserved Accent II, contrasting with the default Accent I:

* All nouns with a singular in -e:
* Plural feminine nouns, as long as they survived as a distinct group into the later centuries (esp. the Schiermonnikoog dialect),
* Weak verbs in -je, primarily in the forms taking /a/ directly after the root in Old Frisian (2nd, 3rd sg. pres., entire past tense and past participle).

Accent I was most likely generalised in the following grammatical categories:

* The entire paradigm of the strong verbs and weak verbs in -e. Little evidence was found for Accent II already in for example, the pl. pres. tense in Middle Frisian (no Vowel Harmony before the Old Frisian ending -attih), but the infinitive and gerund of these verbs definitely bore Accent II in the first half of the 15th century.
* Adjectives, even when they often had the ending -a in inflected forms, seem to have generalised Accent I to the entire paradigm at an early stage.
Both Frisian and North Germanic are peripheral languages within the Germanic family. Both preserved the phonetic archaic feature of varying tone contours, at least for a while. Phonologically, they became modernised as much as the ‘major’ languages did.

Section summary:

• The phonologisation of tone contours was a break with the past, where tone contours were completely predictable from the word structure;

• Frisian and Scandinavian dialects share this innovation, as distinct from large West-Germanic languages.
4.8 The dialect of Wûnseradiel in the 14th and 15th century

The dialect of Wûnseradiel and direct surroundings (such as the city of Harlingen) situated in the western part of the province, show traces otherwise found in north-eastern dialects in:

- Vowel Harmony, cf. map 2.16;
- The shortening of long vowels before unstressed /a/, as in <cappet> ‘bought’, Old Frisian kâpad and <burrên> ‘neighbours/-hood’, Old Frisian bûran, cf. § 2.3.3.3, type 2.

It is, however, completely embedded in the rest of western and southern Fryslân in:

- The development of Open Syllable Lengthening before the Old Frisian /ə/ as in bitalad, cf. § 2.3.3.2 and map 2.3;
- The absence of Vowel Balance effects for unstressed /a/ in words with a short root, cf. map 2.14;
- The apocope of word-final /c/ as in seke, cf. map 2.12.

A reason for this apparent contradiction lies in the chronological order of the events. ‘North-eastern’ features in Wûnseradiel must be old, from the 14th century:

- The phonetic roots of Vowel Harmony lie in the 14th century, cf. § 2.6.3;
- Protected Old Frisian /a/, as in kâpad and bûran was already weakened in the late 14th century (§ 2.4.3.2), so the full quantitative impact of this /a/ was most likely before that time.

The features where the dialect spoken in Wûnseradiel behaves like the adjacent western and southern dialects are from the second half of the 15th century:

- Open Syllable Lengthening before unstressed /a/ is from the second half of the 15th century. The first attestation in bitalad is in 1447, OFO 1-99.
- The /ə/ apocope in seke took place in about 1460, cf. § 2.4.3.8.

The phenomena in the dialect of Wûnseradiel can be explained by assuming the region had a strong pitch peak delay in the 14th century, similar to that in the north-east. During the 15th century, the realisation of Accent II in Wûnseradiel fit in with the rest of western Fryslân. In Scandinavia, different realisations of Accent II are
The dating of the spelling forms <cappet> and <burren> in Wünsraderiel seems contradictory to this interpretation: The first attestations to <cappet> (OFO I-487) and <burren> (OFO II-202) are from 1504. Earlier attestations from Wünsraderiel, like OFO II-2, 1379 <bu(w)ren> and OFO I-66, 1436 <kapat> do not show this shortening. The oldest case of <kappeth> is from OFO I-24, 1417 a copy from Littenseradiel. Statistical evaluation of the data reveals that the lack of older examples may be the result of mere chance. The phenomenon of vowel shortening in kâpia is limited; even in Wünsraderiel no more than 7% of the tokens. From the 15th century, there are only seven original attestations to kâpia which are linked to Wünsraderiel. The probability of finding no instances of shortening is subsequently 60% (= 0.93). Therefore, shortenings such as <cappet> may very well be older in Wünsraderiel.

Section summary:

• The dialect of Wünsraderiel shared a relatively late pitch peak in words with Accent II with the dialects from the north-east in the 14th century;
• In the 15th century, Wünsraderiel speakers drifted towards the Accent II realisation of speakers from the adjacent regions in the south-west, with an earlier pitch peak.

142 It is a frequent phenomenon in historical dialect geography that a feature appears in a more or less random distribution over the entire language region, and becomes a geographically distinct feature after some time. This kind of transition can be modeled by simple algorithms with a stochastic variation component and a component causing accommodation between adjacent agents (cf. Ball 2004, 392).
4.9 Conclusion

This chapter argues that a relatively late pitch peak on words with an /a/ in unstressed syllables is a logical consequence of a combination of a predictable, redundant prosodic tone contour as well as the stage of vowel reduction that Old Frisian had reached during the 12th century. Geographical and temporal variations are the result of gradual differences in pitch peak delay, which increases from the south-west to the north-east, and the cumulative impact of quantitative duration effects and perceptual biases in various cues for locating the primary stress. At the end of the period, early-Modern Frisian was a language with tonal contrasts comparable with Scandinavian languages.¹⁴³

¹⁴³ A relatively recent observation in the literature is the tonal distinction in North Saxon, with an Accent II on formerly bisyllabic words such as /dusf/ < /dusv ø/ (Ternes 2006, 92 ff.). The case of tonal contrasts in Franconian dialects (Dutch and Belgian Limburg, the German Eifel region and Luxemburg) is well known. West Frisian may not have been that exclusive within the West Germanic family as may be understood from the final conclusion of this section. However, the Frisian case is definitely rooted in the late Middle Ages, the description of the Low Saxon case suggests that the tonal contrast is from a later period, as apocope of /ø/ in North Saxon is a phenomenon from the second half of the 16th century onwards (König 2001, 159)