

VOWEL REDUCTION IN SPONTANEOUS SPOKEN DUTCH

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ABSTRACT

This paper reports on a study of vowel reduction in contemporary Standard Dutch. The focus is on the first, unstressed syllable of four bisyllabic Dutch words: *moment*, *manier*, *probeer(t)* and *docent*. Vowel reduction is studied in a corpus of spontaneously spoken Standard Dutch, produced by 80 Flemish and 80 Dutch teachers of Dutch. Three labelers independently evaluated and scored the stimuli on a seven point scale with 'long vowel' and 'complete deletion' as its extreme values. Three main types of vowel reduction were distinguished: reduction to schwa (e.g. *moment* > $m[\text{ə}]ment$), vowel shortening (e.g. $m[\text{o}]ment$ > $m[\text{ɔ}]ment$) and complete reduction (e.g. *moment* > 'ment). Short vowels appeared to be most frequent, especially in Flanders. Reduction to schwa and complete reduction only occurred in the Netherlands. The Dutch material also supports the assumption that in high-frequency words vowels are more easily reduced than in words with a lower frequency.

1. INTRODUCTION

Much phonetic research is based on analyses of short, isolated utterances that are read aloud by selected speakers. Obviously, the choice to look at such highly restricted kinds of speech materials is to a large extent motivated by methodological considerations, given that such data can be studied in a controllable and manageable way. However, one could question to what extent inferences based on this kind of 'lab' speech generalize to 'real' speech, since read-aloud utterances, produced out of context, may not be representative of casual speech production. As a matter of fact, particular phenomena that are typical for spoken language as it is used as a vehicle of human communication have long time been understudied,

simply because they did not occur in controlled types of speech ([8]).

One counterexample, which did attract some scholarly attention in the past (e.g. [7,9]) and which will also be the topic of the current paper, is the case of vowel reduction, which is often considered to be a typical correlate of a 'casual' speaking style, and has been studied in quite a number of languages. Vowel reduction has often been equated with spectral reduction (more schwa-like pronunciation of vowels); however, as we will see below, it can also be defined more broadly, and also comprise vowel shortening and even complete vowel deletion. Thus, in the remainder, in our study of spontaneous spoken Dutch, we will therefore distinguish: (i) reduction to schwa (e.g. *moment* > $m[\text{ə}]ment$), (ii) vowel shortening (e.g. $m[\text{o}]ment$ > $m[\text{ɔ}]ment$) and (iii) complete reduction (e.g. *moment* > 'ment). The goal of the current paper is to gain insight into regional and lexical factors that determine the occurrence of vowel reduction. The following section first briefly summarizes how vowel reduction has been dealt with in both prescriptive and descriptive approaches to the pronunciation of Dutch.

2. BACKGROUND

Vowel reduction has been studied to some extent in the Dutch phonological literature, though the focus has very much been on reduction to schwa, while complete deletion has only marginally been discussed ([3]). Reduction to schwa is claimed to be a phenomenon which applies most clearly to unstressed syllables that end in a vowel ([2,4]). In addition, this type of reduction is more likely for syllables which contain vowels that are [-high], such as /a/, /o/ and /e/, whereas it would occur more rarely for vowels such as /i/, /y/ and /u/. In addition, there are claims that the probability for such reduction is lexically determined, as more frequent words are more likely to

have reduction to schwa. Vowel shortening, used as a term to explain a change from /a/ to /a/ ([5]) has also received some attention. Shortening would most strongly occur in word-initial position in syllables without major word stress, especially when the second syllable in a 3-syllabic word is reduced to schwa (like in 'politiek'). Note, however, that the use of the term 'vowel shortening' is not unquestionable, since –phonetically– some vowels, that are claimed to be 'long' in a phonological description, are often 'short' when their actual duration is measured ([6]).

Vowel reduction has also been treated in more normative approaches to language, e.g. in various pronunciation guides developed for Flanders and/or The Netherlands. As with the phonological descriptions above, in the vast majority of the cases, the comments in these books are related to reduction to schwa, far fewer comments are concerned with vowel shortening, whereas vowel deletion gets almost no attention. The picture that emerges from these normative approaches is that in the Netherlands there is relatively more tolerance for different forms of reduction than in Flanders, especially when relatively recent publications are compared.

What is clearly missing in both descriptive and prescriptive approaches to vowel reduction is an empirical basis. Therefore, the goal of this paper is to gain more insight into the frequency of different types of vowel reduction in the two countries, by means of a detailed analysis of a larger corpus of spontaneous speech. The general hypothesis to be tested is that the pronunciation of words, especially when they are produced in this speaking style, can diverge considerably from what is prescribed in pronunciation guides, and that such deviations can be regionally determined, given that the guides that circulate in Flanders and the Netherlands express different views on what is considered to be a 'good' pronunciation, especially in that there is more tolerance in pronunciation in the Netherlands. In addition, we will explore whether different types of vowel reduction are also lexically determined, taking into account the relative frequency of words.

In the following sections, we will describe the speech corpora, the selected words, and the labeling procedure, and then the actual results and a discussion.

2. METHOD

5.1. Speakers

The data were collected from 160 native speakers of Dutch, 80 from the Netherlands and 80 from Flanders. These speakers were selected on the basis of their regional background, age and gender. All informants were teachers of Dutch working at a high school situated in cities in Flanders and the Netherlands which were comparable in terms of their population density and their "social" function. The latter was determined on the basis of the

number of services the city provides (such as schools, shops and hospitals). The cities differed in that they were located in different regions of the two countries (4 in Flanders, 4 in the Netherlands), in which different dialects of Dutch are spoken. In Flanders, the regions were (1) Antwerp/Brabant, (2) Belgian Limburg and the provinces of (3) East-Flanders and (4) West-Flanders; for the Netherlands, the selected regions were: (1) North (Groningen, Drenthe), (2) Center (Gelderland, Utrecht), (3) West (Randstad) and (4) Dutch Limburg. Out of each of these regions, 20 speakers were selected (10 male and 10 female) in two age categories, labeled as "old" (born before 1955) or "young" (born after 1960 in Flanders, born after 1958 in the Netherlands)

5.2. Speech materials

The speech data of interest here were collected from conversations of minimally 15 minutes between the selected speakers and two interviewers (one for the Netherlands, one for Flanders). The latter were instructed to interfere as little as possible so that the speakers could talk freely, but they could guide the interview by means of a list of topics they could use as a source of inspiration. All the conversations were first recorded with an AKG C420 headset with condenser microphone on a dat-recorder, and later digitized in a computer with a 16 kHz sampling frequency. From these conversations, we first selected 813 instances of 3 words: *manier* (manner) (236 cases), *moment* (moment) (291 cases), and *probeer* (try) (286 cases). The selection of these words was based on the fact that they have a comparable prosodic structure: they all consist of two syllables with the first syllable ending in a long vowel and the main stress on the second syllable. In addition, the CELEX frequencies ([1]) for these words are all high, 14107 (*manier*), 11452 (*moment*) and 2179 (*probeer*). The words were isolated from their context and saved as separate speech files for further analyses. Finally, for comparative reasons, we also analysed the word 'docent'. Though it has the same syllabic structure as the other words, it does not suit our research purposes equally well, since it is used only by speakers from the Netherlands, it is infrequent (81 cases, CELEX-frequency: 222), and is more formal than the other words.

5.3. Labeling of vowel reduction

Given that it is not always easy to decide on (the degree of) vowel reduction and given that it would have been too time-consuming (and not necessarily more reliable) to analyse all individual speech data acoustically, we applied the following procedure to label our data in terms of vowel reduction. Using a specifically developed labeling tool, three labelers (three of the authors) independently scored all recorded words in terms of a 7-point scale, with "long

vowel” and “complete deletion” as the extreme values, and various in between categories such as “short vowel” and “short vowel/schwa” (see figures below). There was an additional option to mark a word as “unrecognizable” if the word could simply not be understood. Each labeler got a different randomly constructed list of words. The results that are reported in the next section are based on the analyses of words that got the same label by the three labelers, or on words where one labeler differed from the other two by only one point on the scale. Using this procedure and excluding the words that were scored as “unrecognizable” by at least one of the labelers, we could retain 549 words (67.5%), out of the original 813 stimuli.

3. RESULTS

The results section is organized as follows. First, we will present overall results for the different types of reduction. Then, we will look whether these frequencies differ for the two regions we investigated. Finally, we will explore whether there are important differences between words.

Table 1: *Distribution of different reduction types*

	Total	
	N	%
1. long	8	1.5
2. long/short	46	8.4
3. short	373	67.9
4. short/schwa	26	4.7
5. schwa	38	6.9
6. schwa/zero	10	1.8
7. zero	48	8.7
Total	549	

Table 1 gives an overview of the results, when the data for the two regions are collapsed. It is clear that all possible realizations of the vowels occur in our corpus, but that short vowels are most popular. A first striking results is that the long vowel realization, though being prescribed in various pronunciation guides, is very rarely used. When we include the factor region in our analyses, it appears that Flanders and the Netherlands show quite different results (Pearson $\chi^2 = 199.89$, $df=6$, $p < 0.01$) (see Figure 1). It can be seen that, in both countries, the short vowel is most frequent, in line with what can be observed in Table 1. However, the figure shows that this preference is much stronger in Flanders than in The Netherlands (86.8% versus 36.7%). In other words: whereas Flemish speakers almost exclusively choose this short variant, the variation in vowel realization is more distributed for the speakers from the Netherlands; in the Netherlands the whole spectrum of realizations is represented. If we look at results for each word separately, it becomes clear that the

variation is also lexically determined. Table 2 lists the different realizations for each word. The short vowels appear to be most frequently used, but this is most clearly the case for ‘probeer(t)’. The regional differences between Flanders and The Netherlands, which were already clear from looking at Figure 1, become even stronger when the distribution in vowel reduction per word is listed for each region separately (see Table 3).

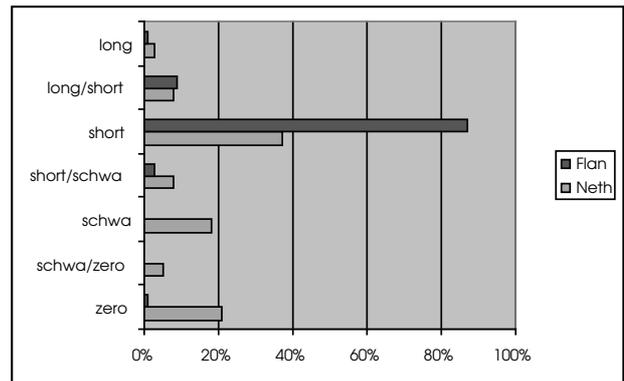


Fig. 1: *Distribution of reduction types per word per region*

The distributions are significantly different from chance for the two countries (Netherlands: Pearson $\chi^2 = 216.7$, $df = 12$, $p < 0.01$; Flanders: Pearson $\chi^2 = 22.3$, $df = 8$, $p < 0.01$). In Flanders, ‘manier’ is almost exclusively produced with a short vowel, whereas the speakers from the Netherlands tend to use more schwa-like vowels. The difference in realization is even more clearly visible for ‘moment’, which are again most often produced with a short vowel in Flanders, but the vowel is completely deleted when the word is produced by speakers from the Netherlands. The realizations for probeer(t) are similar in both regions.

Table 2: *Distribution of reduction types per word (explanations of codes: see Table 1)*

	manier		moment		probeer(t)	
	n	%	n	%	n	%
1	0	0	3	2.1	5	2.2
2	4	2.2	15	10.4	27	12.1
3	107	58.8	78	54.2	188	84.3
4	23	12.6	0	0	3	1.4
5	38	20.9	0	0	0	0
6	4	2.2	6	4.2	0	0
7	6	3.3	42	29.2	0	0
Total	182		144		223	

A comparison of these findings with the CELEX frequencies reveals that frequency can partly explain the

patterns in vowel reduction, but only so for the Netherlands. Vowels in more frequent words such as ‘manier’ and ‘moment’ are more often reduced, as opposed to ‘docent’, which is relatively infrequent, and almost never realized with a schwa-like production. An additional phonetic factor is the phonetic environment in which the vowel occurs. That is, vowel reduction occurs more often in syllables whose vowels appear in between consonants that are (nearly) identical (‘moment’, ‘manier’), which could possibly lead to a more continuous articulation, as opposed to a vowel that appears in between dissimilar consonants as in ‘probeer(t)’. More research to separate the contribution of these factors is needed here.

Table 3: *Distribution of reduction types per word per region (explanations of codes: see Table 1)*

score	<i>manier</i>		<i>moment</i>		<i>Probeer(t)</i>	
	VL	NL	VL	NL	VL	NL
1	0	0	0	3	2	3
2	4	0	6	9	20	7
3	102	5	52	26	143	45
4	6	17	0	0	3	0
5	0	38	0	0	0	0
6	0	4	0	6	0	0
7	1	5	3	39	0	0
Total	113	69	61	83	168	55

4. DISCUSSION

In this paper, we have shown that vowel reduction is highly frequent in spontaneous standard Dutch, but it also clear that the variation is regionally and lexically determined. One remarkable result is the fact that the long vowels, or long/short vowels, were rather infrequent, for both regions. This general finding leads to the conclusion that the prescriptions found in Dutch and Flemish pronunciation guides have so far not been very successful. This result is also in conflict with standard phonological descriptions in which it is argued that short vowels cannot occur in open syllables ([10]). The advice to avoid vowel reduction, as it has been advocated in the guides, may to some extent be dictated (implicitly) by a concern to have clearly separable vowels, that are maximally different in terms of their spectral features, so that they can more easily be distinguished by listeners. This perceptual constraint, however, is in conflict with the speaker’s tendency to produce words with minimal articulatory effort, leading to more schwa-like productions or even a complete deletion of vowels, which in turn increases the perceptual processing load. Note that quite a number of words, when presented without context to the 3 labelers, were simply unrecognizable for them. Related to this

issue, it would be interesting to learn more about the effect of the lexical and the prosodic context in which the various instances of the words occurred: some preliminary observations of the data reveal that reduction is more likely when the words occur in standard expressions such “op een gegeven moment” (at some stage).

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