

The measurement of Dutch dialect change in the sound components

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Abstract

In this paper we study the development of koines ('regiolects') and other intermediate varieties out of traditional local dialects, using phonetic transcriptions of newly collected dialect recordings of representative Dutch dialects of 20 locations in the Netherlands and the northern part of Belgium, which have been made in 2007/2008. For each site an older male and a younger female speaker are recorded, representing conservative and innovative speakers respectively. We measure dialect change at the levels of the lexicon, morphology and the sound components. Changes in the sound components have been measured with Levenshtein distance.

We found that the distances among dialects have significantly decreased at the level of the sound components, and that the 20 dialects have significantly converged towards standard Dutch. Dialects which were distant to standard Dutch converge more strongly to standard Dutch than dialects which were more closely related to standard Dutch. Considering dialect change, we found that the lexical level is affected most strongly.

Future work will involve a web-based perception experiment based on the newly collected recordings. Subjects will judge distances between their own dialect varieties and the varieties they hear in the experiment.

1. Introduction

The last two decades have seen an upsurge of studies on the mechanisms underlying dialect convergence and divergence (cf. Auer, Hinskens & Kerswill eds. 2005 for an overview), both across dialects and between dialects and the related standard variety. Most of these studies share most of the following characteristics:

- a) attention is focused on one or a few selected dialects;
- b) the language system is studied through data from dialect production;
- c) one or several selected dialect features are analysed;

d) the analyses are typically based on the apparent time approach to language change and findings are usually compared to available (and often static) descriptions of related dialects.

In this contribution, a study will be presented which complements this type of work in that

ad a) over 80 different dialects, evenly spread over the Dutch language area, are studied and compared;

ad b) for each single dialect, data for both production and perception are systematically collected and analysed;

ad c) the analyses encompass major parts of the phonetics, phonology, morphology and lexicon of each dialect;

ad d) a range of dialectometrical and statistical techniques are applied to sort out the relevant patterns in the data.

The main research questions, the methods and some first findings¹ will be introduced here. As this contribution gives an interim report on a work-in-progress, only part of the planned study can be discussed in the following pages. Section 2 discusses the questions regarding the changes in the dialect systems and, specifically, the production data in which these are being unearthed in this project. Subsection 2.1 gives a brief overview of the methods used for collecting and analysing the relevant data, and in subsection 2.2 some first findings are discussed. The preliminary conclusions from the outcomes of the available data for this part of the project will be briefly discussed in section 2.3. In section 3 the questions which guide the study of perceptual aspects of the changes from dialect to ‘regiolect’ are presented, i.e. a koineised, supralocal variety which was not originally spoken in any single village or city in the region; subsection 3.1 gives a brief overview of the ways in which the relevant data will be collected and analysed, while subsection 3.2 shows how the hypotheses will be operationalized. Section 4 offers some speculations regarding the significance of possible outcomes of the comparison of the production and perception data.

2. Changes in the dialect systems

In this paper we study dialect change at the level of the sound components. Our analyses of processes leading to the convergence and/or divergence of dialects concern the following five research questions: First, do dialect varieties change? If so,

which dialects change most? Second, to what extent do dialects converge towards or diverge from each other? Do they mainly converge towards each other, thus leading to the development of regiolects? Third, do dialects converge to standard Dutch? Fourth, what are the main predictors of dialect change? Fifth, which level is affected most strongly: the lexical level, the morphological level or the level of the sound components, and how are the changes in these levels related to each other?

2.1. Methodology

In section 2.1.1 we will sketch the procedures used to collect the data in the fieldwork. In section 2.1.2 we will discuss the measurement techniques which were applied to the data as a first step towards answering the research questions.

2.1.1. Collecting the dialect data

For this project, data are being collected for 80 different dialect varieties which are scattered regularly over and representative of the major Dutch dialect areas. The Dutch dialect area comprises both the Netherlands and the northern part of Belgium. For each village both two old males (between 60 and 80 years old) and two young females (between 20 and 40 years old) were recorded. In general, the speech of young speakers tends to be more innovative than that of old speakers. The difference may be stretched even further by making a distinction between males and females since, according to Romaine (1984: 113), “women consistently produce forms which are nearer to the prestige norm more frequently than men.” Labov (1990: 206) writes: “In the majority of linguistic changes, women use a higher frequency of incoming forms than men” (see also Chambers [1995: 102-103]).

As a basis for the recordings, an episode of the Charlie Chaplin movie “The Kid” is used. This episode is about a neighbourhood where many windows are suddenly broken. By chance (or so it seems), a glazier is walking around in the same area; he is very willing to repair the windows. A policeman tries to find out why so many windows have been broken in such a short time. He sees a little boy throwing a stone. The policeman realizes that the glazier told the child to do that; he tries to catch both the glazier and the kid, but does not succeed. The story was presented with stills from the movie as well as in narrative (a 175-word summary of the episode). The episode may be considered a cross section of daily spoken language. We established

the episode by means of a written standard Dutch text. The text consists of 175 word tokens and 105 different word types.

When the male informants are being recorded, they first write a translation of the text in their own dialect independently of each other. Second, the males compare their translations and discuss the differences. For each difference, they must decide amongst them which alternative is best. They write a third translation, which might be seen as a consensus translation which both agree on. Finally, the two males read the text aloud. For the females the same procedure is applied.

In order to measure dialect change we make phonetic transcriptions of the recordings. For both groups, old males and young females, two recordings are available. Since making transcriptions is time-consuming, we transcribe only one recording per group. When selecting a recording, we favour the speaker who is most autochthonous, has the clearest voice and reads the text most fluently. The transcriptions are made in IPA and digitized in X-SAMPA.

2.1.2. The measurement techniques applied

Linguistic distances between dialects are measured with the aid of the Levenshtein distance (Levenshtein 1965). In 1995 the algorithm was introduced in dialectology by Kessler. The Levenshtein distance between two strings is given by the ‘cost’ of the total set of insertions, deletions and substitutions needed to transform one string into another (Kruskal 1999). Kessler applied this algorithm to the comparison of Irish dialects. Heeringa (2004) refined the algorithm in several respects and applied it to both Norwegian and Dutch dialects. We follow his approach and give a brief description below.

Using the Levenshtein distance measure, two dialects are compared for a given text by establishing differences in the realization of single corresponding words in both dialects through the insertion, deletion or substitution of sounds. In the simplest form of the algorithm, all operations have the same cost, e.g. 1. For example, the Dutch word *politie* ‘police’ is realized as [plitsi] by the old males of Grolloo and as [polizi] by the old males of Westkapelle. The Levenshtein algorithm aligns the pronunciations as follows:

	1	2	3	4	5	6	7
Grolloo	p		l	i	t	s	i
Westkapelle	p	o	l	i		z	i
		1			1	1	total: 3

Actually the two realizations may be aligned in many different ways, each corresponding with a different set of operations which map one realization to another. The power of the Levenshtein distance is that it finds the least expensive set of operations needed to transform one realization into another. The alignment of our example suggests three operations: an insertion (position 2), a deletion (position 5) and a substitution (position 6). The total cost is 3, and the alignment length is equal to 7.

In our example, all operations have the same weight. Thus a pair such as [i,ɒ] counts as different to the same degree as [i,i]. In this paper we use graded weights, so that the pair [i,ɒ] counts as more different than [i,i]. Weights are based on the comparison of spectrograms of the sounds. The spectrograms were made on the basis of recordings of the sounds in the International Pronunciation Alphabet as pronounced by John Wells and Jill House on the cassette *The Sounds of the International Pronunciation Alphabet* (1995). For each sound a spectrogram was made using the so-called Barkfilter, which is a perceptually-oriented model. On the basis of the Barkfilter representation, segment distances were calculated. The technique used for this step is described extensively in Heeringa (2004: 79-119). The largest distance was found between [a] and silence. All other segment distances are divided by this largest distance, so that all distances have a value between 0 and 1.

In perception, small differences in pronunciation may play a relatively strong role in comparison to larger differences. Therefore we used logarithmic transformations of the segment distances. The effect of using logarithmic distances is that small distances are weighed relatively more heavily than large distances.

A restricted set of diacritics is used in the transcriptions and processed by the distance measure. We distinguish two degrees of length, namely short (all segments without additional length marks) and long (noted as :). Before the Levenshtein algorithm is applied to the phonetic transcriptions, long sounds are represented as two

successive realizations of the corresponding ‘short’ vowel. For example, the standard Dutch realization of *beet* ‘bite’ is [be:t] and will be converted to [beet].

Furthermore, we use and process diacritics for palatalization (e.g. [tʲ]), velarization (e.g. [tʷ]) and nasalization (e.g. [t̃]). When a segment is compared to a palatalized segment, the segment distance is averaged with the [j]. For example, the distance between [p] and [tʲ] is equal to the average distance between [p] and [t] and [p] and [j]. In the case of comparison to velar and nasal segments, the distances are averaged with the [ɣ] and the [n], respectively.

To deal with syllabification in words, the Levenshtein algorithm is adapted so that only a vowel may match with a vowel; a consonant with a consonant; the [j] or [w] with a vowel (or vice versa) or, possibly, other consonants such as intervocalic /d/; the [i] or [u] with a consonant (or vice versa) or another vowel; and a central vowel (in our research only the schwa) with a sonorant (or vice versa) or a full vowel (after schwa is the reduction vowel). In this way unlikely matches (e.g. [p] with [a]) are prevented.

Heeringa (2004) normalized word pronunciation pair distances by dividing them by the alignment length. The effect is that a substitution of e.g. [u] with [y] in a pair of long words will count less than in a pair of short words. In relation to this, Heeringa, Kleiweg, Gooskens and Nerbonne (2006) found that results based on non-normalized Levenshtein distances better approximate dialect differences as perceived by the dialect speakers than results based on normalized Levenshtein distances. Non-normalized Levenshtein distances, however, are not easily interpretable. Therefore we calculate the aggregated distance between two dialects as the sum of maximally 175 word pair distances divided by the sum of the alignment lengths which correspond with the word pairs. Since the weights of operations vary between 0 and 1, the distance (i.e. the sum of all weights) of a word pair with alignment length n will be smaller than or equal to n . Therefore, the sum of the word pair distances will be smaller than or equal to the sum of the corresponding alignment lengths, and thus the sum of the word pair distances divided by the sum of the corresponding alignment lengths will vary between 0 and 1. We multiply these proportions by 100 in order to express them as percentages.

When measuring dialect distances at the level of the sound components, we apply Levenshtein distance to pairs of word realizations which are lexically and morphologically the same, i.e. which are cognates with identical morphological structure. However, our data set also provides the possibility to measure dialect variation and change at the lexical and morphological level. The lexical or morphological distance between two dialect varieties is measured with the method introduced by Séguy (1973), namely as the percentage of items on which the two dialects disagree lexically or morphologically. Assume we compare Grolloo to Westkapelle lexically on the basis of three items: *snel* ‘quickly’ (*rap* vs. *gauw*), *gooien* ‘to throw’ (*smijten* vs. *gooien*) and *politie* ‘police’ (in both dialects realized as *politie*). The dialects disagree on the first and second item – therefore the lexical distance is $\frac{2}{3}$ times 100, or 67%. Similarly we compare Grolloo to Westkapelle morphologically on the basis of three items: *huizen* ‘houses’ (*huizen* vs. *huizen*), *wil* ‘want’ (third person singular) (*wil* vs. *wilt*), *jongetje* ‘little boy’ (*jonkie* vs. *jongetje*). The two dialects disagree on the second and third item, so the distance is $\frac{2}{3}$ times 100, or 67%. We will return to these measurements in section 2.3 (research question 5).

The aggregated distance between two dialects is based on 175 word pairs (and fewer if words are missing). In the text, several words appear more than once. For example, the word *straat* ‘street’ appears three times in the text. When calculating the aggregate, each of the corresponding word pair distances counts for one third. In this way each word pair is weighted. The sum of the weights is 105, which is the number of different words.

2.2. First findings

In this subsection we present aspects of the changes from dialects into regiolects and other intermediate varieties using analyses of phonetic transcriptions of newly collected recordings; samples are representative of Dutch dialects in 20 locations in the Netherlands and northern Belgium, and were recorded in the period between June 2008 and May 2009. The analysis follows the research questions presented in section 2 above.

Research question 1. Do dialect varieties change?

In this study, the change of a particular dialect is measured by comparing the realization of the words in the Charlie Chaplin text translation by the old men with the realization of the same words by the young females. For this purpose we used Levenshtein distance.

Figure 1 shows the distribution of our set of 20 dialect varieties. In the map the intensity of blue in a dot represents the extent to which a variety has changed. We find that Koekange has changed least and Zevenhuizen has changed most. The map shows that the southern dialects have changed more than the northern ones. Apart from Zwinderen, especially the varieties in the transitional zone between Frisia (northwest) and Lower Saxony (northeast), namely those spoken in Grijpskerk, Zevenhuizen, Appelscha and Noordwolde-Zuid, have changed relatively strongly. In the second column of Table 2 for each dialect the extent to which it has changed is given as a percentage, calculated by Levenshtein distance. Dialect changes appear to vary from 4.9% (Koekange) to 16.6% (Zevenhuizen).

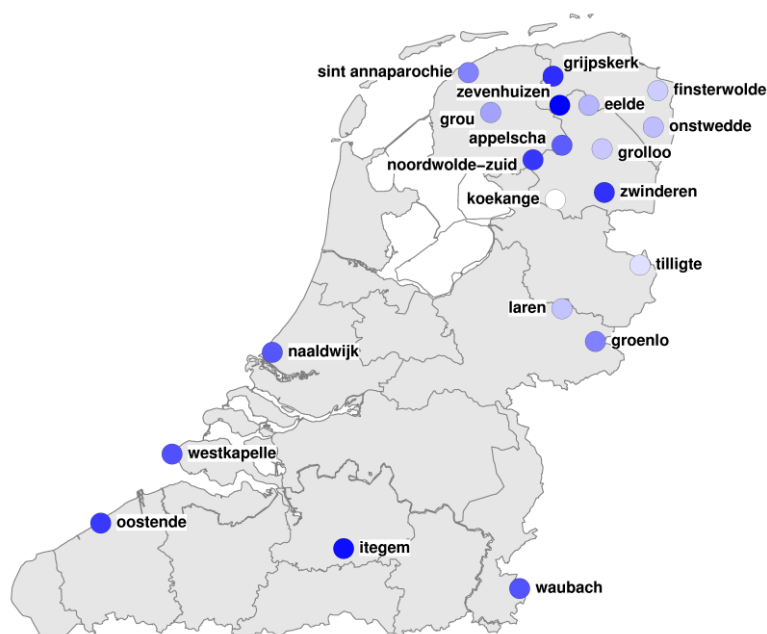


Figure 1 Dialect change as differences between old male and young female speakers. The intensity of blue in a dot represents the extent to which a variety has changed.

Table 1: Dialect change, average convergence towards/divergence from other varieties and convergence towards/divergence from standard Dutch. The figures are percentages (2nd and 7th column), differences expressed in percentage points (5th and 6th column) or the average of percentage differences (3rd and 4th column). Percentages are calculated by means of Levenshtein distance.

dialect variety	dialect change	average convergence towards other varieties	average divergence from other varieties	convergence towards standard Dutch	divergence from standard Dutch	distance to standard Dutch
Koekange	4.9	.7	.5	1.3	.0	29.1
Tilligte	6.4	1.3	.2	2.4	.0	31.3
Finsterwolde	7.2	1.1	.3	2.5	.0	34.8
Grolloo	7.4	1.3	.4	3.6	.0	28.0
Laren	7.6	.7	.9	3.9	.0	33.3
Onstwedde	8.0	.7	.6	1.6	.0	33.0
Eelde	8.3	1.5	.6	1.1	.0	29.7
Grou	9.1	.9	.5	2.0	.0	34.7
Sint Annapar.	10.6	3.0	.0	.4	.0	27.2
Groenlo	10.7	1.7	.8	4.5	.0	30.8
Appelscha	12.3	1.0	.8	1.5	.0	28.5
Naaldwijk	12.7	3.0	.5	.0	.4	20.7
Waubach	12.8	1.2	.3	2.3	.0	32.7
Westkapelle	13.0	1.1	.3	3.1	.0	32.6
Oostende	14.1	2.1	.0	4.5	.0	35.2
Noordwolde-Z.	14.1	2.8	.3	.0	.3	28.7
Zwinderen	14.4	2.6	.4	4.1	.0	33.9
Grijpskerk	14.5	.5	1.6	.0	1.8	26.8
Itegem	16.0	.4	1.5	.0	2.4	32.6
Zevenhuizen	16.6	.9	1.3	1.8	.0	33.7

Research question 2. Do dialect varieties converge towards each other?

The distances among the 20 dialects measured based on the recordings of the old male speakers significantly correlate with the distances obtained for the transcriptions of the young female speakers: $r=0.897$ ($p<0.001$). We compared the ‘old male distances’ with the ‘young female distances’ by means of a paired-samples t test and found that the ‘young female distances’ are significantly lower than the ‘old male distances’ ($t=8.631$, $p<0.001$). Taken together, these two outcomes show that, generally speaking, dialects are converging towards each other.

To what extent can dialect change (research question 1) be explained by convergence and divergence among varieties? In order to answer this question, we measured the average amount of convergence or divergence of each dialect with respect to the other varieties. The convergence/divergence of a dialect A towards dialect B is:

$$\text{distance}(A_{\text{old male}}, B_{\text{old male}}) - \text{distance}(A_{\text{young female}}, B_{\text{old male}})$$

where $A_{\text{old male}}$ refers to the dialect as pronounced by the old males, and $A_{\text{young female}}$ to the dialect as pronounced by the young females. Since both $\text{distance}(A_{\text{old male}}, B_{\text{old male}})$ and $\text{distance}(A_{\text{young female}}, B_{\text{old male}})$ are quantitatively expressed in percentages, we refer to the difference between these two percentages as differences in percentage points. Each of the 20 dialects is compared to the 19 other dialects, and we take the average of 19 convergence/divergence figures (i.e. percentage differences). When calculating the average, we distinguish between convergence figures (positive values) and divergence figures (negative values). The average convergence values are given in the third column of Table 2, and the average divergence values are given in the fourth column of Table 2. Sint Annaparochie and Naaldwijk have converged most strongly to the other varieties (3.0%), followed by Noordwolde-Zuid (2.8%) and Zwinderen (2.6%). Of all 20 dialects, Naaldwijk is closest to standard Dutch, and both Sint Annaparochie and Noordwolde-Zuid are Frisian-Dutch mixed languages – so it seems as though cross-dialectal convergence is partly or even largely brought about by convergence to the standard language. Grijpskerk has most strongly diverged from the other varieties (1.6%), followed by Itegem (1.5%) and Zevenhuizen (1.3%). Both Grijpskerk and Zevenhuizen are Groningen dialects found in the transitional zone between Frisian and Lower Saxon dialects.

When we correlate the dialect change measurements with the convergence and divergence measurements separately, we do not find significant correlations (convergence: $r=0.207$, $p=0.381$, divergence: $r=0.389$, $p=0.090$). But if we add the convergence and the absolute divergence values (since divergence values were originally calculated as negative values we need to take the absolute values), we get a significant correlation ($r=0.503$, $p=0.024$). This means that dialect change may be brought about for $(0.503)^2 = 25.5\%$ by convergence towards and divergence from other dialect varieties.

In Table 2 the seventh column shows the distances to standard Dutch measured as the dialect production of the old male speakers. We found a significant correlation between the sum of the convergence and absolute divergence values and the distances compared to standard Dutch measured via the ‘old male transcriptions’ ($r=-0.521$, $p=0.019$). The negative correlation suggests that the more distant a dialect is from the standard language, the less it changes. In Figure 2, for each dialect the sum

of the convergence and absolute divergence values is shown. Most of the varieties which are spoken close to the Dutch/German border look stable, as well as the Frisian variety of Grouw and the Zeeland dialect of Westkapelle.

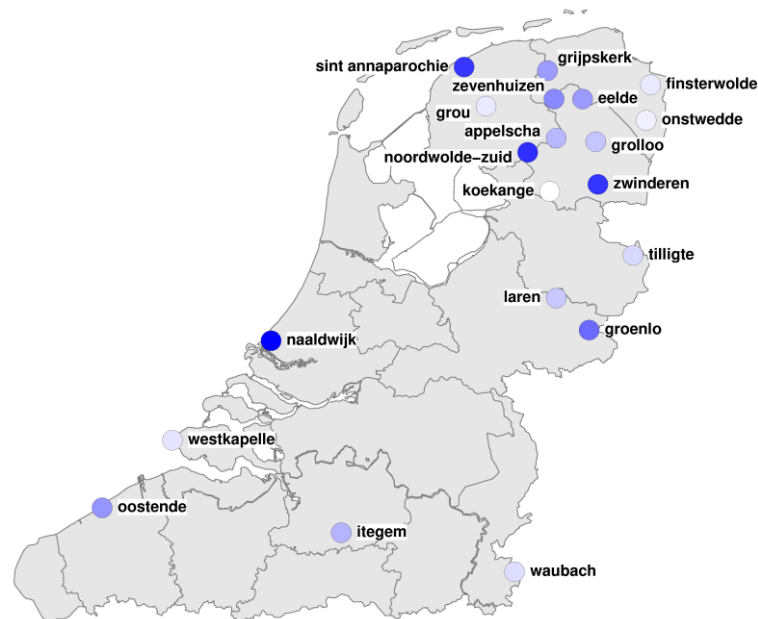


Figure 2 The intensity of blue in a dot represents the extent to which a dialect has converged towards and/or diverged from the other 19 dialects.

Research question 3. Do dialect varieties converge to standard Dutch?

The distances between the 20 dialects and standard Dutch obtained via the transcriptions of the old males correlate significantly with the distances obtained via the transcriptions of the young females ($r=0.836$, $p<0.001$). We compared the ‘old male distances’ with the ‘young female distances’ by means of a Wilcoxon signed-rank test and found that the ‘young female distances’ are significantly lower than the ‘old male distances’ ($z=-3.024$, $p=0.001$), which shows that, generally speaking, dialects are converging towards standard Dutch.

When we subtract the ‘young female distances’ from the ‘old male distances,’ we get either positive values (convergence) or negative values (divergence). In the map in Figure 3, the intensity of red represents the extent to which local dialect has converged towards standard Dutch, and the intensity of blue represents the extent to which a dialect has diverged from standard Dutch. The map shows that most dialects have converged towards standard Dutch, except for the dialects spoken in Itegem and Grijpskerk.

In Table 2, the fifth column shows the degree to which dialects have converged towards standard Dutch, and the sixth column shows the degree to which dialects have diverged from standard Dutch. The seventh column shows the distances to standard Dutch measured on the basis of the ‘old male transcriptions.’ We found a significant correlation between the distances to standard Dutch measured on the basis of the ‘old male transcriptions’ and the extent to which dialects converged to standard Dutch ($r=0.564$, $p=0.010$). This significant moderate correlation suggests that dialects which are distant from standard Dutch are relatively more sensitive to the pressure of standard Dutch than dialects which are (already) close to standard Dutch. The question may arise whether this significant correlation may be due to a ceiling effect. When sorting the dialects according to their distance to standard Dutch, we find a leap between Naaldwijk (20.7%) and Grijskerk (26.8%), but we do not find any other leap, at least not larger than 1%. We therefore excluded Naaldwijk and found a correlation of $r=0.504$ ($p=0.028$), which is still significant.

We did not find a significant correlation between the degree to which dialects diverged from standard Dutch and the distances to standard Dutch measured on the basis of the ‘old male transcriptions’ ($r=-0.173$, $p=0.465$).

As mentioned above, Itegem and Grijskerk have diverged from standard Dutch. As can be seen in the sixth column of Table 1, Naaldwijk and Noordwolde-Zuid also diverged from standard Dutch. But the degree to which they diverged is so small that the dots in Figure 3 look white. Of all 20 dialects, the relationship to standard Dutch is most stable in these two dialects. Naaldwijk is already close to standard Dutch, but Noordwolde-Zuid is more distant.

The dialect of Itegem, in the Dutch-speaking northern part of Belgium, has diverged strongest (2.4%). We compared each dialect to standard *Netherlandic* Dutch, but perhaps Itegem has converged to standard *Belgium* Dutch. Since standard *Netherlandic* Dutch and standard *Belgium* Dutch slightly differ, convergence towards standard *Belgian* Dutch may cause divergence from standard *Netherlandic* Dutch. In the future we intend to also compare the dialects to standard *Belgium* Dutch. After Itegem, Grijskerk diverged strongest (1.8%). This may be explained by the nasalizing of several vowels and the voicing of several fricatives by the young female in the transcription, which did not occur in the variety of the local dialect spoken by the old men.

To what extent can dialect change be explained by convergence towards and divergence from standard Dutch? In order to answer this question we correlated the dialect change percentages of the second column in Table 1 with the percentage points expressing differences in convergence and divergence in columns 5 and 6. The convergence measurements did not correlate significantly ($r=-0.192$, $p=.419$), but the divergence measurements did ($r=0.461$, $p=0.041$). It is striking that dialect change can partly ($[0.461]^2 = 21.25\%$) be explained by divergence from standard Dutch but not by convergence towards standard Dutch. It suggests that unstable dialects diverge from standard Dutch.

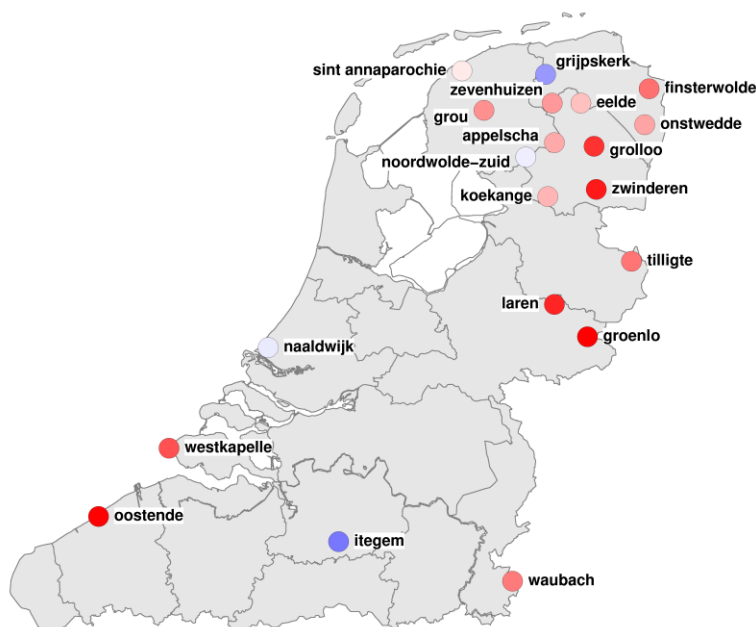


Figure 3 Convergence towards standard Dutch, divergence from standard Dutch. Red dots indicate convergence and blue dots indicate divergence.

Research question 4. What are the main predictors of dialect change?

When answering research question 2, we found that cross-dialectal convergence and divergence – when added together– correlated significantly with dialect change. Under research question 3 we found that divergence from standard Dutch correlates significantly with dialect change. We also found that distances to standard Dutch measured on the basis of the ‘old male transcriptions’ correlate inversely and significantly with convergence towards and divergence from dialect varieties and with the degree to which dialects converged towards standard Dutch.² This suggests that dialects which are relatively distant to standard Dutch are more strongly influenced by standard Dutch while their relationship to other varieties is relatively more stable.

In order to find the main predictors of dialect change, we carried out a linear multiple regression analysis, with dialect change as the dependent variable (method: stepwise, i.e. at each step, all eligible variables are considered for removal and entry). We entered four independent variables:

1. the sum of the indexes for convergence towards and divergence from all other dialects studied, i.e. third and fourth column of Table 1 are added together;
2. convergence towards standard Dutch, i.e. the fifth column of Table 1;
3. divergence from standard Dutch, i.e. the sixth column of Table 1;
4. the distance from standard Dutch on the basis of the ‘old male transcriptions’, i.e. the seventh column of Table 1.

The regression procedure entered the variables in three steps. In the first step, the first variable (the sum of the indexes for convergence towards and divergence from all other dialects studied) is entered, which explains 21.1% of the variance in the dialect change percentages. In the second step the third variable (divergence from standard Dutch) is entered. The explained variance increases to 36.9%. In the third step the fourth variable (distance to standard Dutch) is entered. Together the three variables explain 50.4% of the variance. It is striking that the second variable (convergence towards standard Dutch) is not found to be a significant predictor of dialect change, but this agrees with our finding under the third research question.

Research question 5. Which linguistic level is affected most strongly?

Under research question 1 we measured dialect change at the level of the sound components for each of the 20 dialects. At the end of section 2.2, we pointed out that there is an easy way to measure lexical and morphological dialect distances. Thus we also measured lexical and morphological change. Similar to the distances and changes in the sound components, they are expressed as percentages; this makes the three levels comparable. However, we must take into account that the number of words which show variation across dialects or age and sex groups (old males versus young females), differs per level: 94 items for the lexical level, 33 for the morphological level and 169 for the level of the sound components. At the morphological level, the distances will be relatively small, since the greater part of the words will not vary morphologically. Therefore for each linguistic level we measured aggregated distances only on the basis of those words which vary across the data set.

Following this procedure, we found an average dialect change of 28.9% at the lexical level, 11.1% at the level of the sound components and 8.3% at the morphological level. The lexical changes are significantly higher than both the changes at the level of the sound components (Wilcoxon signed-rank test, $z=-3.920$, $p<0.001$) and the morphological changes ($z=-3.808$, $p<0.001$). There are not significantly more changes in the sound components than in the morphology ($z=-1.419$, $p=0.078$). We conclude that the lexical level is affected most strongly, followed by the level of the sound components, and morphology is affected least.

We correlated the three levels of dialect change with each other, and found a nearly-significant correlation between the lexical and morphological level ($r=-0.438$, $p=0.053$). The negative correlation suggests that dialects which change more at the lexical level are relatively stable at the morphological level, and vice versa. For the other pairs of linguistic levels we did not find significant correlations.

In the course of this project, we will study the level of the sound components in more detail by distinguishing three sublevels: the lexical-phonological level, the post-lexical level and the (purely) phonetic level.

2.3. Preliminary conclusions

On the basis of the data for 20 dialect varieties, we may draw several conclusions. First, the distances between dialects have significantly decreased at the level of the sound components. Second, the 20 dialects have significantly converged towards standard Dutch. Third, dialects which are distant from standard Dutch show less convergence towards and/or divergence from other varieties than dialects which are closer to standard Dutch. Figure 2 suggests that especially dialects in peripheral and (formerly) isolated areas are stable. Fourth, dialects which are distant to standard Dutch converge more strongly to standard Dutch than dialects which are more closely related to standard Dutch. Fifth, in order of decreasing importance, 1) convergence and/or divergence among dialects, 2) divergence to standard Dutch and 3) the distance to standard Dutch are significant predictors of dialect change and together they explain 50.4% of the variance in dialect change. Sixth, the lexical level is affected more strongly than both the level of the sound components and the morphological level, but there is no significant difference in the degree to which the sound component and morphology have been found to change.

3. Perceptual aspects: main research questions

In the previous section, we demonstrated how dialectometrical techniques are applied to measure dialect change at the level of the sound components, the lexical level and the morphological level on the basis of systematically collected data for 20 different dialects of Dutch. In this section we present a perception experiment which enables us to measure dialect distances as perceived by the dialect speakers who listen to recordings of dialect texts read by other dialect speakers. This will make it possible to compare production and perception with respect to changes in dialect use. In section 3.1 we discuss the methodology, and in section 3.2 we present the hypotheses to be tested on the basis of the data from the experiment.

3.1. Methods

In 2000 Gooskens carried out an experiment in order to measure Norwegian dialect distances as perceived by the dialect speakers themselves (Gooskens 2005; Gooskens and Heeringa 2004). In 15 locations in Norway, a school class listened to fragments of each of the 15 dialect varieties. For each dialect the pupils judged the distance to their own dialect on a scale from 1 (similar to native dialect) to 10 (not similar to native dialect). This works especially well for the Norwegian situation where everyone speaks dialect, but we expect that this approach would not work as well for the Dutch situation. According to Kraaykamp (2005), 43.2% of the Dutch are native dialect speakers, whereas 36% of the Dutch born in the last quarter of the twentieth century are native dialect speakers. A more practical approach is the use of a web survey, which was carried out by a small group of students at the University of Groningen under the supervision of Heeringa in the winter and spring of 2004. Fragments of 11 modern varieties of North and West Germanic languages were put online, and native speakers of these varieties were asked to listen to the fragments and to rate the distance to their mother tongue on a scale from 1 (no distance) to 10 (maximum distance). For the present study, we adapt the latter approach, but with some modifications. To obtain results which are detailed enough, our research will be based on approximately 80 dialects. The subjects are requested to listen to and rate recordings of their own dialect plus another twelve dialects spoken in the Dutch language area, which are chosen such, that the main Dutch dialect areas are represented.

As recordings, the dialect translations of the story of the glazier episode in the Charlie Chaplin movie “The Kid” will be used. The subjects are asked to judge the distance of each of eight dialect varieties to their own dialect variety on a scale from 0 (the dialect does not differ from their own dialect) to 4 (the dialect differs very strongly from their own dialect). A subject hears his/her own dialect, the four geographically most nearby dialects, and two dialects spoken in the two geographically most nearby dialect groups. For each dialect variety a recording of both a male speaker and a female speakers is presented. Therefore a subject will hear 16 recordings, recordings of male and female speakers are presented in a random order.

In the web survey we distinguish between four types of ratings: a. old males listening to old males, b. old males listening to young females, c. young females listening to old males, and d. young females listening to young females.

3.2. Research questions and operational hypotheses

The measurements obtained by the perception experiment described in section 3.1 enable us to answer three research questions. The first question considers the perception of changes in the production of the speakers, and the second question concerns apparent time changes in the perception of the speakers. In the third question, production and perception are compared.

Research question 1. Are dialects becoming less differentiated?

To answer this question, we use the judgements of the old males listening to recordings of old males (‘old’ judgments) and the judgements of old males listening to young females (‘new’ judgments). On the basis of each of the two sets of judgments, the dialects will be clustered. Dialects are classified into clusters such that similar dialects are in the same clusters. For both judgments we will determine the natural number of clusters. We will use the “elbow criterion,” which says that the number of clusters should be chosen such that adding one more cluster does not lead to a significant increase of information. If the percentage of variance explained by the clusters is plotted against the number of clusters, the first clusters will add much information (and explain a lot of variance), but at some point the marginal gain will drop, giving an angle in the graph (the elbow; cf. Aldenderfer and Blashfield 1984).

We *hypothesize* that the ‘new’ judgements will suggest fewer and larger groups than the ‘old’ judgements, i.e. that dialects have become less differentiated.

Research question 2. Are younger speakers less sensitive to minor dialect differences than older speakers?

We compare the judgments of old males listening to old males (‘old’ judgments) to those of young females listening to old males (‘new’ judgements). As in the case of the first research question, we determine the number of natural groups for both the ‘old’ judgements and the ‘new’ judgements. Our *hypothesis* is that the ‘new’ judgements will suggest fewer and larger groups than the ‘old’ judgements. This means that younger speakers are less sensitive to minor differences than older speakers.

Research question 3. Has the speech production of the speakers changed more than the speakers’ perception?

As in the case of the first research question, we measure the reduction in the number of natural groups on the basis of change in the production of dialect speakers as perceived by the subjects who participate in the web-based perception experiment. As pointed out above, in order to answer the second research question, we measure reduction in the number of natural groups based on the apparent time change in the perception of the dialect speakers. We *hypothesize* that the reduction in the number of groups will be stronger at the production level than at the perception level, i.e. that perception lags behind production in the change from smaller dialect groups to larger regiolect areas. This corroborates Janson (1983: 31), who claimed that “for an individual in a situation of change, perception seems to lag behind production.”

4. Sizing up and looking ahead

This project is based on data concerning both the production and perception of 80 different modern dialects of Dutch. Given the questions guiding the project and the approach, this project complements the available research on the mechanisms underlying dialect convergence and divergence in several respects. The amount of data forces us to use quantitative methods, and the nature of the data enables us to do so. However, the findings from this project will have to be explained along phonetic, linguistic, socio-dialectological and socio-psychological dimensions.

What will the outcomes of the overall study (concerning both production and perception) tell us about social and psychological aspects of language and, particularly, dialect convergence and divergence? With regard to the social aspect: to the linguist, living languages and especially dialects are dynamic systems which may influence each other, while to the speakers they are primarily totems of shared identity. This latter fact may partly shape not only the active use but also the perception of one's own dialect and related varieties.

Not only dialects are permanently changing: standard varieties typically do so as well. In the case of the Dutch standard language, this change may well lead to the crystallization of a separate Belgian variety of the Dutch standard language; earlier studies by Van de Velde (1996) on the phonetic level and Geeraerts et alii (1999) regarding the lexicon found strong indications for gradual divergence between Belgian and Netherlandic Dutch at the level of the standard norm. For the present project, a development of this type would have important methodological implications, some of which were hinted at in section 2.2, and particularly in the paragraphs dedicated to research question 3.

Regarding the psychological aspects of language, linguistic change and specifically dialect change: what could be the possible implications of a confirmation of Janson's claim (paraphrased in connection with research question 3 in section 3.2 above)? Would this mean that language variation is not central in the human perception of linguistic utterances? Is there a critical period for the perception of language variation or (at least) dialect change? The interpretation of the findings from this part of the study may bring together insights from several different branches of linguistics.

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² All significant correlations (the statistics are presented in the preceding sections) appeared to be of moderate strength, all *r*-values being around |.5|.