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On variation and change in diphthongs and long vowels of spoken Dutch

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1. GENERAL INTRODUCTION

Abstract In this dissertation, long vowels and diphthongs of contemporary casual Dutch as spoken in the Netherlands are investigated. The main concern will be to discover structures in variation and interconnected changes within the Standard Dutch vowel system of the last decades. This first chapter provides an introduction and motivation for the underlying variation research; it outlines the background and summarizes literature related to the topic. After the introduction and the subject specification, a short description of the articulatory-auditory vowel space is given, followed by a discussion of the literature on the phonetic quality of the long vowels and diphthongs of the last decades.

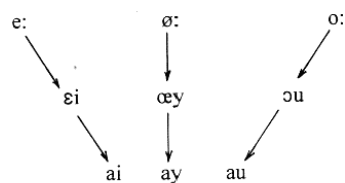
1.1 Introduction

Speech is most commonly and naturally used as an interaction medium in social settings. Along with communicating meaning, the acoustic signal is a product of physical properties and changes, as well as of more generally all those factors that form the identity of the speaker, such as social affiliation or family origin. The choice of words but also the way they are realized differs from speaker to speaker, as well as within a speaker. Even more, from an acoustic point of view, each utterance is unique.

In this study, we will concentrate on variation in the realizations of Dutch vowel phonemes. Next to variation caused by anatomical differences, the articulatory-acoustic variation between speakers often turns out to be regionally and socially structured. The objective of our investigation will be the phonetic variation between speakers that is caused by other factors than speaker-specific biological attributes of the vocal tract. In addition to this inter-speaker variation, present at a certain point in time, the sound system of a language is in a state of flux, and sounds that once were contrasted get merged and vice versa. In this research, we will consider both kinds of vowel variation: synchronic and diachronic.

The present research was triggered by the appearance of a new diphthong variant: In the beginning of the 1990's an ear-catching pronunciation in Dutch was noticed, a lowered variant of the diphthong / ϵi /. Stroop (1998 [140]) documented the phenomenon, claimed that it was primarily produced by young and highly educated progressive females, e.g. from the world of art, research, and politics, and predicted that men of the same status would soon apply the pronunciation pattern as well.

Figure 1.1: *Shift of long vowels and diphthongs in Dutch according to Stroop (1998). The first two rows show the long vowels and diphthongs of the Dutch vowel system. Here, the arrows indicate the recent movements within this vowel system, and, in the bottom row, the resulting new forms.*



Stroop stated that the standard pronunciation of the three Dutch diphthongs / ϵi , œy , ou / (also referred to as / ϵi , ay , au /) had been lowered in the late 20th century, and the phenomenon had become widespread since then. Figure 1.1 shows his perceived changes. The diphthongs / ϵi , œy , ou / are lowered to / ai , ay , au /. The lowering of these diphthongs in the articulatory-auditory space drags along the long vowels / ϵ :/, ø :/, o :/, which, by being lowered as well, fill in the empty space previously occupied by the diphthongs. Stroop named this pronunciation variant *Polder Dutch*¹, and suggested that the lowering phe-

¹ see Stroop's website <http://www.hum.uva.nl/poldernederlands>

nomenon could be the Dutch counterpart of British ‘Estuary English’. ‘Estuary English’, named after the banks of the Thames and its estuary, is expected to become the future RP (Received Pronunciation).

With the term ‘Polder Dutch’ Stroop wanted to refer to the Dutch political term *pol-dermodel*, a model of political consensus in the seventies that brought economic growth. According to Stroop, the changes in society induced by the model supported individualism and informality, and the end of authorities such as the norm ABN (Stroop, 1998 [140]). ABN, the abbreviation of *Algemeen Beschaafd Nederlands*, is the term for the Dutch speech standard, meaning ‘general cultivated or civilized Dutch’. Stroop argued that women made the most of the new possibilities and Polder Dutch started in the seventies, with women’s emancipation bringing along a looser attitude towards language norms. He also stated that, following Labov’s findings (Labov, 1994 [84]), the tendency to lower diphthongs seems to be a rather natural language change², once the prestige of a narrow articulation in the 16th century was lost. In the neighbouring languages English and German the cognates of Dutch [ɛi] or [œy] are fully open diphthongs, starting with a low vowel (compare Dutch <ijs> [ɛi] vs. English or German <ice> or <Eis> [ai], and <huis> [œy] vs. <house>, <Haus> [au]). A look at the Middle Ages reveals that these developed from long /i/ and long /u/ respectively (for Dutch see Janssen & Marynissen, 2003 [62], for English Fennell, 2001 [37]). To others than Stroop, the new Polder Dutch variety simply showed that a few patterns from rural varieties, the so-called “plat Nederlands”, found their way into (informal) Standard Dutch (Janssen & Marynissen, 2003 [62]).

Whatever the source, research confirmed the perceived change in quality of the diphthong /ɛi/ to almost [ai]. To investigate whether the lowered realization of /ɛi/ predominated in females as opposed to males, Edelman (1999 [33]) and van Heuven et al. (2002 [156]) used recordings of ‘Het blauwe licht’ (“The blue light”). The latter was then a regular TV-show where two presenters discussed a recent event, or relevant issues with invited guests belonging to the Dutch avant-garde. Having measured the magnitude of formant change between onset and offset of the guests’ diphthongs, the investigators concluded that within this homogenous group of ‘avant-garde’ speakers, the women’s diphthongs were lowered more than the men’s. For the females, their data also show longer diphthong durations, together with lowered onsets and stronger movement. The onset of the reported female variety of /ɛi/ was therefore close or even identical to the Dutch monophthong /a/ (Edelman, 1999 [33]).

Since this change in pronunciation was first noticed amongst younger well-educated women from the upper middle classes, including women working in universities, left-wing politicians, artists or authors, van Heuven et al. (2002 [156]) suggested calling it *Avant-garde Dutch* rather than Polder Dutch, as the latter might lead to the wrong conclusion of

² One of Labov’s principles of linguistic change is that “... in chain shifts, the nuclei of upgliding diphthongs fall ...” (Labov, 1994 [84], p.116).

a geographic epicentre, whereas it truly qualifies as a sociolect.

Research by van Bezooijen et al. (2001 [151, 153]) investigated how people value and differentiate speech assigned to ABN, Polder Dutch, and speech strongly affected by dialect. To the younger subjects taking part in her experiment, Polder Dutch was as highly appreciated as ABN, or even more appreciated, though it was thought of as not as "beschaafd" (cultivated) as ABN. In contrast, Polder Dutch was less appreciated among elderly people. Furthermore, young females identified themselves more with the new variety than young males.

All of these investigations suggested that for / ϵ i/ indeed a new pronunciation pattern had arisen, and that its appearance is, or at least was, sex-dependent. However, most of the above-mentioned studies on the ear-catching lowering included only speakers of the avant-garde, and investigations have been restricted to the diphthong / ϵ i/. Testing a phenomenon only where it is expected or predicted by a theory is a common procedure in linguistics, yet, one that might produce biased results. Reliable conclusions can only result from testing other assumptions included in the hypothesis as well - namely the implicit predictions for the non-target group; there is a need to find out whether the new pronunciation pattern is indeed only apparent within the avant-garde, as assumed by the previous investigators.

Investigations have been restricted to / ϵ i/, but the existence of chain shifts suggest that more vowels changed in interdependence with / ϵ i/. As an example, a vowel shift of crucial importance during the 16th century that marked the end of Middle Dutch was the diphthongization of <ij> and <uu>. Spreading from the dialect of southern Brabant and from within the lower classes of Holland, [i:] became [ϵ i], and [y:] became [α y], and the new patterns became part of later Standard Dutch. Both diphthongs had already been part of the Middle Dutch phoneme inventory. These days, <ei> and <ij> are homophonous.

Following this, other vowels might differ as well within speakers whose / ϵ i/ is lowered. The previous investigations on / ϵ i/, and the hypotheses they were based on, led to the subject of the present research; analyzing the variation – and its presumed social structure – in the Dutch long vowels and diphthongs.

1.2 Present Research Objective and Outline

With respect to Dutch vowels, the most recent realization that has been documented to diverge from a previous standard, is the pronunciation of / ϵ i/. Here, a social markedness was attributed to its lowered and more strongly diphthongized realization, as well as a sex-specific occurrence. Our first, general hypothesis will therefore be:

- The realizations of the Standard Dutch vowel phonemes show sub-phonemic variation that is socially marked.

Testing the general relation between the pronunciation pattern on the one hand, and sex, education and age on the other will clarify whether the pronunciation of ‘well-educated’ speakers indeed differs from that of other speakers, and whether the term ‘avant-garde Dutch’ matches the appearance of the pronunciation variant. Previous studies were mainly limited to the speech of avant-garde speakers. An analysis of vowel variation in larger corpora of speakers is lacking for Dutch, which gives rise to the second hypothesis of our research:

- While the well-educated (the avant-garde) have lowered / ϵi /, led by the females, the phenomenon is not apparent in other speakers.

One hypothesis in the previously mentioned studies on / ϵi / was that highly educated women lead in the lowering process. The studies of Edelman (1999), and van Heuven et al. (2002, 2003) seemed to have proved this. To test these findings, the emphasis will have to lie on both an adequate method for the analysis and comparison of vowel qualities between various speakers, including males and females. For variation research, special attention has to be paid to gender (the cultural attribute) differences contrary to sex (the biological attribute) differences. The third hypothesis is:

- Vowel space sizes (to be defined later) differ, and gender differences may be caused by anatomical differences between the sexes: When comparing realizations across speakers and sexes, a speaker’s realized vowel quality needs to be defined in relation to the size of the individual’s vowel space.

A more detailed research question is whether onset lowering, longer duration and stronger diphthongization of / ϵi / are entangled as reported in Edelman (1999) and van Heuven et al. (2002, 2003). Lowering and diphthongization are entangled in the method of measurement, whereas duration is known to be affected by sex (for Dutch vowels see Koopmans-van Beinum, 1980 [77]).

Measuring and comparing various speakers’ realizations will thus require the application of procedures for inter-speaker normalization. The latter should make different speakers’ data comparable by reducing speaker-dependent physical attributes while keeping variation without getting artifacts. A principal component analysis on bandfiltered spectra as described by Plomp et al. (1967 [117]), could be applied to variation analysis as a more objective method than formant analysis for measuring and comparing the quality of vowels. Our fourth hypothesis is:

- Principal component analysis on barkfiltered spectra are a more objective method of measurement in vowel variation research than formant analysis.

To take into account the occurrence of systematic vowel shifts, next to the analysis of / ϵi /, the pronunciation of the other Dutch diphthongs and the diphthongized long vowels will

yield a more complete picture of the pronunciation variation and vowel changes. The fifth hypothesis is:

- The long vowels and diphthongs of Dutch vary interdependently. If the pronunciation of / ϵi / is changing, the diphthongs / $\alpha \epsilon y$ / and / αu /, and the long vowels / $e:$ /, / $\phi:$ /, and / $o:$ / are, too.

A recent schematic articulatory-acoustic description of these vowels is given in figure 1.2. To find out more about speech changes in motion in general, these contemporary vowel variants will be measured and compared under aspects of speaker sex, age, and (social) background. Thus, next to investigating to what extent the pronunciation of the vowels of Standard Dutch speakers varies, factors that possibly form a speaker's pronunciation pattern will be analyzed. Hereby we expect to get further insight into the interrelation of social alteration and spoken language as one of the routes to the emergence of variety and language change. We will argue that acoustic differences in realization between speakers that are related to the speakers' background data are caused by differences in their acoustic input.

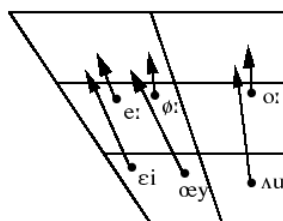


Figure 1.2: *Articulatory-acoustic schema of Dutch long vowels and diphthongs taken from Gussenhoven (1999 [43]): The beginning of each long vowel and diphthong is marked by a dot; the arrows direct to their endpoints.*

The following chapter 2 will focus on general aspects that we need to consider when acoustically measuring and comparing vowels and diphthongs. In chapter 3 a preliminary analysis of / ϵi / is provided to determine how a perceived vowel lowering can be captured acoustically. Also, it is tested to what extent vowels in the 'spontaneous speech' mode can be analyzed reliably, and whether this can be automated by a principal component analysis on barkfilters in contrast to a formant analysis. The central chapter 4 develops the method of chapter 3 to compare vowel realizations between speakers, and describes the acoustic analysis of the diphthongs and long vowels of 70 Dutch Standard speakers in relation to the speakers' background. The perception experiment presented in chapter 5 was set up to verify that the sub-phonemic acoustic differences found in chapter 4 can be perceived as well. In chapter 6 we investigate social behavior and how it is related to the appearance of variation. In that chapter we will also present literature that underlines the connection of perception and production. Chapter 7 will summarize our research on variation within the Dutch long vowels and diphthongs and its limitations, and will identify prospects.

However, first, research on variation holds that there is something to diverge from, and considering spoken Dutch, presumably, this would be a pronunciation standard. To consider (changes in) variation, in the next section, we will first gather general attributes

of the Dutch speech standard, followed by a more detailed documentation of the vowel quality during the last decades.

1.3 Literature on Dutch Long Vowels and Diphthongs

Lacking methodical acoustic analyses, descriptions of spoken Standard Dutch have usually been phonological-descriptive³, and thus strongly related to the writing system.

Considering Modern Dutch, the reciprocal relationship of standard speech and the writing system goes back to the beginning of the 19th century, when for the first time spelling rules were officially published. To keep pace with the development of spoken Dutch, spelling rules are officially changed from time to time; the last spelling reforms took place in 1954 and 1994. Since the 19th century, the main principle for written Dutch has been the striving for a phonological spelling, based on ‘educated’ speech (Janssens & Marynissen, 2003 [62]). A popular and still common definition of the Dutch spoken standard has been that this proper spoken Dutch has no traces of a speaker’s area of origin (see e.g. Jespersen, 1929 [63]).

Apart from variation in realization due to the speaker’s regional background, there is still a large variety of possible pronunciations that lie within the boundaries of this definition. Accordingly, the *Nederlandse Taalunie*⁴ defines the spoken standard as "...the varieties of Dutch spoken all over the Netherlands excluding dialects...". Due to the inclusion of variation in the definition of the standard, it is difficult to assign articulatory-acoustic categories to the phonemes of what is called the spoken standard, and any grapheme-phoneme alignment or phonological-phonetic boundaries will be abstract rather than physically clearly defined. This vagueness is central to another common definition: interpreting a standard language not as something uniform but rather as an abstraction of a usage description, an abstract norm (compare Kloeke, 1951 [74]).

In 1895, ABN, the acronym of *Algemeen Beschaafd Nederlands* was introduced as a term for the Dutch speech standard. *Algemeen Beschaafd Nederlands* means ‘general cultivated or civilized Dutch’, suggesting that people who do not speak ABN are not civilized. Politically correct or not, the term ABN implies that there is a social attribute attached to this pronunciation of Dutch, namely ‘well-bred’. The number of speakers who use ABN is reported to have grown in the 20th century (Janssens & Marynissen, 2003 [62]). If this is the case, either the number of ‘well-bred’ people increased, or the ABN pronunciation has been adopted more generally, or the criteria have become more lenient. Also, it is

³ Cf. Smakman (2006 [133]) for an extensive review on the history and definition of Standard Dutch.

⁴ These days, the Dutch, Flemish and Surinamese governments coordinate their language activities in a language union called *De Nederlandse Taalunie* (abbreviated to NTU). This Dutch union is an association established by the Dutch government and the government of Flanders. Within this policy organization, Dutch and Belgians work together on various Dutch language fields, including the standard language to be used by authorities, language education and humanities. In 2004, Suriname joined the union.

often reported that what is referred to as ABN (in terms of the Dutch speech standard) has changed over the years. With respect to the actual Dutch speech standard, an audible change has been asserted compared to the middle-class ABN of the 50's and 60's [62].

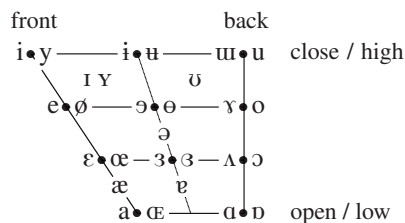
In conclusion, the following attributes were assigned to the Dutch Standard: It is the speech of the educated and 'well-bred', it has no traces of a speaker's origin, and it is in a state of flux. To account for existing variants and documented changes within the long vowels and diphthongs of Modern Standard Dutch, in the next section, previous descriptions of the Dutch vowel qualities are considered for reference.

1.3.1 Auditory-Articulatory Description of Vowel Quality

Vowel realizations are usually perceived in categories that match the phonemic system of the language one uses, and have therefore more often been described in a normative way or on the phoneme level than in terms of phonetic variation. Since many definitions of vowel quality in the Dutch phonetic literature are transcriptions based on auditory-articulatory categories, we will start with a short outline of the application of phonetic symbols and their interpretation.

Across and within languages, vowels and the symbols they were transcribed with had often been used inaccurately. More congruent transcriptions came with articulatory models of vowel production, firstly resting on x-rays. Seminal for the objectivity of vowel quality descriptions and the associated articulations were Jones's *cardinal* vowels (see Jones, 1967 [65]), a vowel system with reference to the most peripheral tongue positions as anchors of vowel articulation. After its introduction at the beginning of the 20th century, the vowel system was later implemented by the IPA⁵, where, based on a phonemic principle, a separate symbol is provided for each distinctive sound (see fig. 1.3 for the monophthongs). For a phonemic or broad transcription, the symbols are written within oblique lines; when placed between square brackets they represent a narrow phonetic transcription, encoding phonetic variation and allophones⁶ (IPA, 1999 [56]).

Figure 1.3: IPA vowels: Vertically, the schematic vowel space is based on openness and tongue height. Horizontally it is based on tongue position (fronted or backed), with the unrounded vowels to the left side of the dots, and their rounded counterparts to the right.



⁵ IPA, the acronym of the *International Phonetic Alphabet*, a notational standard for the phonetic representation of all languages, provided to the academic community world-wide by the International Phonetic Association (also IPA). The latter was established in 1886 in Paris and is the major as well as the oldest representative organization for phoneticians (with the journal *JIPA* and the conference *ICPhS*).

⁶ e.g. /axt/ versus [ʔaxt^h] for a German pronunciation of the digit 8

Although transcriptions are useful in many ways, studies are manifold that show the influence of the listener's speech background such as the size of his/her vowel inventory, and expectations on the perception of vowel categories or the assignment of phonetic symbols (e.g. Liberman et al., 1957, [89], Cohen et al., 1963 [18], Terbeek, 1977 [145], Dioubina & Pfitzinger, 2002 [29], Iverson et al., 2003 [58], Magnuson & Nusbaum, 2007 [93]). Mees & Collins (1983 [96], 2003 [21]) reported how the Dutch perceive and interpret German or French diphthongs, and their errors in pronouncing English. Cross-language discrimination studies indicate a shift from a language-general to a language-specific pattern of vowel- and consonant-contrast perception already during the first year of life (Polka et al., 1994, 1996 [119, 118]). And when trained adults' transcripts of speech (segments) across or within linguistic boundaries are compared, significant interrater differences are found, especially for narrow transcriptions (as in Shriberg & Lof, 1991 [131], or Cucchiari, 1993 [22]).

Yet, most descriptions of vowel quality are based on articulatory-auditory transcriptions, also for Dutch. This has changed only recently as methods of signal analysis became generally practicable and more easily accessible. With acoustic correlates to the transcriptions, rendition and interpretation can be objectified. (A further possibility would be articulatory measurements, but due to the sparseness of articulatory data, and the difficulties in accessing articulation, acoustic measurements of vowels have generally been preferred.)

Besides the vowels used in loanwords, and a schwa occurring in unstressed positions, Dutch is said to have twelve vowel phonemes, traditionally divided into short and long ones, plus three diphthongs (Moulton, 1962 [103], Booij, 1995 [13]). Measurements in a corpus of sentences from Dutch public news broadcasts showed the shortest mean duration for schwa, followed by short vowels, then the vowels /i/, /u/, /y/ (before /r/ they are lengthened), followed by the long vowels, and finally the diphthongs with the longest duration (Klabbers & van Santen, 2000 [71]). Though duration generally adds to the classification of Dutch vowels, it is heavily influenced by context and speech condition (cf. the following chapter). The Dutch long vowels /o:/, /e:/, /a:/, /ø:/ are said to have the corresponding short vowel phonemes /ɔ/, /ɛ/, /a/, /œ/. However, the long vowels and their short counterparts differ not only in duration but also in spectral composition, at least for /a:/. Shortening a phonemically long /a:/ resulted in the perception of the short vowel phoneme, but the opposite effect of perceiving a long /a:/ was not found when lengthening the short vowel phoneme (Nooteboom, 1980 [107]). Thus the cues for a short versus long vowel distinction must include more than duration.

Most vowel research has been carried out on the analysis of monophthongs, with diphthongs being comparatively neglected, partly as a result of traditional phonological theory (Zonneveld & Trommelen, 1980 [167]). Phonologically, diphthongs behave as monophthongs, the presence of the glide being phonemically irrelevant (Moulton, 1962 [103]).

In phonetic terms, monophthongs are often referred to as ‘single target’ vowels, since they aim at only one articulatory target gesture, whereas diphthongs require two target specifications to represent their changing nature (Lehiste & Peterson, 1961 [88]). In conventional transcription following the IPA chart, diphthongs are described by a sequence of two phonetic symbols, representing the two articulatory gestures, often with a bottom tie bar to show the phonological unity of the segments (e.g. [au] or [au]). These days, though a monophonemic transcription of diphthongs is accepted, there is a consensus that a diphthong is not a sequence of two monophthongs (Lehiste & Peterson, 1961 [88], Holbrook & Fairbanks, 1962 [52], Gay, 1968 [39], Ladefoged, 1972 [85]).

Next to the *genuine* diphthongs /ɛi/, /au/ (also referred to as /ɔu/) and /œy/ (also referred to as /ʌy/), and the aim of our investigation, Dutch is said to have some so-called *pseudo*-diphthongs /aj, oj, uj, iw, ew, yw/. Cohen (1971 [17]) proposed treating only genuine diphthongs as unitary segments. For the Belgian variant of Standard Dutch, Collier et al. (1982 [19]) found that the main difference between genuine and pseudo diphthongs, both articulatorily and acoustically, lies in the dynamics of movement. Though in an auditory-acoustic study with synthesized diphthongs, the perceptual distinctiveness between genuine and pseudo-diphthongs turned out to be less clear to listeners in Dutch, pseudo-diphthongs can be distinguished from genuine diphthongs in terms of articulatory dimensions, speech errors, and phonological rules (Collier & ‘t Hart, 1983 [20]). Also, the production of pseudo-diphthongs shows a greater rate of formant change. Regardless of the distinctions between genuine and pseudo-diphthongs, in the present study we will concentrate on the genuine diphthongs only, and on the long vowels.

Regarding diphthongs, Modern Standard Dutch begins with no longer contrasting the diphthongizations of <au> and <ou>. The stagnating pronunciation difference between these diphthongs is situated around the turn of the 19/20th century, with the last grammar in 1911 to distinguish the pronunciations of <au> from <ou>⁷ (Den Hertog, 1911 [28]). Our literature research on the long vowels and diphthongs of Modern Standard Dutch will start in the first half of the 20th century, after the pronunciation of <au> and <ou> had merged.

Though there is the Dutch *Uitspraakwoordenboek* by Heemskerk and Zonneveld (2000 [48]), unlike the German *Ausspracheduden* (Dudenredaktion, 1990 [31]) or the *English Pronouncing Dictionary* (Jones, 1997 [66]), there is no tradition of Dutch pronunciation codification or generalization of the IPA (see 1.3.1, page 8) within Dutch dictionaries. The English standard pronunciation RP (Received Pronunciation) for example, was first defined by Jones at the beginning of the 20th century by a quantitative-qualitative transcription (Jones, 1997 [66]), and a redefinition in 1990 by Wells shows the changes that

⁷ Modern Standard Dutch still encodes the two spelling variants of homophonous <au>/<ou> and <ij>/<ei> respectively, as besides the main principle of a phonological spelling, another important principle for spelling is the rule of derivation that takes into account etymological differences.

RP underwent in the course of almost a century (Wells, 1990 [165]).

To get a grip on possible changes in the Dutch standard pronunciation, we will have a look at descriptions of the qualities of the Dutch diphthongs and long vowels by several phoneticians and phonologists throughout the last century, starting with descriptions of /*ɛi*/, the object of the most recent investigations. Most of the literature on vowel pronunciation, however, does not consider aspects of social pronunciation differences, and the authors usually refer to the pronunciation of a Standard speaker without further explanation of his background.

1.3.2 Diphthong Quality

In 1928, the fronted Dutch diphthong /*ɛi*/ was described by Zwaardemaker and Eijkman as being articulated with a smaller mouth-opening and a higher tongue than the vowel [*ɛ*] (Zwaardemaker & Eijkman, 1928 [168]), thus starting with a different vowel quality than the transcription would suggest⁸. A decade later, Eijkman (1937 [34]) wrote of a tendency to widen the first part of the diphthong, [*ɛ*], to strengthen the contrast between the diphthong parts. Around the same time, the first component of the diphthong /*ɛi*/ was like the vowel sound of <bek> to Kaiser (1941 [69]).

In 1969 't Hart reported trying to find those formant combinations of vowel segments that were most suitable to represent the diphthongs. He presented fragments of diphthongs of increasing length to listeners ('t Hart, 1969 [143]) and concluded that /*ɛi*/ started with [*ɛ*], and was followed by a movement into the direction of [*i*], the usual endpoint being [*ɪ*]. The same can be taken from a short and speaker-specific acoustic description of Dutch diphthongal qualities of three speakers by Pols (1977 [121]). Based on a PCA on spectral bands the starting point for the diphthong /*ɛi*/ is in the close area of the speaker's /*ɛ*/.

To Nooteboom (1976 [106]), /*ɛi*/ moved from a position before [*ɛ*] in the direction of [*ɪ*], thus presumably starting a little lower than [*ɛ*]. Thus, compared to Zwaardemaker and Eijkman's description of an articulation closer than [*ɛ*] in the 1920's, a lowering of the first part of /*ɛi*/ is described. Yet, for want of reference, all descriptions are difficult to compare and should be interpreted with caution.

The variation (over time) in the descriptions concerning the components of the diphthong /*ɛi*/ is also apparent for the other two diphthongs /*au*/ (also referred to as /*ɔu*/), and /*œy*/ (also referred to as /*ʌy*/). Similar to his description of /*ɛi*/, Eijkman (1937 [34]) stated a tendency to articulate [*ɔ*] more open ([34]). In 1949, Kaiser put the first components of the diphthongs of <ei>, <ou>, <ui> (/*ɛi*/, /*au*/, /*œy*/) on a par with Dutch <bek>, <hok>, and English <up>. Also, she assigned the first part of the diphthong of Dutch

⁸ Zwaardemaker and Eijkman (1928 [168], p.155): "[*ɛɪ*] – Het eerste deel van dezen tweeklank heeft gewoonlijk een eenigzins hooger en vóórtoon dan de enkele klinker [*ɛ*]. Dit wordt het gemakkelijkst verkregen door den mond ietwat minder open te doen en daarbij de vóórtong wat meer op te heffen." ... "Onbeschaafd klinkt [*ɛɪ*] voor [*ɛɪ*], b.v. in het Leidsche dialect: [*kɛ:k sɛ:m*] (kijk hem eens)."

<bruin> and French <brun> the same vowel quality, both cases showing an identical vowel that undergoes a resonatory change (Kaiser, 1949 [69]). The same is said about the diphthong of Dutch <jasmijn> and French <jasmin>. Again, with little reference, especially for the French/English counterparts, the descriptions are difficult to interpret.

Moulton (1962 [103]) commented on differences in the degree of diphthongization of the diphthongs. He described the three diphthongs /ɛi, œy, au/ as ‘strongly’ diphthongal; all second vowels being allophonically non-syllabic. He mentioned that the pronunciation of the diphthongs is considered ‘substandard’ when /ɛi, œy, au/ are diphthongized too weakly.

Besides the diphthong /ɛi/, previously mentioned, ‘t Hart analyzed the diphthongs /au/ and /œy/, and stated in 1969 that /au/ started with [ɑ] and was followed by a movement in the direction of [u], the usual endpoint being [o]. His analyses showed that the first part of /œy/, often referred to as /ʌy/, was normally unrounded: /œy/ started with [ʌ] and was followed by a movement in the direction of [y]; the usual endpoint was [ø]. Unlike the long vowels /e:, ø:, o:/, the diphthongs /ɛi, œy, au/ could not be synthesized satisfactorily by a single homogenous spectral composition (‘t Hart, 1969 [143]). Several years later, to Nooteboom (1976 [106]), /œy/ moved from a position before /ʌ/ (as in English <but>⁹) to /y/, and /au/ from a position before /a/ in the direction of /u/.

As mentioned before, all descriptions are difficult to interpret for want of an (acoustic) reference. Yet, several Dutch vowel descriptions come up with acoustic data, such as the early detailed acoustic investigations of Dutch vowels by Pols et al. (1973 [122]), and Van Nierop et al. (1973 [157]). Most of these, however, focus on monophthongs (see e.g. Koopmans-van Beinum, 1980 [77], van Son, 1993 [158], Weenink, 2006 [164]).

A recent official transcription of the vowel system of Dutch can be found in the Handbook of the IPA from 1999 (Gussenhoven, 1999 [43]), of which the long vowels and diphthongs are displayed in figure 1.2, page 6, all with a closing movement (moving towards a closer tongue position). Except for /e:/, the description is consistent with the description of Mees & Collins in 1983 [96], where /e:/ is located slightly higher. Also, the diphthong movements (arrows) go a little less far in the description from 1983.

There are two articulatory-acoustic descriptions of the long vowels and diphthongs, 20 years apart, which we will compare in the following. Figure 1.4, p. 13 shows a formant plot of the Dutch vowels of an ABN-speaker¹⁰ after a graph by Koopmans-van Beinum, 1969 (p. 250 [75]). Her representation is comparable to a graph by Mol (1969 [101]), pub-

⁹ When describing the quality of [ʌ], Dutch authors often referred to the vowel of English <but>. The interpretation of the symbol [ʌ] following IPA is a lower back vowel. It is doubtful whether the vowel of English <but> was still a lower back vowel [ʌ] in the 1970’s. In Daniel Jones’ (1967) English vowel space for example, [ʌ] is placed more central in the vowel space than its assigned place in the IPA-vowel chart. The symbol [ʌ] was probably used inappropriately as a transcription for the corresponding Dutch sound to the English vowel of <but>.

¹⁰ refer to subsection 1.3, p. 7 for ‘ABN’

lished in the same collection. Additionally, it includes data on the formant movement of the long vowels /e:/, /o:/, /ø:/ (in the figure, 'ö' represents /ø:/). The original figure furthermore included arrows to indicate the movement of the vowels when appearing before [r], where all move towards [ə]. Effects of coarticulation on vowel quality and further factors (e.g. suprasegmentalia) will be considered in the next chapter. In figure 1.4, the formant values of the same Dutch vowel phonemes taken from the sound files of the 1999 IPA-handbook¹¹ have been added in grey. With some caution since the two male speakers' vowel space sizes differ, it can be seen that diphthongization has increased for the diphthongs, and the onset of /au/ ('ou') has become centralized.

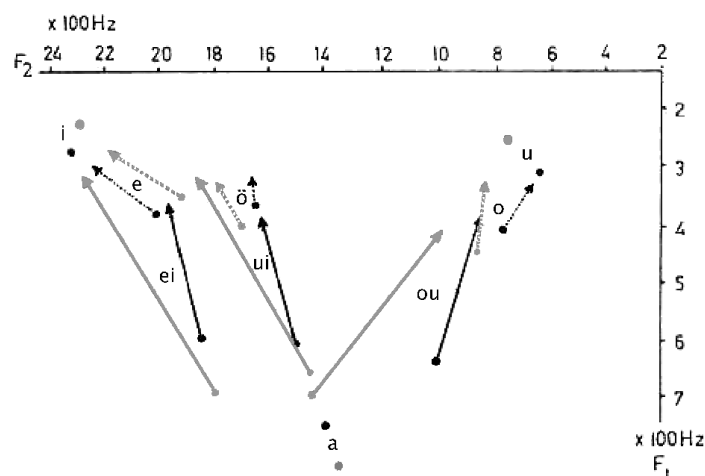


Figure 1.4: Dutch vowel system after the figure of Koopmans-van Beinum: In black the vowels of a male speaker measured by her in 1969, in grey the measured values of the vowels uttered by Gussenhoven for the IPA-handbook 30 years later. The thick arrows show the formant movements of the three diphthongs /*ei*/, /*œy*/, /*au*/ ('*ei*', '*ui*', '*ou*'); the dotted arrows show the movements of the three long vowels /*e:/*/, /*ø:/*/, /*o:/*/ ('*e*', '*ö*', '*o*').

In 1999, as mentioned in section 1.1, Edelman (1999 [33]), and van Heuven et al. (2002 [156]) found a lowered variety of /*ei*/ with stronger diphthongization to predominate within avant-garde females. The most recent acoustic descriptions including Dutch long vowels and diphthongs are by Adank (2003, 2004 [1, 2]) and Smakman (2006 [133]). Smakman stated that in his corpus of male news readers, recorded from 1950-1990, the degree of diphthongization of /*ei*/, /*œy*/, /*au*/ has been stable, though some of his speakers showed slightly lowered first elements. In Adank's research on normalization procedures for variation research, she investigated the vowel qualities of read speech, secondarily considering diphthongs. Contrary to Edelman (1999 [33]), van Heuven et al. (2002 [156]), and Smakman (2006 [133]), her male speakers diphthongized more than the females. However,

¹¹ see <http://web.uvic.ca/ling/resources/ipa/handbook> for corresponding sound files

the investigators used different methods of formant normalization, which compromises a comparison of the results (in chapter 2 we will consider methods of normalization).

In sum, the phonetic descriptions of /ɛi/, /œy/, and /uu/ differ in terms of the diphthongal quality and the diphthongs' starting positions in the vowel space. Similar to the Dutch diphthongs, the next section will show that variation is apparent in the descriptions and transcriptions in the phonetic literature on the Dutch long vowels /e:/, /ø:/, and /o:/ as well.

1.3.3 Long Vowel Quality

The Dutch long vowels /e/, /ø/, and /o/ are traditionally transcribed as steady-state vowels, though being realized slightly diphthongized (compare fig. 1.2, p. 6, and figure 1.4, p. 13). To differentiate them from the short vowels, they are usually noted with a length attribute, /e:/, /ø:/, /o:/.

In 1937, Eijkman described a tendency to make 'unreal' diphthongs of long and tense /o:/, /e:/, /ø:/: The diphthongal character showed up as a slight front-upwards movement for [e], and as a little more rounding for /o:/ and /ø:/ (Eijkman, 1937 [34]). According to van de Velde (1996 [154]), the slight diphthongization of /e:, ø:, o:/ started in the 1920's.

Mees and Collins (1983 [96]) mentioned that in 1877, /e:/, /ø:/, /o:/ were noted as being unusual with diphthongal glides, whereas in 1962 a moderately diphthongal quality was mentioned (Moulton, 1962 [103]). However, the pronunciation was considered 'substandard' when diphthongized too much. Accordingly, in 1962, Blancquaert transcribed [ɛɪ] for /e:/, and [ɔu] for /o:/ with some dialects of Brabant (Blancquaert, 1962 [11]).

A few years later, Koopmans-van Beinum (1969 [75]) described the measured diphthongal quality of separately uttered /o:, ø:, e:/ as follows: after a constant beginning, [ɔ] moves in the direction of [u], [ø] in the direction of [y], and [e] in the direction of [ɪ] or [i] (compare figure 1.4, p. 13).

Also in 1969, 't Hart concluded after his speech perception experiment that the first part of /e:/ was identified as [ɪ], followed by a change towards [i]. /ø:/ started as [œ], then changing to [y]. /o:/ started as [ɔ] then changing to [u] ('t Hart, 1969 [143]). However, he also stated that to listeners, the long vowels /e:, ø:, o:/ could be synthesized satisfactorily by a single homogenous spectral composition.

In a phonetic description from 1983 (Mees & Collins [96]), the long vowels /e:/, /ø:/, and /o:/, referred to as 'potential' diphthongs, were alluded to as retaining a narrow glide within conservative Standard Dutch (ABN), but being realized increasingly wider (diphthongized more strongly) by younger mainstream speakers of Standard Dutch (see also Collins & Mees, 2003 [21]). To Mees and Collins, the strength of diphthongization is regionally and socially marked: While steady-state realizations were said to be restricted to areas outside the central conurbation of the Netherlands, the popular speech in the central

conurbation (the 'Randstad' speech) was mentioned to be socially marked by wide diphthongs [96]. This view has recently been adopted by Stroop (1998, 2003 [140, 141]), who said both the diphthongs and long vowels have been diphthongized and lowered, and that the lowering is socially marked. On the assumption that news readers reflect the standard speech, Van de Velde (1996, 2001 [154, 155]) investigated the variation and change in the spoken Dutch of male presenters of the years 1935 to 1993. Within these speakers, he found the pronunciation of /o:/ and /e:/ to change from monophthongal to diphthongal from 1935 to 1993.

Peeters (1991 [113]) referred to the long vowel phonemes /e:/ and /o:/ as "/e(i)/" and "/o(o)/", suggesting they are diphthongized to a certain amount but not lowered.

The slightly diphthongized quality has thus been perceived for decades (Moulton, 1962 [103], Mees & Collins, 1983 [96], Booij, 1995 [13]). Since the diphthongization of the mid vowels has been mentioned for so long, Smakman (2006 [133]) argued that a change in progress in the degree of diphthongization is exaggerated. In his corpus of seven news readers as representatives of Standard Dutch, all except one recorded in the 1990's, the females showed stronger diphthongizations for /e:, ø:, o:/ than the males. In Adank's read corpus (2003 [1]), the females did not differ from the males in terms of diphthongization, though the females' long vowels started at lower onset positions.

So, today, the status of the long vowels is still uncertain, and the reported reluctance in attributing a certain diphthongal quality to /e:/, /ø:/, /o:/ indicates on the one hand co-existing variation, such as regional or social variants (e.g. suggested by Mees & Collins, 1983 [96]), whereas on the other hand a change in quality over the decades is reflected (following van de Velde (1996 [154])). The different modes of speech that have been used for the studies hinder a clear definition of recent and previously existing vowel qualities (see Koopmans-van Beinum, 1980 [77] for effects of speech mode on vowels). Except for Edelman (1999) and van Heuven et al. (2002) who used spontaneous speech, the speech mode was read or semi-spontaneously carefully pronounced syllables. For American English, early studies already showed that vowels which are used to describe diphthongs do not necessarily reflect the measured formants of the vowel targets (Lehiste, 1961 [88], Potter & Peterson, 1964 [125]). Concerning Dutch vowels, the findings were similar: In spontaneous speech, variability is very large, and the vowel positions indicated by the phonetic transcriptions are not reached by the three long vowels (compare Pols, 1977 [121]). However, the variation in the literature seems to be limited to differences in the degree of diphthongization, whereas there is not much variation in the descriptions of the long vowel onsets. In the previous section, variation had also been assumed when the phonetic descriptions of /ei/, /au/ and /æy/ were compared in terms of their diphthongal quality. Contrary to the long vowels, variation was found both in the diphthongs' starting positions in the vowel space as well as in terms of diphthongization.

1.4 Summary

Triggered by recent findings of socially structured variation in the pronunciation of the Dutch diphthong /*ɛi*/ ('Polder Dutch'), our objective is the analysis of variation in the long vowels and diphthongs of Standard Dutch. Even when excluding regional accents, variation is still included in the Dutch Standard pronunciation. The previously indicated effect of social background (section 1.3) on the pronunciation pattern has not yet led to a consistent speaker control when the pronunciation of Dutch is reported or measured. The understanding of the necessity to control the speaker background is a rather recent development in phonetics, and for Dutch, the social markedness of diphthongs as described by Mees and Collins (1983 [96]) has only been revived some years ago.

The transcriptions and descriptions of the vowel qualities of /*e:*/, /*o:*/, /*ø:*/, /*ɛi*/, /*au*/, and /*œy*/ indicate changes in realization through the years as well as synchronous vowel variation. Whereas for /*e:*/, /*o:*/, /*ø:*/ the differences in the various transcriptions seemed to be limited to the degree of diphthongization, with little variation in the descriptions of the long vowel onsets, the phonetic descriptions of /*ɛi*/, /*au*/ and /*œy*/ vary in terms of their diphthongal quality and as well in their starting positions in the vowel space.

However, many studies show that transcriptions are affected by the transcriber's own background, and accordingly, variation research that is based on transcriptions of vowels is probably not very reliable, especially when it comes to phonetic detail and differences within phoneme categories. Besides inter-speaker differences in the perception of vowel quality, unknown speaker backgrounds or homogenous speaker data, the usual falling back on traditional ways of transcribing the vowel categories (the strong relation to the writing system), and thereby neglecting potential changes, make an interpretation more complex. To disentangle all effects, different speaker groups should be formed and the vowel realizations of /*ɛi*/, /*au*/, /*œy*/, /*o:*/, /*e:*/, and /*ø:*/ should be compared within and between these groups.

As a more objective approach to vowel quality, we prefer an analysis of spontaneous speech within the (articulatory-)acoustic domain. However, though probably being the more objective method in vowel variation research, assessing the vowel quality in acoustic terms brings difficulties as well, even more when analyzing spontaneous speech.

The next chapter describes how vowel quality is measured in acoustic terms, problems that occur in measuring and comparing spontaneous speech data, and the complexity of matching the acoustics of a vowel with the perceived vowel quality.