DIPHTHONGISATION OF /iː/ IN WEST FRISIAN

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ABSTRACT

Contemporary West Frisian (ISO 639-2 fry; henceforth: Frisian) has a rich and symmetrical vowel system, with nine short and nine long monophthongs as well as numerous rising, falling and centring diphthongs. However, the vowel system of this minority language is changing, some of these changes are induced by contact with Dutch, others are more likely to be internal changes. One such sound change in progress is observed in the long high vowel /iː/, which younger speakers tend to realise as a centring diphthong [iˑə]. Consequently, the traditional minimal pair *wiid* /ʊiːt/ 'wide' ~ *wiet* /ʊiˑət/ 'wet' becomes homophonic [ʊiˑət].

We present the first analysis of this sound change in progress. Based on acoustic analyses of the trajectory of /iː/ of 51 speakers from Boarnsterhim, we show that the youngest speakers use this centralising diphthongisation more often than older speakers. Moreover, analyses show that diphthongisation occurs more often before alveolar consonants.

Keywords: Sound change, diphthongisation, Frisian, sociophonetics, vowels

1. INTRODUCTION

1.1. The Frisian language situation

Frisian is a West Germanic language spoken by approximately 450 thousand people in the province of Fryslân in the north of The Netherlands [1]. It is recognised as the official second language in the province and spoken by around three quarters of its inhabitants. Though the language is supported in more formal domains, it is strongest in the domains of family, work and village communities [2]. Traditionally, three dialects are distinguished: Clay, Wood and Southwestern. The Clay dialect provides the basis for the official standard, though this standard is not often adhered to in less formal domains.

For centuries, Frisian has been in direct contact with its neighbouring languages, especially Dutch. Yet, the influence of Dutch on Frisian has increased since the advent of mass media and the increase of mobility from the 19th century onwards [1, 2]. This intensive contact has left its mark on Frisian syntax (e.g., verb order), lexicon, morphology (e.g., diminutive formation) and phonology (e.g., realising /a/ as [a] instead of rounded [ɔ] before dentals) [3].

1.2. The Frisian vowel system

The Frisian vowel system is quite a large one [4]. Each monophthong displayed in Table 1 – except schwa – has a long counterpart that has phonemic status (e.g., *wer* /ʊɛr/ 'again' ~ *wêr* /ʊɛːr/ 'where' and *kat* /kɔt/ 'cat' ~ *kâld* /kɔːt/ 'cold'). Thus, there are 19 monophthong phonemes in Frisian.

	front	central	back
close	i iː y yː		u uː
close–mid	e eː ø øː		o oː
mid		ə	
open–mid	ɛ ɛː		ɔ ɔː
open		a aː	

Table 1: Vowel chart of Frisian.

Frisian also has three types of diphthongs, which can be split into rising (e.g., *ljocht* /ljɔχt/ 'light'), falling (e.g., *rein* /rajn/ 'rain') and centring (e.g., *beam* /beˑəm/ 'tree'). The centring diphthongs play a role in one of the most characteristic processes of Frisian phonology: breaking [5]. In complex words, they change to a combination of a glide + vowel (e.g., *stien* /stiˑən/ 'stone' becoming *stiennen* [stjenn̩] 'stones' or *stientsje* [stjentsjə] 'small stone').

As Dutch pressure on Frisian increases, the vowel system of Frisian may also be affected. One sound change brought forward as Dutch interference is the diphthongisation of long high vowels [3]. Though Sipma already noted slight diphthongisation in all long vowels as early as 1913 [6], Frisians born after circa 1980 are said to realise the long high vowels as centring diphthongs instead, especially before dental and alveolar consonants [3, 7]. These novel realisations indicate a merger between two vowel

phonemes, as *wiid* /ʊiːt/ ‘wide’ and *wiet* /ʊiˑət/ ‘wet’ are both increasingly realised as [ʊiˑət]. The current diphthongisation can also be seen as a language-internal process, as since the Early Modern Period, a context-conditioned reshuffle of /i/, /iː/ and /iˑə/ of various etymological origins has been in progress in Frisian [8].

1.3. The Boarnsterhim Corpus

The Boarnsterhim Corpus (BHC) provides an excellent tool to study sound change in Frisian.[1] This corpus comprises roughly 120 hours of speech in both Frisian and Dutch by bilinguals from the former municipality of Boarnsterhim. It is claimed that the (Clay) Frisian variety from this centrally located area is rather conservative and close to the standard (like Oxford for English or Haarlem for Dutch). The corpus is unique in its design, as multiple generations of a total of 37 families were recorded in both Frisian and Dutch at two points in time (1982–1984 and 2017–2019).

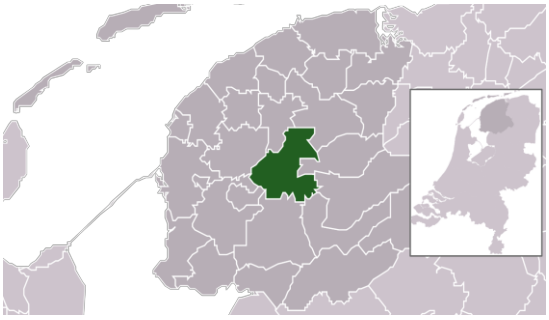

Figure 1: Map showing the Boarnsterhim area (1984–2012) [9].

All 113 speakers in the BHC were recorded reading a passage of 20 sentences and a short story of roughly 5 minutes. Following this, a semi-structured interview with a native speaker of the language in question ranging between 15 and 40 minutes is included. Recordings were made in the living rooms of participants to create a natural language setting for the use of Frisian.

In this paper, we use data from the BHC to look for acoustic confirmation that younger Frisian speakers show more centralising diphthongisation of /iː/ and make some first steps toward relating this sound change to linguistic factors.

2. METHOD

2.1. Materials

A total of 51 speakers recorded in the 2017–2019 section of the BHC were analysed. There were 20 male speakers and 31 female speakers. The youngest was born in 2001, while the eldest was born in 1929 (M = 1963, SD = 22). Thus, this study spans a birth cohort of 72 years.

All instances of /iː/ in closed, stressed syllables of content words in both read and spontaneous speech were traced using the Frisian orthographic annotation (i.e., <ii>) in the textgrids accompanying the audio files. After excluding 6 tokens with excessively foregrounded background noise, a total of 370 tokens were analysed.

2.2. Data processing

The start and end times of the vowels were manually segmented in a textgrid in Praat [10]. Neighbouring consonants were also annotated. The first three formants were estimated using a Praat script at 25%, 50% and 75% of the vowel duration with the Burg algorithm (for data files and scripts, see fon.hum.uva.nl/archive). While the time step (10 msec), number of formants (5), window length (25 msec) and pre-emphasis (50 Hz) were kept constant, the formant ceiling was adapted per speaker following the best fit provided by the FormantPath function in Praat in the read word *wiif* [ʊiːf] ‘woman’. For 2 speakers, the read word *siik* [siːk] ‘sick’ was used due to interfering background noises in *wiif*. Outliers that were further than 1.5 times the interquartile range from the lower/upper quartiles at 25, 50 and 75 percent were manually corrected based on changed LPC settings that best tracked the first three formants upon visual inspection.

2.3. Data analysis

To analyse the effect of the fixed factor *birth year* on diphthongisation of speakers, the lme4 package [11] in R [12] was used, as well as the lmertest package [13] to compute *p*-values. Diphthongisation was operationalised as change in (natural) log-transformed F1 between 25%, 50% and 75% of vowel duration. The three points of measurement, i.e., the within-speaker factor, were coded as the factor *position* (1, 2 and 3 respectively). The factor *speaker* was included as a random effect. The factor *birth year* was centred (byc) by subtracting the mean birth year (1963) individual values, and position by subtracting 2 from each position value (psc). The model specification was as follows in R (for more details, we refer to our analysis scripts):

(1) logf1~byc*psc+(psc|speaker)

The interaction effect between position and birth year will answer our primary research question. Inspection of the residuals showed no deviations of normality such as skewness or long tails. F1–F2 graphs were created in the web tool Visible Vowels [14].

3. RESULTS

Figure 2 shows the untransformed mean formant values, pooled over both genders and all following consonants and split by birth year (before and after 1980). This year was chosen because it represents the start of the fourth generation of BHC speakers. Note that due to this pooling, the figure is best interpreted as heuristic. As expected, younger speakers show a centralising realisation against a closing trajectory for older speakers. This is visualised by a higher F1 and lower F2 at 75% than at the previous two points. Older speakers on average exhibit a trajectory to a more peripheral position, similar to (short) [i] in Dutch [15].

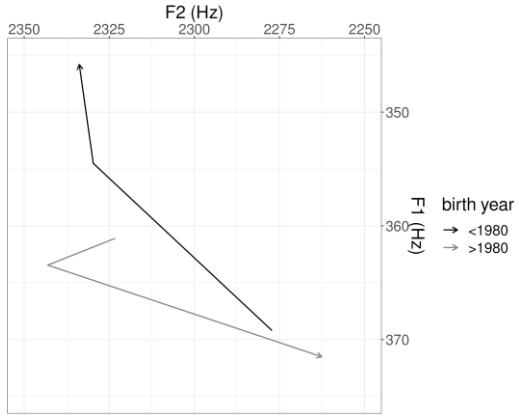

Figure 2: Average trajectory of [i:] split by generation.

	$\hat{\beta}$	SE	*t*	*p*
intercept	5.874	0.012	477.386	<0.001
byc	$-3.6 \cdot 10^{-5}$ /yr	$56.4 \cdot 10^{-5}$ /yr	-0.064	0.95
psc	-0.0254 /qrtile	0.0036 /qrtile	-7.009	<0.001
byc × psc	$9.5 \cdot 10^{-4}$ /qrtile/yr	$1.7 \cdot 10^{-4}$ /qrtile/yr	5.497	<0.001

Table 2: Summary of the linear-mixed effects model for logF1, referenced to *position* 2 (psc) and *birth year* 1963 (byc).

Table 2 shows the results of our model, specified in section 2.3. The interaction between *birth year* and *position* shows that when birth year increases, the slope for position becomes less negative (i.e., the fall of F1 becomes shallower by 0.095 percent per quartile per year, i.e., by 0.19 percent from first to third quartile in the vowel per year, e.g., by 9.5 ± 3.4 percent in 50 years). It can thus be concluded that younger speakers centralise more than older speakers, as such a diphthongised realisation goes hand in hand with an increased F1.

3.1. Effect of following consonant

In order to explore the effect of place of articulation of the *following consonant* on diphthongisation, it is included as a fixed effect (folc). In our data set, possible assimilation was not accounted for, meaning for instance that all tokens of 'tiid' were treated as [ti:t] and possible cases of assimilation of voice (e.g., [ti:d]) were ignored. As there were four consonants, we made a four-way distinction with three contrasts: alveolar (+0.5) vs non-alveolar (-0.5), labiodental [f] (-0.5) vs velar [k] (+0.5) and the two alveolars [s] (-0.5) vs [t] (+0.5). The model specification in R was:

(2) logf1~byc*psc*folc+(psc*folc|speaker)

	$\hat{\beta}$	SE	*t*	*p*
intercept	5.877	0.012	464.820	<0.001
byc	$1.9 \cdot 10^{-5}$ /yr	$58.1 \cdot 10^{-5}$ /yr	0.033	0.97
psc	-0.0228 /qrtile	-0.0045 /qrtile	-4.987	<0.001
folc-fk+st	0.0381	0.0137	2.787	0.0078
folc-f+k	0.0124	0.0123	1.011	0.32
folc-s+t	-0.0128	-0.0185	-0.695	0.50
byc × psc	$8.6 \cdot 10^{-4}$ /qrtile/yr	$2.1 \cdot 10^{-4}$ /qrtile/yr	4.070	<0.001

Table 3: Summary of the linear-mixed effects model for logF1, including *following consonant.*

As can be observed in Table 3, there is a significant effect for the following consonant. Non-significant interactions are not mentioned in the table. Alveolarity influenced F1 positively, increasing roughly 3.8% per quartile (measurement position). This rise in F1 can be interpreted as a lowering of the tongue, indicating a centring realisation. Thus, it seems that diphthongisation of /i:/ is encouraged by the alveolarity of the following consonant, confirming [3, 7]. No significant differences between the alveolar fricative and plosive, or between velar [k] and labiodental [f], were detected. The fact that these non-alveolars mostly come from read speech, while the alveolars all came from spontaneous speech, may have influenced these results.

3.2. Individual variation

The average trajectories in Figure 2 are, due to the averaging, not very insightful in the nuances of the sound change in question. Following the theories on language change [16], some speakers lead while others follow. Therefore, we explore the individual variation displayed regarding diphthongisation of [iː] in this section.

Figure 3 shows two extremes, exemplified by the average trajectories of the two young male speakers in the data set: speaker 73 (14 tokens) and speaker 113 (5 tokens). The former can be labelled as conservative, while the latter innovatively diphthongises his /iː/. As can be observed, 73 shows a centralising trajectory, realising a centralising offglide typical to Frisian [iˑə] [17, 18].

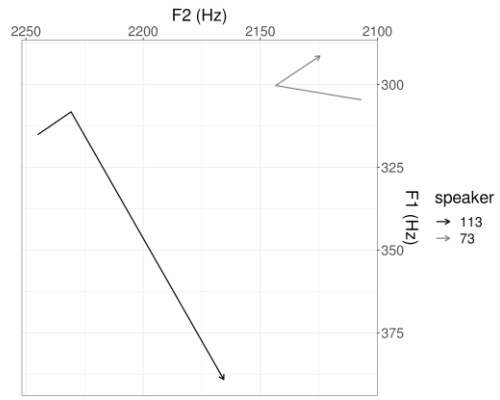

Figure 3: Average trajectory of [iː] of a conservative (073) and an innovative (113) speaker.

To further explore the individual variation of each speaker, we added up the fixed effect of position, plus each speaker's age effect ($\hat{\beta}_{byc \times psc}$ · (birth year – 1963)), plus each speaker's random slope for position, and multiplied the result by 2 to obtain the difference between the first and third quartile. Figure 4 shows a histogram of these total effects, or diphthongisation indexes, of all speakers.

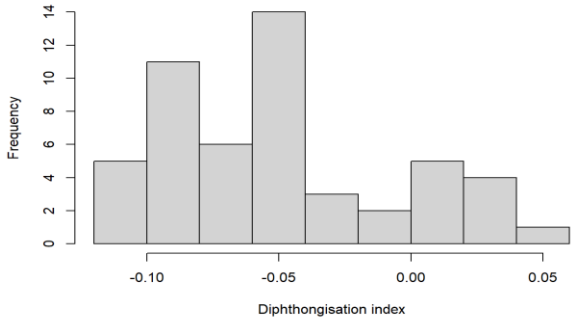

Figure 4: Histogram showing the individual variation in diphthongisation of [iː]. (n=51)

In Figure 4, we find the people that diphthongise their /iː/ to [iˑə] in the rightmost peak (0–0.05), as their realisations show a trajectory of rising F1 values instead of the conventional lowering (see also Figure 2). Speakers on the negative side of the x-axis more often have a closing trajectory typical of [iː], while speakers on the positive side more often show a centring trajectory. The fact that most speakers display a negative diphthongisation index shows us that the ongoing sound change is still in its incipient phase.

4. CONCLUSION

In conclusion, young Frisian speakers diphthongise /iː/ to [iˑə] more than older speakers, though not every young speaker participates equally in this sound change. On average, centring diphthongisation (with regard to F1) increased between 6.1 and 12.9 percent over half a century in apparent time. This diphthongisation is especially apparent before alveolar [t] and [s]. The findings regarding alveolarity ought to be viewed as exploratory, as the data were not equally spread across speech styles.

Although diphthongisation of long vowels in Frisian was already observed in 1913 [6], it is mainly present in the speech of speakers from Boarnsterhim born after 1980. Though the actuation and diffusion of sound change lie beyond the scope of this paper, we hypothesize that the (minority) language situation in Fryslân may play a role. For Frisian, both laymen and linguists commonly point to Dutch as the cause of all changes. As Dutch lacks the phonemes /iː/ and /iˑə/, and as a matter of fact lacks centring diphthongs altogether [19], attributing this sound change purely to language contact seems unsatisfactory. The sound change fits a long-standing shift in realisations of high vowels in Frisian [8]. Yet, the merger of two non-Dutch phonemes to one may be an indirect result of Dutch influence on Frisian. We plan to investigate this in the future, on the basis of the complete BHC. This will also include more analyses on the graduality of the sound change in question.

As far as other future research is concerned, most opportunities with the BHC lie in including more vowels and more consonantal contexts. Speakers recorded in both time periods of the corpus could also be investigated in order to see whether change in real-time can be observed. Nevertheless, this study serves as a stepping stone for additional research into the sound changes currently occurring in this minority language.

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[1] The first author is currently working on publishing an updated version of the corpus online.