

# SCHWA DELETION RESULTS IN GEMINATE FORMATION IN WEST-FRISIAN

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## ABSTRACT

West-Frisian has a highly frequent suffix *-ən/* in which the schwa is usually deleted. This results in a single nasal which is analysed as ‘syllabic’, at least after obstruents. However, it is unclear what happens if schwa deletion occurs after a stem-final nasal as in *hûn-en* ‘dog.PL’. We consider several options, including nasal deletion, nasal contraction, and gemination. We compare the duration of an underlyingly single nasal in stem-final position with that of the nasal after schwa deletion in *-nən/* as in *hûn ~ hûnen*. The results reveal that the nasal in *hûnen* after schwa deletion is more than twice as long as in *hûn* and also longer than after schwa deletion in *-tən/*. This suggests that the nasal is geminated. We discuss the status of this nasal in light of the fact that gemination has not been reported elsewhere in the phonology of West-Frisian.

**Keywords:** duration, gemination, nasals, syllabic consonants, West-Frisian.

## 1. INTRODUCTION

West-Frisian is a North-West Germanic language spoken in the North of The Netherlands. All its speakers are bilingual with Dutch. West-Frisian has a highly productive and frequent suffix *-ən/*, orthographically <en>, which also occurs in other Germanic languages like Dutch, Danish, and German. In West-Frisian, final *-ən/* appears as the nominal plural marker, verbal past plural marker, the participle, and the gerund. Final *-ən/* may also occur as part of the stem.

- |    |            |              |
|----|------------|--------------|
| 1. | boek-en    | book.PL’     |
|    | gong-en    | ‘go.PAST’    |
|    | witt-en    | ‘know. PART’ |
|    | te litt-en | ‘let.GER’    |
|    | eksamen    | ‘exam’       |

The pronunciation of *-ən/* is remarkably variable. On the phonemic level, full pronunciation [ən] sometimes occurs, schwa deletion or n-deletion occurs [1], and even zero realization can be observed [2]. Full pronunciation is a somewhat archaic

pronunciation [2], whereas nasal deletion is likely an influence of Standard Dutch [1,2,3]. Zero realization occurs sometimes after plosives [2]. The preferred variant in West-Frisian, however, is a nasal, which remains after schwa deletion [1,2,4,5]. This nasal is subject to nasal place assimilation, mostly regressive, but sometimes also progressive [1,2,5,6].

- |    |             |           |              |
|----|-------------|-----------|--------------|
| 2. | doarp-en    | [dwarpm]  | ‘village.PL’ |
|    | moat-en     | [mwatn]   | ‘must.PL’    |
|    | boek-en     | [bukŋ]    | ‘book.PL’    |
|    | moat-en mei | [mwatmɛi] | ‘must with’  |

In addition, schwa can be nasalized [1,2], whether or not it is followed by a full nasal. This leads to the following variation for the word *boeken* /bukən/ ‘book.PL’:

- |    |         |          |
|----|---------|----------|
| 3. | [bukən] | [bukə̃n] |
|    | [bukə]  | [bukə̃]  |
|    | [bukŋ]  | [buk]    |

Of these forms, [bukŋ] is the most commonly used.

The nasal in [bukŋ] is analysed as a syllabic nasal [5]. This is because the preceding consonant [k] has a lower sonority than the nasal and subsequent coda consonants universally have a decreasing sonority. This means the nasal cannot be parsed with the first syllable if the stem-final consonant is an obstruent [5]. Theoretically, this is different if the stem-final consonant is an approximant, as in *te skriuwen* [skrjuwn] ‘write.GER’, in which the nasal is incorporated in the syllable.

In case the stem-final consonant is a nasal, as in *hûnen* /hunən/ ‘dog.PL’, the nasal is also regarded as syllabic. It is unclear, however, what the phonetic realization of this syllabic nasal is. Does the nasal appear as a geminate? This is unlikely since geminates do not occur elsewhere in West-Frisian. If a morphological process leads to two adjacent consonants that are the same, the result is a single consonant [6]:

- |    |             |                 |              |
|----|-------------|-----------------|--------------|
| 4. | rêst-t      | rest.3SG        | [rɛ:st]      |
|    | stean neist | stand next (to) | [steə̃ndist] |

An alternative scenario is nasal deletion. Although this would conflate the inflected and the non-inflected form, zero inflection does occur as we

illustrated above in e.g. *boeken* [buk] ‘book.PL’. Another possibility is that the stem-final nasal and the nasal of the suffix are contracted to a certain extent.

In order to find out the true nature of the surface nasal of underlying  $-\text{/}\text{ə}n\text{/}$ , we measured and compared the duration of the nasal in pairs of singular and plural nouns as in *hûn* and *hûnen*. We compared the duration of these nasals to that of a syllabic nasal after /t/ as well, since it is possible that the syllabic nasal is always a bit longer than a non-syllabic nasal. In other words, the syllabic nasal in *tinten* ‘tent.PL’ after schwa deletion may have the same duration as the nasal in *hûnen* after schwa deletion.

## 2. APPROACH

We designed a production experiment to compare the duration of a stem-final nasal with the nasal that results from schwa deletion in  $-\text{/}\text{ə}n\text{/}$ . The target words were the singular and plural of the same n-final stems like *hûn* ‘dog’ vs. *hûnen* ‘dogs’. We designed carrier sentences in which singular and plural forms appeared in sentence-final or sentence-medial position.

5. *Ik ha ien hûn.*

‘I have one dog.’

*Ik ha ien hûn hân.*

‘I have had one dog.’

*Ik ha twa hûnen.*

‘I have two dogs.’

*Ik ha twa hûnen hân.*

‘I have had two dogs.’

We decided to not confront our participants with orthographic representations of the stimuli in order to prevent spelling pronunciation such as the full pronunciation of a schwa and nasal in the plural suffix. Therefore, the speech materials were elicited by asking the participants to produce sentences that would fit the constraints embodied by pictures. It was explained to the participants that they should produce sentences with a fixed structure *Ik ha {ien, twa} X(X) hân* ‘I have {one, two} X(X) (had)’. The direct object in this structure should be either a singular or a plural noun preceded by the numeral one or two, respectively. Singular objects were targeted by a single picture; plural object forms were elicited by showing a picture of two identical or similar objects. The tense would either be present or past; in the latter case the participant was told to finish his sentence with the past participle *hân*. The

participants were instructed that the past tense was intended if the picture was contained in a thinking cloud (see Figure 1), which would be absent when a present tense was targeted.

**Figure 1:** Picture to elicit the utterance *Ik ha twa spinnen hân* ‘I have had two spiders’.



We hypothesize that the nasal in the plural is longer than in the singular because the plural underlyingly consists of two nasals. We also hypothesize that the nasal in final position is longer than in non-final position, both in singular and plural, due to final lengthening [7]. We finally expect the difference in duration between singular and plural forms to be similar in both final and non-final position.

## 3. METHOD

### 3.1 Stimuli

We selected ten monosyllabic words ending in /n/ which were suitable to illustrate by pictures.

**Table 1:** Critical stimuli.

#	Stimulus	Gloss	#	Stimulus	Gloss
1.	ein	duck	6.	kroan	crown
2.	hân	hand	7.	pin	pen
3.	hûn	dog	8.	spin	spider
4.	knyn	rabbit	9.	tún	garden
5.	kraan	tap	10.	troan	throne

These ten stimuli were targeted in the four different carrier structures, so that there would be 40 target utterances in all. The critical stimuli alternated with 26 filler stimuli targeting objects with stems not ending in /n/. These filler stimuli also occurred in the four carrier structures. The total number of stimuli was thus  $(10 + 26) \times 4 = 144$ . There was no explicit familiarization phase, but the first target stimulus occurred as number nine, and was realized without hesitation by all subjects.

### 3.2 Subjects

Eighteen native speakers, nine males and nine females, participated in the study. The age range of the group of participants was 25-75 years, with a mean of 44.89 (SD 14.84). They volunteered and received no compensation.

### 3.3 Procedure

The experiment was run in a quiet office. The second author, a native speaker of West-Frisian, carried out the experiment and controlled the stimulus presentation. Participants were instructed orally and on the computer screen. They were asked to produce the sentences that would be shown to them in pictorially coded form on the screen. The speech was recorded onto a Tascam DR-40 with a headworn ATM73cW cardioid condenser microphone.

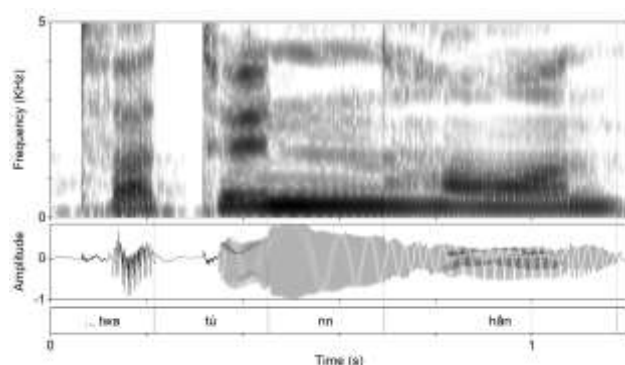
Stimulus and filler pictures appeared on screen one by one in quasi random order such that structures containing the same target word were separated by at least two intervening stimuli.

## 4. RESULTS

The duration of the nasals was measured in Praat [8]. Nasalization of the stem vowel was not included in the nasal duration. The end of the nasal was defined as the onset of breathiness (noise between harmonics) caused by the following /h/-sound (see Figure 2).

**Figure 2:**

Annotation of *Ik ha twa túnen han.*



A number of realizations were excluded for different reasons. In one case, only schwa was realized; in two cases, neither schwa nor a nasal was realized (but the stem vowel was nasalized); in 85 cases, fully realized [ən] occurred. In another 39 cases the target word and/or sentence were incorrectly

realized. We analysed the duration of the remaining 593 (82%) realizations.

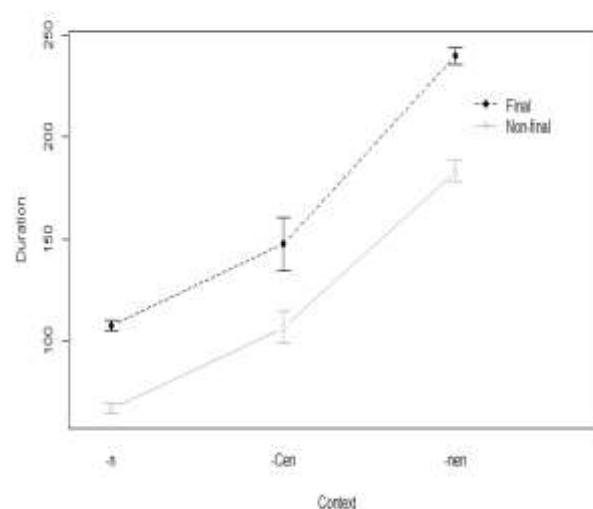
The mean duration of the nasal in the four groups broken down by number (singular, plural) and position (medial, final) in the sentence are shown in Table 2. The means show that the nasal in the plural is more than twice as long as in the singular, both in medial and final position. We compared this to the nasal in *tinte-n* 'tent.PL'. The underlying schwa in this word is also deleted in 80% of the cases, comparable to that in the *-nən/* words. The duration of the nasal in *tinten* is clearly shorter than that of the plurals in the *-nən/* words, and longer than the coda nasal of the singulars. The duration in final position is 40 ms longer than in non-final position, comparable to the duration in the *-nən/* words.

**Table 2:** The aggregated nasal duration (ms) in *-nən/* (n=593) and *tinten* (n=26) depending on number and position in the sentence.

	Position	Number	
		Singular	Plural
<i>-nən/</i>	Medial	67	183
	Final	107	240
<i>tinten</i>	Medial	NA	107
	Final	NA	147

The distribution of the nasals of the *-nən/* words is visualized in a plot (Figure 3), which shows that the plural forms (e.g. *túnen*) pair together with a significantly longer duration than the singular forms (e.g. *tún*).

**Figure 3:** Duration of nasal (ms) broken down by number and position in sentence.



To see if these means are significantly different, we ran a linear mixed model with duration as the

dependent factor, stimulus type (-/n/, -/nən/ or -/tən/), and number and position as random factors. We compared the model with and without interaction based on the AIC. The model with the best fit (i.e. the lowest AIC) is presented in Table 3.

**Table 3:** Values, t-values and p-values of the intercept, number, position in sentence and their interaction. Stimulus type refers to n-final stems vs. *tinten*.

Effect / interaction	Value	t	p
Intercept)	68.4	10.6	<0.001
Position (Final)	40.3	9.7	<0.001
Number (Pl)	115.3	25.9	<0.001
Stimulus Type ( <i>tinten</i> )	-84.4	-10.9	<0.001
Position (Final) : Number (Pl)	16.2	2.7	0.008

The results show that the longer duration of the nasal in final position as opposed to medial position (reference level) is significant ( $t = 9.7$ ,  $p < 0.001$ ). The duration of the nasal of the plural is significantly longer than the coda nasal in the singular ( $t = 25.9$ ,  $p < 0.001$ ). Further, the nasal in *tinten* is significantly shorter than the nasal in the critical stimuli ( $t = -10.9$ ,  $p < 0.001$ ). Finally, we observe a relatively small but significant interaction between position and number ( $t = 2.7$ ,  $p = 0.008$ ).

## 5. DISCUSSION

West-Frisian word-final -/ən/ tends to undergo schwa deletion, after which only the nasal remains. This resulting nasal is syllabic after obstruents, but incorporated in the syllable of the stem if the stem ends in an approximant. We investigated the realization of this nasal after a coda nasal, and raised the possibility that it was geminated.

One would expect the nasal resulting from schwa deletion in final -/nən/ to be longer than the stem-final nasal without the suffix final. One would also expect the plural form to be pronounced somewhat faster than the singular form since the plural is longer, and a stress-timed language such as West-Frisian aims to maintain constant word length. Our results show that the coda nasal is shorter than the syllabic nasal, and that the syllabic nasal after a coda nasal is even longer. This suggests that gemination occurs.

Geminate formation in West-Frisian is remarkable since geminates are avoided in the rest of the grammar [6]. Geminates are also entirely absent in Dutch, the majority language, and the other native language of all native West-Frisian speakers. The phonology of West-Frisian is to a great extent

similar to that of Dutch, but schwa deletion does not occur in final -/nən/ in Standard Dutch. Instead, n-deletion is favoured. The pattern we found in West-Frisian is more similar to German, in which schwa deletion is applied in the same final -/nən/ context, also leading to a longer duration [9]. Schwa deletion is not borrowed from German, however, but probably an innovation resulting from dialect contact with a neighbouring Low Saxon dialect spoken in the Netherlands [10].

Alternatively, we could consider the syllabic nasal as concatenated to the stem, without gemination. However, this immediately raises the question why the syllabic nasal does not delete, as in other parts of the grammar (see example 4). Apparently, the syllabic nasal blocks deletion. Further research has to show whether this holds for other sonorants as well, as schwa deletion in final -[əl] and -[ər], and what other phonological processes are blocked or caused by syllabic sonorants. Finally, we have to note that we only investigated the duration of the alveolar nasal. The nasal in -/ən/ undergoes place assimilation to the preceding consonant, especially if this preceding consonant is itself a nasal [2]. This means that a geminate labial nasal is expected to occur in e.g. *eksamen* [eksam:] ‘exam’ and a geminate velar nasal is expected in *gongen* [gɔŋ:] ‘went.PL’.

## 6. CONCLUSION

We raised the question what the result is of schwa deletion in words ending in a nasal and suffixed with -/ən/ in West-Frisian. Therefore, we measured the nasal duration of singular and plural forms of the same -n final stems. We did this in sentence medial as well as in sentence-final position.

The results show that the duration of the nasal in the plural forms (with two underlying nasals) is more than twice as long as in the singular (with just one underlying nasal). This suggests that nasals in underlying word-final -/nən/ in West-Frisian result in a geminate. This is interesting since we are unaware of other geminates or gemination processes in the West-Frisian, neither does it occur in the majority language Dutch that the speakers have native proficiency in. Rather, West-Frisian seems to pattern with German in this respect.

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