Title: How well can Norwegians identify their dialects?

Author: Charlotte Gooskens
 P.O. Box 716
 NL-9700 AS Groningen
 The Netherlands
 Tel. +31 (0)50 3635827
 Fax. +31 (0)50 3635821
 E-mail C.S.Gooskens@let.rug.nl

The aim of the present study is twofold. First, it addresses the question of how well Norwegians are able to identify Norwegian dialects. Second, it investigates the role which intonation plays in the identification of Norwegian dialects. In a number of listening experiments, 15 groups of young Norwegians from different parts of Norway were asked to identify 15 different dialects. The dialects were presented in the original form as well as in a version that was manipulated by computer in such a way that the intonation was removed. In this way it was possible to see how important intonation is for the identification of the dialects. The results are put into perspective by comparing them to results of similar experiments with Dutch dialects. Norwegians turned out to be less good at recognizing Norwegian dialects than Dutchmen. Linguistic and extra-linguistic explanations are given. Furthermore the results show that intonation is more important for the identification of Norwegian dialects than for the identification of Dutch dialects.

How well can Norwegians identify their dialects?

1. INTRODUCTION

Norwegian dialectology has a long tradition of dialect classification. Knowledge of (regional) dialect characteristics is part of the curriculum at secondary school in Norway (see for example Torp, Dahl and Lundeby 1993) and dialects are used actively by most Norwegian people in a wide range of situations. Any dialect can be heard anywhere and in any social context, even in more official contexts. Local dialects enjoy a higher status and may be used more widely and freely in Norway than in most other European societies (see for example Venås 1992 and Wiggen 1995). For example, pupils have the right to use their dialectal mother tongue for any purpose at school. As a consequence, dialect usage has a very strong position. No real standard variety exists as a spoken language and the regional varieties have many dialectal characteristics. This situation means that Norwegians are often confronted with different dialects and therefore have much experience and knowledge about dialects. Also, most Norwegians take a great interest in their dialects, which can be illustrated by the popularity of the television entertainment program *'Har det på tunga'*, where participants were asked to identify dialects. However, little is known about the extent to which Norwegians are able to use this knowledge and experience to hear where an interlocutor comes from. The special Norwegian dialect situation gives reason to expect Norwegians to be good at locating dialects geographically. The first part of the present investigation was carried out in order to examine the ability of Norwegians to identify a number of Norwegian dialects.

The traditional classification of the dialect areas of Norway is based on a limited number of linguistic characteristics. For example, Sandøy (1991) bases his classification on only four characteristics. Other classifications are based on a larger number of characteristics (Christiansen 1954, Elstad 1982, Jahr and Skare 1996). However, little is known about which characteristics are important for Norwegians when identifying dialects from different areas. In the literature on Norwegian dialects, it is often assumed that intonation plays a major role in their characterization (Christiansen 1954, Fintoft and Mjaavatn 1980). Maybe it is even the most important cue for the identification of a dialect (Sandøy 1991). According to Hognestad (1999) linguistically unsophisticated Norwegian listeners probably make the first approximate identification of a dialect on the basis of intonation. He suggests (or suspects) that the more traditional dialect characteristics, which are also taught at school, are only used in order to place the dialects more precisely.

Most Norwegian dialects distinguish between two tonal patterns on the word level, often referred to as tonemes (e.g. Kristoffersen 2000). Dialectologists usually divide the Norwegian dialects into low tone dialects and high tone dialects, based on whether toneme 1 in the dialects in question begins with a high or a low tone. Christiansen (1954) includes the tonemes in the characterization of the Norwegian dialects along with the position of the tonemes in the stress group. Fintoft and Mjaavatn (1980) assume that the realization of the tonemes plays a very important role when it comes to the precise identification within a dialect area by the locals. They therefore suggest that the isoglosses which divide the different realizations of the tonemes should be included in the characterization of the Norwegian dialects along with the more traditional characteristics. Hognestad (1999) stresses the importance of teaching the intonational characteristics (including the realization of the word tones) during lessons in dialectology at school since this characteristic is already used by the pupils in their daily dealing with dialects. However, no research has been carried out so far in order to confirm the importance of intonation for the identification of Norwegian dialects

experimentally. The aim of the second part of the present study is to investigate the importance of intonation for the identification of Norwegian dialects.

As far as the identification of language varieties is concerned, it has been established that knowledge about the background of a speaker is of great communicative importance. Prejudice is often based on the listener's (valid or invalid) ideas about the social and geographic background of the speaker (Giles 1970, Trudgill and Giles 1978, Omdal 1995, Ladegaard 1994). Knowledge about the role of different linguistic levels may also add to the understanding of the role which linguistic distance between language varieties plays in the perception of language varieties. In addition to such (socio-)linguistic motivations for carrying out the present investigations, knowledge about the identification of language varieties may also have a number of practical applications, for example in the area of speech synthesis and speech recognition, forensic linguistics and the teaching of dialects.

2. MATERIAL

Dialects
For the investigation it was possible to use existing recordings of 15 Norwegian dialects[1]. In Figure 1 the geographical distribution of the dialects is shown. As can be seen, the dialects are spread over a large part of the Norwegian language area. Looking at the traditional dialect areas as found in for example Skjekkeland 1997, we see that most major dialect areas are represented by the 15 dialects[2].

Figure 1 here

Figure 1. Map of Norway showing the 15 dialects included in the present investigation.

Speakers
There were 4 male and 11 female speakers, one speaker per dialect. Thirteen of the speakers had filled in a questionnaire about their background. From this we know that the average age of these speakers was 30.5 years, ranging between 22 and 35, except for one speaker, who was 66. No formal testing was carried out beforehand on the degree to which the speakers were representative of their dialects. However, on average the speakers had lived at the place where the dialect is spoken until the age of 20 and they all regarded themselves as representative speakers of the dialects in question.

Text
The speakers all read aloud the same text, namely the Norwegian version of 'The North Wind and the Sun'. This text has often been used for phonetic investigations, see for example the *International Phonetic Association* (1999), where the same text has been transcribed in twenty-nine different languages.

Recordings
The recordings were made in a soundproof studio in the autumn of 1999 and the spring of 2000. The speakers were all given the text in Norwegian beforehand and were allowed time to prepare the recordings in order to be able to read aloud the text in their own dialect. Many speakers had to change some words of the original text in order for the dialect to sound authentic. The word order was changed in three cases. When reading the text aloud the speakers were asked to imagine that they were reading the text to someone with the same

dialectal background as themselves. This was done in order to ensure a reading style which was as natural as possible and to achieve dialectal correctness.

The microphone used for the recordings was a MILAB LSR-1000 and the recordings were made in DAT format using a FOSTEX D-10 Digital Master Recorder. They were edited by means of Cool Edit 96 and made available on the World Wide Web.

Manipulations

In the listening experiment described below each of the 15 dialect recordings were presented in the following two versions:

1. ORIGINAL VERSION. This version has the original prosodic and verbal information.
2. MONOTONIZED VERSION. By means of electronic monotonization the intonation (including word tones) is removed from the signal.

The manipulation into the monotonized version was carried out with the program PRAAT[3]. The monotonization was carried out by changing the pitch contour into a flat line. The algorithm used was PSOLA. The recordings of female speakers were monotonized at 224 Hz, which is the mean pitch of the eleven female speakers. The recording of the male speakers were monotonized at 134 Hz. This was the mean pitch of the four male speakers.

Listeners

The listeners were 15 groups of high school pupils, one from each of the places where the 15 dialects are spoken. After the experiment had been carried out, the responses from a number of listeners were excluded from the analysis in order to make sure that all responses originated from listeners who were familiar with their regional dialect. Only the responses of listeners who had lived the major part of their lives in the place where the dialect is spoken were used for the analysis. Eventually, each group consisted of 16 to 27 listeners (with a mean of 19). On average these listeners had lived in the place in question for 16.7 years. Nine of the 290 listeners (3%) said they never spoke the dialect, the rest spoke the dialect always (60%), often (21%), or seldom (16%). A large majority of the listeners (83%) had one or two parents who also spoke the dialect. The mean age of the listeners was 17.8 years, 52 percent were female and 48 percent male.

Procedure

The two versions (monotonized and original) of the 15 dialects were presented in two blocks, with the dialects randomized within each block. First the block with the monotonized version was presented and after a short break the block with the original version was presented. If the original version had been presented before the monotonous version, the listeners might have used information about intonation gathered from the original version for their identification of the monotonous version. Each block was preceded by a practice recording (a speaker from Stjørdal, but not the one used in the real experiment). Between the presentations of the dialects there was a pause of 3 seconds.

The listeners were asked to listen to each of the dialect recordings and mark with a cross on a map of Norway indicating all the 19 counties (Norwegian *Fylke*) where they thought the dialect they had just heard was spoken. In this way we hoped to be able to see how well the listeners recognized the dialect when intonation was present in the signal and when it had been removed.

In addition to the identification of the dialects, the listeners were also asked to judge the dialects on a scale from 1 (similar to one's own dialect) to 15 (different from one's own

dialect). The aim of these judgments was to gain insight into the perception of distances between the dialects.

The listening experiment lasted approximately 20 minutes. Afterwards they filled in a questionnaire with questions about their personal characteristics, such as language background, age and sex. The listeners were paid for their participation.

Levenshtein distances

In addition to the perceptual scalar measurements, an objective distance measurement was gained by means of the Levenshtein distance measurements. With this method it is possible to measure the phonetic distance between language varieties objectively, on the basis of phonetic transcriptions. The Levenshtein distance may be understood as the cost of (the least costly set of) operations mapping one string to another. The basic costs are those of (single-phone) insertions, deletions and substitutions. Insertions and deletions cost half that of substitutions. The principle can be illustrated by a small example. Assume *afternoon* is pronounced as [ˈæəftəˌnɰˑn] in the dialect of Savannah, Georgia, and as [ˌæftərˈnuˑn] in the dialect of Lancaster, Pennsylvania[4]. Changing one pronunciation into the other can be done as in table 1 (ignoring suprasegmentals and diacritics for this moment):

æəftənɰn	delete ə	1
æftənɰn	insert r	1
æftərnɰn	subst. ɰ/u	1
æftərnun		

_____

3

In fact many sequence operations map [ˈæəftəˌnɰˑn] to [ˌæftərˈnuˑn]. The power of the Levenshtein algorithm is that it always finds the cost of the cheapest mapping.

The simplest versions of this method are based on calculation of phonetic distance in which phonetic overlap is binary: non-identical phones contribute to phonetic distance, identical ones do not. Thus the pair [a,p] counts as different to the same degree as [b,p]. We used a more sensitive version in which phones are compared on the basis of their feature value, so the pair [a,p] counts as more different than [b,p]. For calculating the distance between two dialects a large number of Levenshtein distances are determined — one difference per word, and the mean difference over all words is calculated. It is a disadvantage of the method that it only takes segmental phenomena into consideration and leaves little room for the role which for example syntax and supra-segmental features such as intonation might play. In our case, morphology is included in the distance measurements since words from a running text with different morphological forms are compared. For further detail about the Levenshtein distances we refer to Kruskal 1999 and Heeringa 2004. The correlation coefficient between the aggregate Levenshtein distances and the aggregate perceptual distances (see above) is .68 ($n=225$, $p<.000$) when the distances which subjects perceived when listening to their own dialects and the corresponding Levenshtein distances (always equal to zero) are excluded. This shows that the Levenshtein distances are a good representation of the distances between dialects as perceived by listeners. On the other hand it also shows that listeners base their judgments of dialectal distances to a great extent on linguistic information. The results of the perceptual distances and the Levenshtein distance measurements will be used for the interpretation of the results in Section 3. For more detail about the distance measurements between Norwegian dialects see Gooskens and Heeringa (2004).

3. RESULTS

3.1 Identification of the original version

All listeners were asked to identify the same 15 dialects by putting a cross at a map of Norway in one of the 19 counties where they thought that the speaker came from. We expected it to be easier for the listeners to identify their own dialect than one of the other 14 dialects. For this reason we draw a distinction between listeners identifying the county of their own dialect (endogenous listeners) and listeners identifying the county of one of the other 14 dialects (exogenous listeners). In Figure 2 we present the percentage of correct identifications of the county where the speakers came from, separately for exogenous and endogenous listeners. As expected this percentage is fairly high for the endogenous listeners (67%). For the exogenous listeners the percentage is much lower (25%), though still well above chance level (5.3%). It is a rather difficult task to place a speaker in the correct county. Often a listener puts the cross in one of the neighboring counties. When looking at the crosses which were put in the correct county or in one of the neighboring counties we get a substantially higher percentage, 79% for the endogenous listeners and 52% for the exogenous listeners (see Figure 2). This means that in little more than half of the cases the exogenous listeners had some general idea where the speakers came from, but often they were not able to indicate the precise county.

Here Figure 2

Figure 2. Percentage correct identifications of county (chance level 5.3%) and county including surrounding counties, mean over all 15 dialects, broken down for listener group (exogenous and endogenous).

In order to show how well each of the dialects is identified we present the results of the identification of the county broken down for dialect for exogenous listeners in Figure 3. There appear to be rather large differences between how well the listeners are able to identify the different dialects. All dialects, except for the dialect of Lillehammer, have been identified significantly above chance. Mean percentage of correct identifications was 24.6 (see Figure 2). It can be useful to look at the kind of confusions which have been made systematically since this can give an idea of which dialect areas are perceptually similar and which are easy to distinguish. Figure 4 shows those dialects for which crosses were put in a non-adjacent county in more than 10% of the cases. This is shown by means of arrows from the dialects in question to the county with which the dialect was confused.

The five dialects in the Southeast (Halden, Larvik, Borre, Bø and Lillehammer) were poorly identified (between 4.5 and 10.7% correct identifications with a mean of 8.3%). The crosses were mainly put in one of the neighboring counties. However, as can be deduced from Figure 4 there were also many confusions between the southeastern dialects and the counties further to the north. The listeners obviously find it difficult to identify the exact county where these dialects are spoken. They can only identify them as dialects spoken somewhere in the southeastern part of Norway.

The dialects in the Southwest, Bergen and Bryne, and the dialect in the north, Mørkved, are recognized well (between 41.6 and 54.2%). There were no systematic

confusions with other counties. Apparently, these dialects are so well known or characteristic that many listeners find it easy to place them.

The rest of the dialects are all spoken in central Norway around Trondheim and form a middle group as far as the percentage correct identifications is concerned (between 20.7 and 31.4). The dialects of Trondheim and Lesja are often placed in more southern counties.

Here Figure 3

Figure 3. Percentage correct identifications of county by exogenous listeners broken down for dialect (chance level is 5.3%).

Figure 4 here

Figure 4. Dialects for which crosses were were put in a non-adjacent counties in more than 10% of the cases, original version. The confusions are indicated by means of arrows from the dialects in question to the county with which the dialect was confused.

It could be expected that dialects linguistically close to the dialects of the listeners are better identified than dialects which are less close. There is, however, only a weak relationship between linguistic distances and percentage correct identification. We examined correlations between the distance measurements gained from the perceptual experiments and the identification scores. Furthermore, we also examined correlations between Levenshtein distance measurements and the identification scores. In both cases we get low correlation coefficients, $r=.31$, $p<.000$ when correlating the percentages correct identification with the perceptual distances and $r=.35$, $p<.000$ when correlating correct identifications with Levenshtein distances. A number of reasons can be adduced for the fact that there is no straightforward relation between linguistic distance and percentage correct identification. Dialects which are well-known from, for example, the media or from personal contact can be expected to be better identified than dialects which are heard less often. Furthermore, some dialects might contain more elements which are characteristic or stereotypical for the particular dialect than others, which increases the chance that listeners recognize them. One single very characteristic element in a dialect, a so-called shibboleth, might be enough information for a listener for the recognition of a dialect. It is also possible that some dialects are identified more reliably than others because the speakers are more characteristic than others for the dialects in question. We will return to some of these points in Section 3.1.1 and Section 3.2.

3.1.1 *Comparison with the identification of Dutch language varieties*

In isolation, the results presented in Figure 2 only give us an impression of the ability of Norwegians to identify their dialects. It is not possible to characterize the quality of the level of identification. In order to put the results into perspective we will therefore compare the results to a similar experiment in the Dutch language area. Van Bezooijen and Gooskens (1999) and Gooskens (1997) report on listening experiments very similar to the experiments of the present study. Recordings of six Dutch language varieties (including standard Dutch and two Flemish varieties spoken in Belgium) were presented to six groups of young people from the places where the speakers originated. They were asked to identify the province from which the speakers came. They could choose between 17 provinces in Belgium and the Netherlands or the two standard varieties spoken in the two countries. So in total there were

19 different places to put the crosses just as in the Norwegian experiments (19 counties). This makes it possible to compare the results directly, the chance level being the same (1/19 = 5.3%). The results are shown in Figure 5. The endogenous listeners hardly show any difference as far as the percentage correct identifications is concerned (67% correct identifications for Norwegian as opposed to 70% for Dutch). A t-test showed the difference not to be significant[5] (t = -.131, df = 19). For listeners from both language areas it is equally easy to identify their own dialect. As far as the exogenous listeners are concerned, there is a significant difference of 10% between the two countries, the Norwegian listeners do not perfor as well as listeners from the Dutch language area (t = -2.85, df = 238). Apparently it is more difficult for Norwegian listeners than for Dutch and Flemish listeners to identify dialects from their own country[6].

As noted in the introduction, we expected the Norwegian listeners to have much experience with the identification of Norwegian dialects. Dutch people on the other hand are not confronted daily with a similar variety of different dialects as Norwegians. Dutch dialects are usually only spoken with other speakers of the same dialect, and only in informal situations and, furthermore, knowledge about dialects is not part of the curriculum at Dutch and Belgium schools. For these reasons the comparison of the Norwegian and the Dutch judgments gives results which are contrary to our expectations. There are a number of possible explanations for the fact that Norwegian listeners are not as good at identifying their own dialects as are Dutch and Flemish listeners.

The first reason is linguistic. It is possible that the linguistic differences between Dutch dialects are larger than between Norwegian dialects. Kristoffersen (2000) mentions that speakers of different Norwegian dialects have few problems understanding each other, probably due to the small variation among Norwegian dialects compared to what one finds in other European languages. In the Netherlands, on the other hand, people often have difficulty understanding dialect speakers from other parts of the country. On television, for example, subtitles are provided for programs when dialects are spoken. In order to confirm that the linguistic distances between dialects are larger in the Netherlands than in Norway, we compared objective linguistic distances between Norwegian dialects to similar distances between Dutch language varieties. The method used for measuring the distances was the Levenshtein distance (see Section 2). We measured the differences between 55 Norwegian dialects (including the 15 dialects in the present investigation) on the basis of phonetic transcriptions of the 58 different words in the text 'The Northwind and the Sun' which was also used for our identification experiment. The distances between the Dutch dialects were calculated on the basis of transcriptions of 100 isolated words pronounced by speakers of 27 different dialects (including the 6 dialects from the investigation on Dutch language varieties referred to above)[7]. The results of the distance measurements are shown in Table 1. From this table it is clear that, given the scale used, the differences between the Norwegian dialects are smaller than between the Dutch dialects; the mean is smaller for the Norwegian dialects (21.69) than for the Dutch dialects (36.62). This goes for the standard deviations as well (4.23 versus 8.18)[8]. This might be (part of) the explanation for the fact that it is more difficult for Norwegians to identify their dialects than for the Dutch listeners. If the distances between the Dutch dialects are large it might be easier for the listeners to distinguish between the different dialects than for the Norwegian listeners who are confronted with relatively more similar dialects.

	Norway	Netherlands
Minimum	7.82	10.94
Maximum	35.89	55.53
Mean	21.69	36.62
standard deviation	4.23	8.18

Table 1. Levenshtein distances between 55 Norwegian and between 27 Dutch dialects.

Second, it is possible that the different geographical situations in the two countries have resulted in different identification percentages. Holland is a country with a flat, regularly populated landscape with few natural obstacles such as mountains and rivers. This is in contrast to Norway, with its high mountains and many *fjords,* which have made it quite difficult to travel between places, especially in the past (see Bjørnland 1977). These differences in geographical situations are clearly reflected in the correlations between the linguistic distances and the geographical distances between the dialects of the two countries. When calculating the correlation coefficient between the Levenshtein distances and the geographic distances, we get a relatively high correlation in the case of Dutch data based on 350 dialects (r=.67, p<0.000) while the correlation is considerably lower in the case of the 55 Norwegian data (r=.22, p< 0.000). This seems to reflect the fact that for Norway it is not realistic to represent the contact distances between dialects by straight lines on a map, ignoring the intervention of mountains. It can be expected that the correlation with travel distances would give a higher correlation coefficient. The lack of a straightforward relationship between geographical distance and linguistic distance in Norway may make it more difficult for listeners to place the crosses on the correct place on a map of Norway. Norwegians have a general idea where the dialects are spoken, but may not be able to place them more precisely. Dutch people can use their geographic knowledge when placing a dialect on a map. For example, they may judge that when a dialect sounds very deviant it is spoken at a place far away. This relation is less straightforward for a Norwegian person.

Third, the Dutch material consisted of spontaneous speech while the Norwegian material was read speech. Many socio-linguistic studies have shown that people use more standard variants when reading out a text than when speaking spontaneously (Labov 1972, Trudgill 1974). Although the Norwegian speakers were allowed time to prepare their speech in order to use their dialects as naturally as possible, and although it is not unnatural for Norwegians to use their dialects in a formal setting,it is still possible that their speech was influenced by the fact that they were reading. However, we have some indications that the speech used in the Norwegian experiments was not less representative for the dialects in question than in the Dutch experiments. Like the Norwegian investigation (see Section 2), the Dutch identification experiments were part of a larger investigation where the listeners were also asked to judge the dialects on a scale. In the Dutch experiment, listener groups from 6 different places judged their own language variety as well as Standard Dutch on a scale from 1 (similar to own variety) to 10 (Standard Dutch), see Gooskens and Van Bezooijen 2002. In this way it is possible to get an impression of how representative the language of the speakers was for the dialects in question. When the listeners were asked to judge their own dialect, the mean judgments were very similar for the two countries, 2.22 (with a minimum of 1.7 and a maximum of 3.1) for the Dutch dialects and 2.25 (minimum 1.0 and maximum 3.4) for the Norwegian dialects. So, on average the speakers from the two countries were judged to be equally representative for the dialects in question. This means that there is little reason to assume that the difference in percentage correct identifications is a result of different speaking styles.

Finally, the explanation might be found in the selection of the dialects in the investigations. It is clearly important which dialects are chosen, but it is not clear which dialects should be chosen in order to give a representative picture of the ability of Norwegians and Dutch listeners to identify their dialects. The ideal experiment would consist of a random sample of dialects weighted for number of inhabitants. In the Dutch experiment there were six language varieties from different provinces in the Dutch language area. The Norwegian dialects were not perfectly distributed across Norway (see Figure 1)[9]. There is a cluster of dialects in the Oslo area in the southeast and a cluster in the Trondheim area. The dialects in the Oslo area are all poorly identified while the dialects around Trondheim are rather well identified (see Figure 3). This difference might be explained by the fact that the there are more counties in the southeast area which makes the chance of putting the cross in the wrong county larger. Since there is a cluster of dialects in the Oslo area in our material, it might appear that this is part of the explanation for the low identification scores in the Norwegian experiment. However, if we remove dialects from our material so that each county is represented by only one dialect, in order to have a more equal spreading of the dialects, the Norwegian results are only improved by 2 percent. It is also not a priori clear which geographic distribution of the dialects would be best. The dialects spoken in the geographical periphery are, in general, best identified in Norway while in the Netherlands these dialects were in general poorly identified. Including more dialects from the periphery would therefore probably have improved the Norwegian results while the Dutch identification scores might become lower.

Here Figure 5

Figure 5. Percentage correct identifications of county/province by Dutch/Flemish and Norwegian listeners, broken down for listener groups (chance level is 5.3%).

3.2 Identification of the monotonized version

Little is known about what listeners use to identify dialects. In this section we consider one property which is often mentioned as an important characteristic of Norwegian dialects, namely intonation (including word tones). When comparing the percentage of correct identifications of the two versions, original and monotonous, we will gain knowledge about the importance of intonation for the identification of the dialects. If intonation is indeed as important, as often presumed in the literature, we expect the percentage correct identifications to be significantly lower in the case of the monotonized version.

In Figure 6 we present the overall results of the identification of the monotonized version compared to the original version, broken down for listener groups (exogenous and endogenous, see Section 3.1). For the monotonized version, as for the original version, the listeners perform better when listening to their own dialect than when they have to identify a dialect different from their own. However, both listener groups clearly have greater difficulties identifying the dialects when intonation is not present. The differences are significant. For the endogenous listeners the difference between the two versions is almost 17% (t=2.827, df=14), for the exogenous listeners the difference is 9% (t=9.035, df=209). This means that it is more difficult to identify ones own dialect than other dialects when intonation is not present. The familiar dialect probably sounds strange to the listeners without the well-known intonation and they are not willing to accept it as their own dialect. It is therefore placed in another county. This effect is smaller for the less familiar dialects.

Here Figure 6

Figure 6. Percentage correct identifications of county over all 15 dialects, broken down for listener group and version.

In Figure 7 we have broken down the results for dialect. We see that there are large differences between how well the dialects are identified when intonation is removed. The dialects of Borre and Halden are not even recognized above the chance level (5.3%). The highest score is found for Bergen (36%). In almost all cases the original version is better identified than the monotonized version.

When comparing the percentages correct identification for the two versions it is clear that for some dialects intonation plays a more important role for the identification than for others. The largest differences between the two versions are found for the dialects of Mørkved (a difference of 23%), Bergen (19%), Verdal and Lesja (both 17%). Apparently listeners are very dependent on intonation when asked to identify these dialects.

Figure 7 here

Fig*ure 7.* Percentage correct identifications of county, broken down for dialect and version.

As with the original version, the confusions made with non-adjacent counties are shown by means of arrows in Figure 8. When presenting the results for the original version, we mentioned that the confusions made were mostly with neighboring counties. So the listeners place the crosses in the wrong county, but in many cases they are still able to identify the approximate area where the dialect is spoken. However, in the case of the monotonized fragments the exogenous listeners only place 39% of the crosses in either the correct county or an adjacent county (as opposed to 52% in the case of the original version). For the endogenous listeners this percentage is 69 (79% for the original version). This means that when the listeners have no information about intonation, in many cases they have trouble recognizing even the approximate area where the dialects are spoken. Many confusions with non-adjacent counties are the same as for the original version. This is especially true for the south-eastern dialects which are often identified as dialects spoken further to the north. A striking difference between the original and the monotonized version is that while the dialects of Trondheim and Lesja were often placed more to the south when the original version was identified, these dialects and the other dialects spoken in central Norway (Elnesvågen, Bjugn and Stjørdal) are often placed in the three northern counties when the intonation is absent. The only northern dialect in the investigation (Mørkved) on the other hand was well recognized in the original version. However, when the intonation is removed, the percentage of correct identifications is lower because of confusions with counties in the south (not visible in Figure 8 since none of the confusions were above 10%). So, it is clear that the identification of the original version is often differently distributed than the monotonized version, which suggests that the prosodic level is largely independent of the other linguistic levels. As far as the dialect of Bergen is concerned, this dialect is most often confused with the most southern county of Vest-Agder. This is not unexpected since Bergen is classified together with dialects in the whole south-eastern area in traditional dialectology, as well (Skjekkeland 1997).

Figure 8 here

Figure 8. Dialects which were confused with non-adjacent counties in more than 10% of the cases, monotonized version. The confusions are indicated by means of arrows from the dialects in question to the county with which the dialect was confused.

The results show a clear north-south dimension in the Norwegian dialect area, the dialects in the east not usually being confused with dialects in the west. As can be expected, linguistically similar dialects are more easily confused than less similar dialects. The data in Figure 9 are from Gooskens and Heeringa (2004). In this investigation linguistic distances were measured between the dialects used in the present investigation. The distances are Levenshtein distances (see Section 2)[10]. Darker lines correspond to linguistically close dialects, lighter lines to more distant dialects and linguistically very distant relations result in lines too faint to be seen. In Figure 9 we find the same north-south dimension as in Figure 8 which seems to confirm the conjecture that the confusions can to a large extent be explained by the linguistic distances between the dialects. Only the dialect of Bergen seems to disturb this picture. This dialect is linguistically close to dialects in the south-east and is perceived as similar in the judgment experiment, but is not often confused with these dialects. This might be explained by the high identification percentage of the dialect of Bergen (see Figure 7) which is a well-known dialect in Norway. The correspondence with Figure 4, where the confusions in the case of the original version are presented, is less strong. This is understandable since the results in this figure include the perception of intonation. In both Figure 8 and Figure 9 intonation was excluded from the material. When looking at traditional dialect maps of Norway we see that also here the most important dialect border separates the eastern dialects from the western dialects (Skjekkeland 1997).

Figure 9 here

Figure 9. Levenshtein distances between 15 Norwegian dialects. Darker lines correspond to linguistically proximate dialects, lighter lines to more distant dialects. Linguistically very distant relations result in lines too faint to be seen.

3.2.1 *Comparison with the identification of Dutch language varieties*

From the results in Figure 6 we can draw conclusions about the role which intonation plays for the identification of 15 Norwegian dialects. For both the exogenous and the endogenous listeners it is more difficult to identify the dialects correctly when they have no intonation to support the identification. In order to put these results into perspective we will compare them to results obtained from a Dutch identification experiment with similar data (see Section 3.1.1). In Figure 10 the Dutch results are presented together with the Norwegian results. The difference between the original and the monotonized version is significant for both the Norwegian listeners (t=9.035, df=209) and the Dutch listeners (t= 3.690, df = 29) in the case of the exogenous listener groups. As far as the endogenous listeners are concerned, there is only a significant difference between the versions in the case of the Norwegian listeners (t = 2.827, df = 14). So for Dutch dialects, intonation is hardly missed when the task is to identify one's own dialect, while for Norwegian listeners intonation is important for the identification of familiar as well as less familiar dialects. In Norway intonation is even more important when identifying one's own dialect than when identifying another dialect. In the case of Dutch language varieties, intonation is more important when identifying other dialects. This seems to confirm the remarks of Norwegian scholars that Norwegian listeners first of all use intonation when identifying a dialect. A Norwegian's own dialect might sound unfamiliar

when the expected intonational characteristics are not heard, and so it might be identified as the dialect from some other county. When the dialect not the listener's own, and hence the intonation is unfamiliar, the listener might be inclined to use other information, for example the knowledge of dialect characteristics learned at school. Dutch listeners are hardly distracted when intonation is removed from their own dialect, and they use it only to a limited degree when identifying other dialects.

Here Figure 10

Figure 10. Percentage correct identifications of county/province in the Norwegian and Dutch experiments, broken down for version and listener group.

In order to compare the role of intonation in the two languages we compared the relative identification power of the monotonized version in the two languages. To this end we calculated the correct responses for the monotonized version as a percentage of the correct responses for the original version for both listener groups and both language areas, using the percentages correct identifications from Figure 10 (see Table 2). For example the proportion for the exogenous listeners is $100*(15.64/24.66) = 63\%$. For the endogenous listeners the proportion is 75%. A low proportion suggests a greater importance of intonation for the identification of the dialects than a high proportion. It becomes clear from Table 2 that the proportions for the two versions are lower for the Norwegian dialects than for the Dutch dialects for both listener groups (a difference of 19% for the exogenous listeners and 21% for the endogenous listeners). This confirms our thesis that identification is more difficult for the Norwegian listeners when intonation is removed than for the Dutch listeners and it can thus be concluded that intonation is more important for the identification of Norwegian dialects than for the identification of Dutch dialects[11].

	Norwegian	Dutch
Exogenous	63	82
Endogenous	75	96

Table 2. Proportion of the number of correct identifications of county/province for the monotonized version and the original version, expressed in percentages, broken down for Norwegian and Dutch listeners and for listener group.

4. *Conclusions*

Contrary to our expectations the present investigation showed that young Norwegians are not able to recognize different Norwegian dialects as well as could be expected on the basis of the special status which dialects have in Norway. The results make clear that there are large differences between how well the different dialects are recognized and that the mean over all dialects is low compared to the results of a similar experiment which was carried out with Dutch dialects. Different linguistic and non-linguistic explanations were given for these results. It looks as if there might be a relation between linguistic variability within a country and the percentage of correct identifications. In a language area with large linguistic distances between the dialects, there are more characteristics in the individual dialects on which the listeners can base their identification. However, the results show that there is no straightforward correlation between linguistic distance between dialects and the percentage correct identifications

When looking at the correlation between geographic distances and linguistic distances in a country, there seems to be a relation here, too, with the extent to which the listeners were able to recognize the dialects. If the correlation is low, as is the case in Norway, it is probably difficult for the listeners to recognize the dialects because they have little support from their knowledge about the geography of Norway. It is not always the case that a linguistically very deviant dialect is spoken correspondingly far away or that a very similar dialect is spoken in a place close by. This makes the chance of locating the dialect in the right place smaller.

So far little empirical research has been carried out in order to gain information about which dialect characteristics Norwegian listeners use when identifying a dialect. Intonation has often been mentioned in the literature as an important cue for people when listening to a dialect. The second part of the present investigation was a first attempt to gain experimental evidence about the role of intonation for the identification of Norwegian dialects. In comparison with Dutch dialects, intonation turned out to be a more important cue for Norwegian listeners when asked to identify a dialect. When intonation was removed from a dialect fragment, it was difficult for Norwegians to identify a dialect. This effect was smaller in a Dutch setting. However, it should be kept in mind that it is not possible to draw conclusions about how well Norwegians can identify dialects on the basis of intonation, we can only conclude that when intonation is absent dialect identification is more difficult.

The results confirm the observations of several Norwegian scholars and they support the recommendation of Hognestad that teachers should pay more attention to intonation when teaching dialect characteristics. However, it is clear that to this end more investigation of intonational characteristics of the Norwegian dialects is needed.

AKNOWLEDGMENTS

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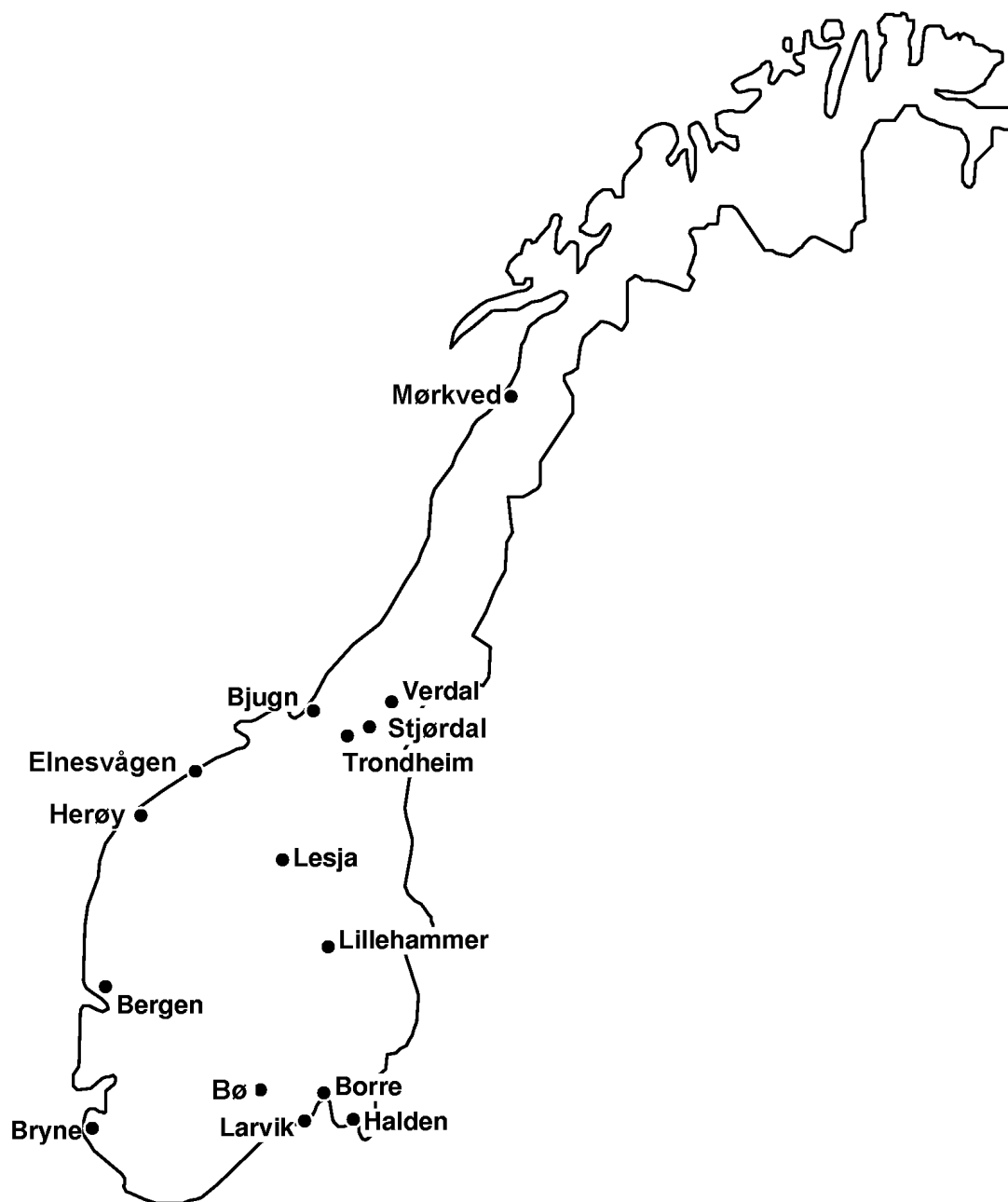
Figure 1 *Map of Norway showing the 15 dialects included in the present investigation.*
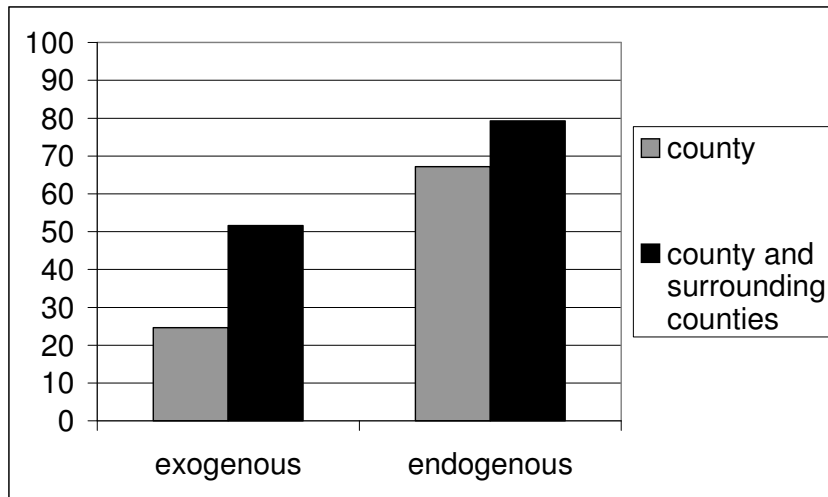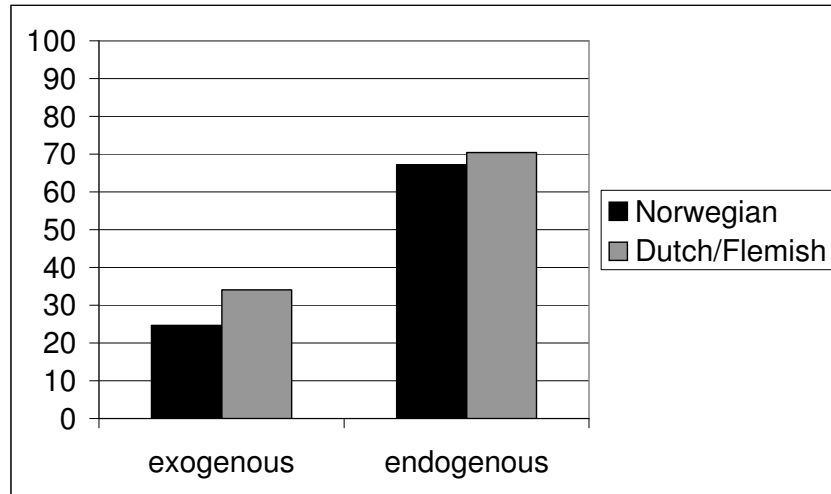
Figure 2. *Percentage correct identifications of county (chance level 5.3%) and county including surrounding counties, mean over all 15 dialects, broken down for listener group (exogenous and endogenous).*
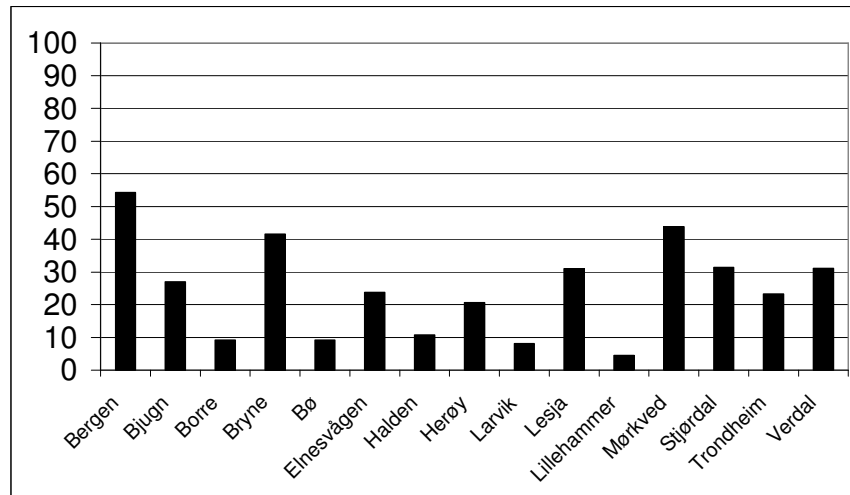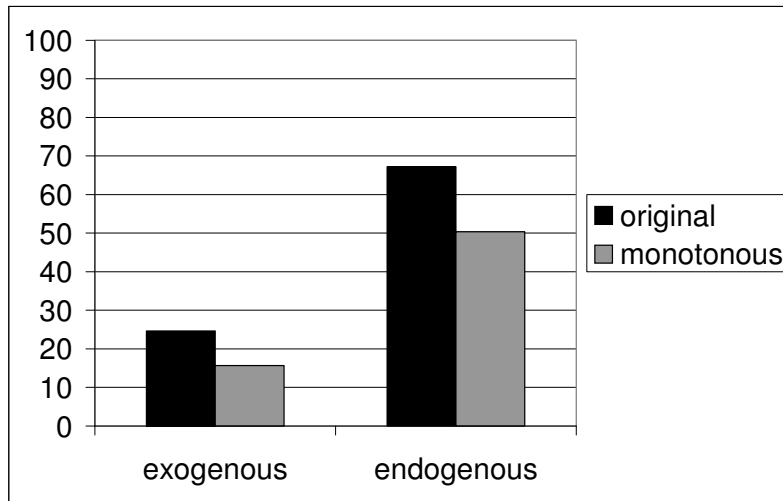
Figure 3. *Percentage correct identifications of county by exogenous listeners broken down for dialect (chance level is 5.3%).*
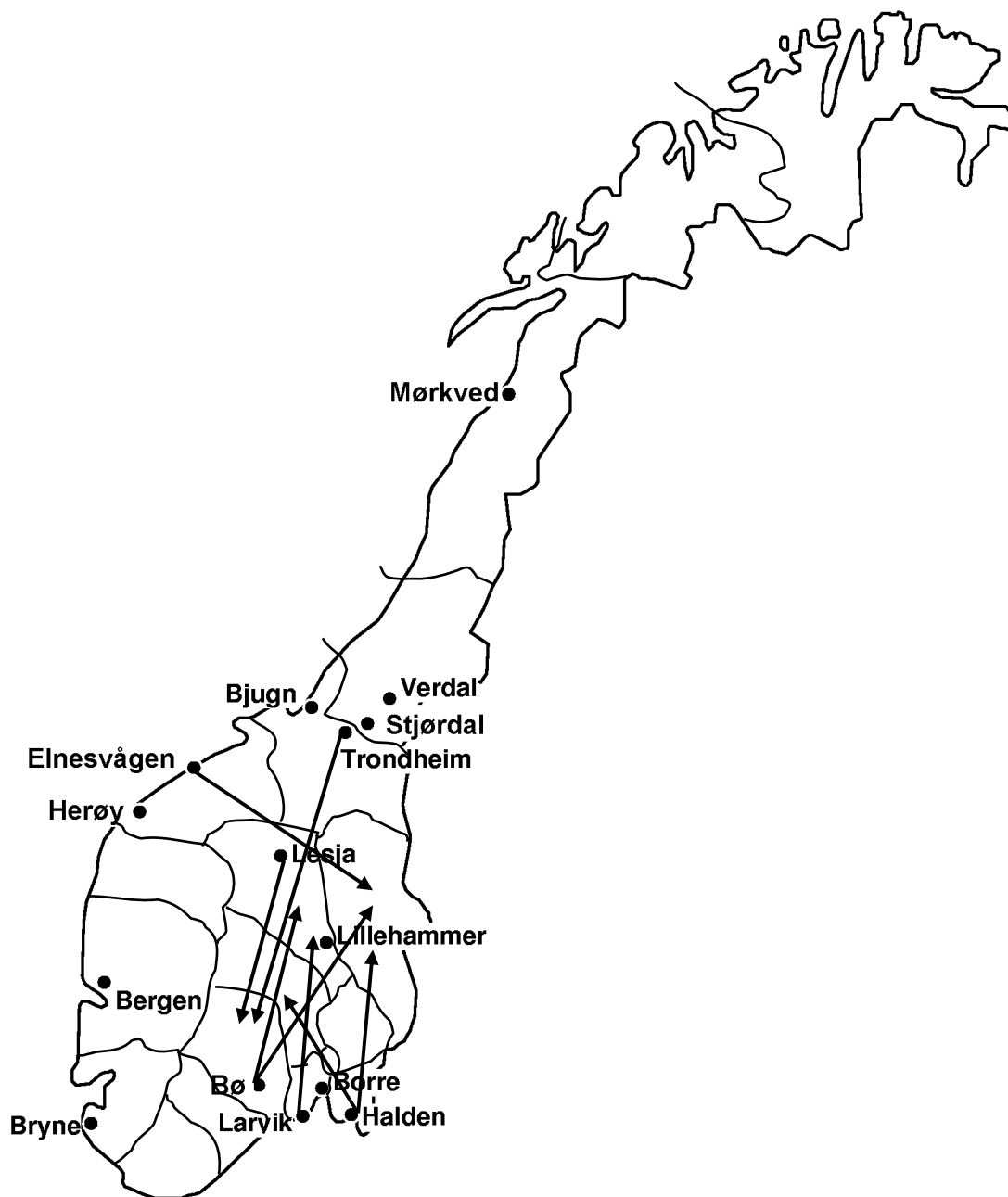
Figure 4. *Dialects for which crosses have been put in a non-adjacent counties in more than 10% of the cases, original version. The confusions are indicated by means of arrows from the dialects in question to the county with which the dialect has been confused.*

Figure 5. *Percentage correct identifications of county/province by Dutch/Flemish and Norwegian listeners, broken down for listener groups (chance level is 5.3%).*
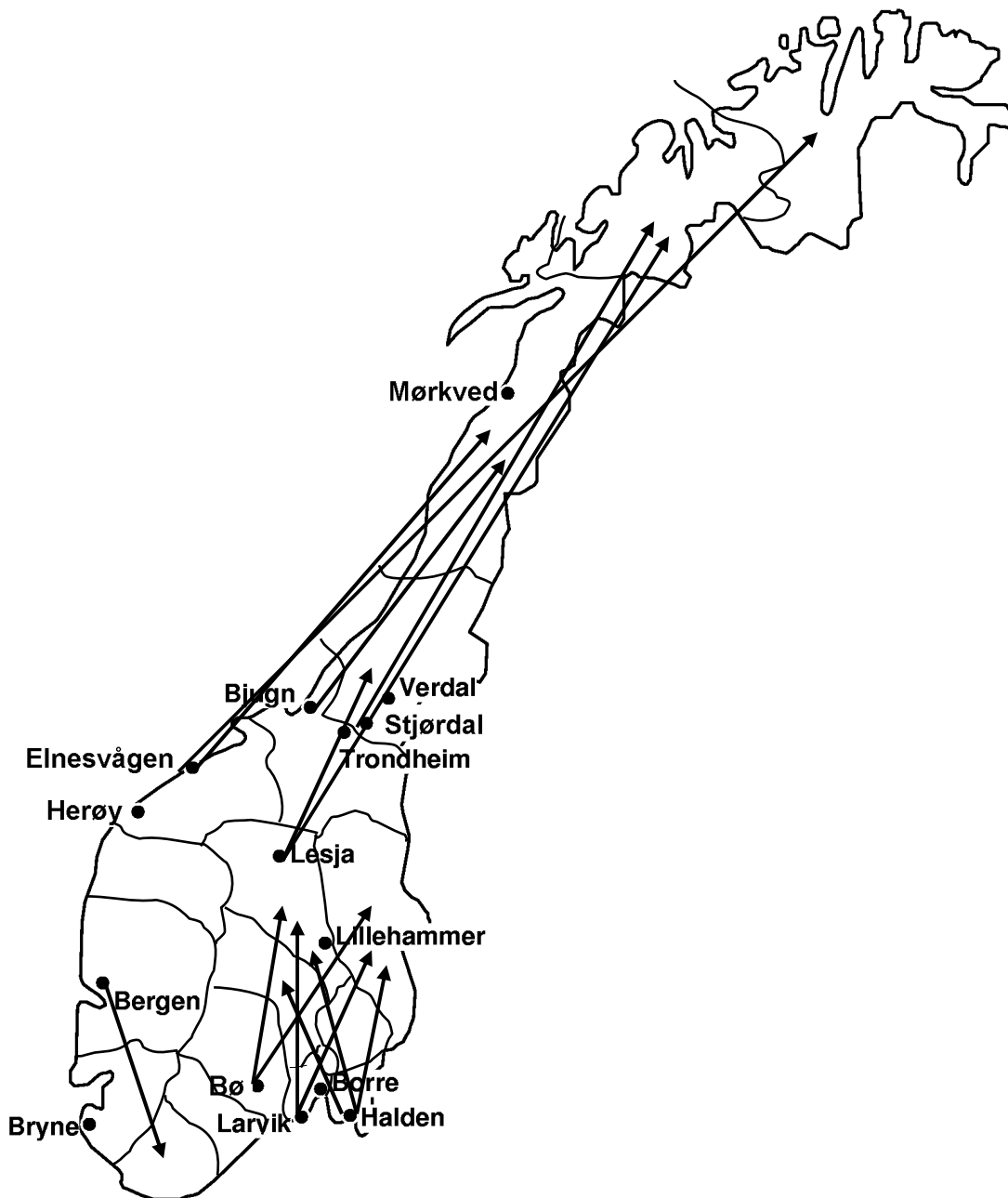
Figure 6. *Percentage correct identifications of county over all 15 dialects, broken down for listener group and version.*
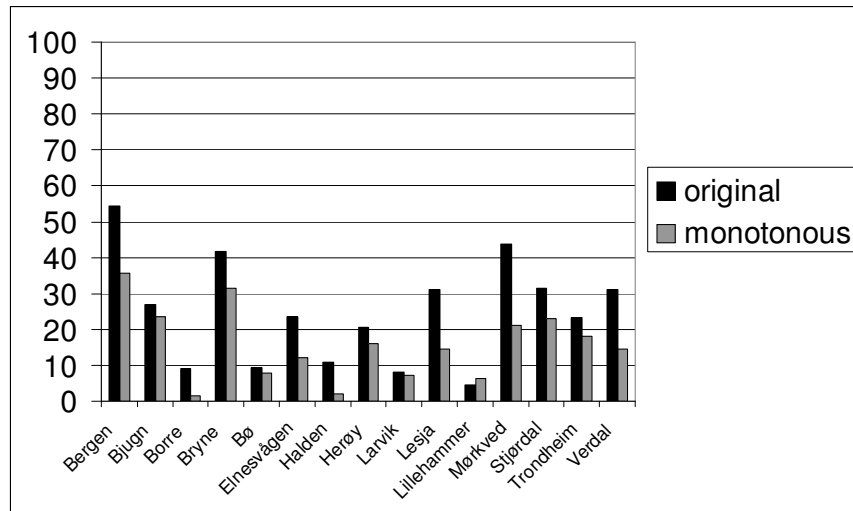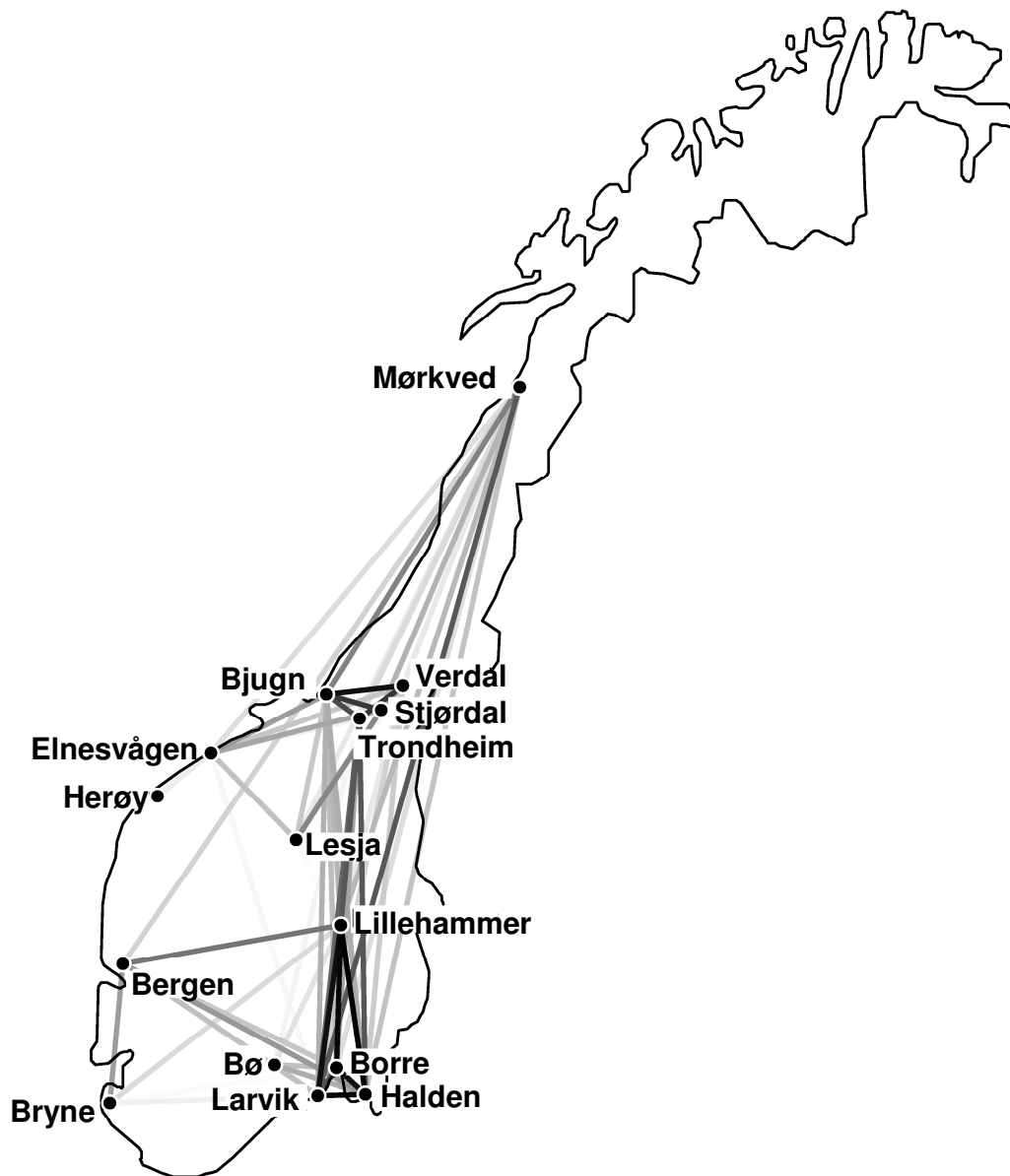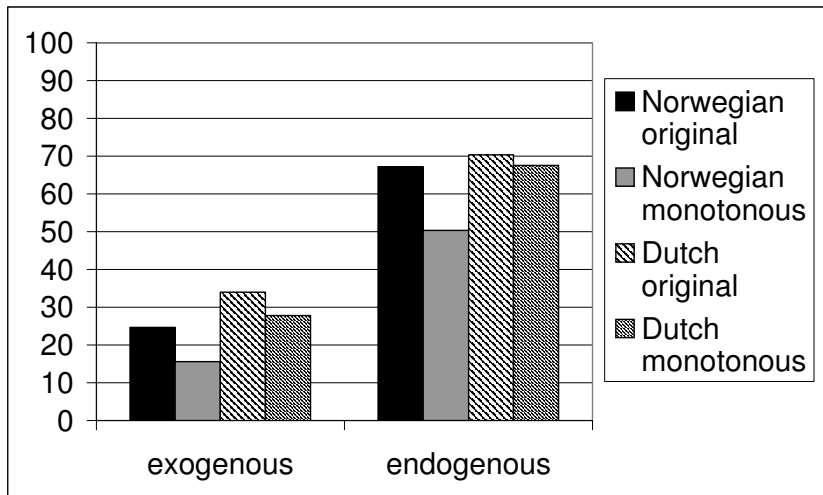
Figure 7. *Percentage correct identifications of county, broken down for dialect and version.*

Figure 8. *Dialects which have been confused with non-adjacent counties in more than 10% of the cases, monotonized version. The confusions are indicated by means of arrows from the dialects in question to the county with which the dialect has been confused.*

Figure 9. *Levenshtein distances between 15 Norwegian dialects. Darker lines correspond to linguistically proximate dialects, lighter lines to more distant dialects. Linguistically very distant relations result in lines too faint to be seen.*

Figure 10. *Percentage correct identifications of county/province in the Norwegian and Dutch experiments, broken down for version and listener group.*

NOTES

[1] The recordings were made by Jørn Almberg in co-operation with Kristian Skarbø at the Department of Linguistics, University of Trondheim and made available at http://www.ling.hf.ntnu.no/nos/ along with the phonetic transcriptions (in IPA as well as in SAMPA), see Almberg and Skarbø (2002). I am grateful for their permission to use the material and for the help of Jørn Almberg during the whole investigation.

[2] There are no dialects included in the material from the areas of Helgeland and Troms-Finmark in the north and Sørland in the south.

[3] http://www.fon.hum.uva.nl/praat/

[4] The data is taken from the *Linguistic Atlas of the Middle and South Atlantic States* (LAMSAS) and available via: http://hyde.park.uga.edu/lamsas/.

[5] Level of significance was tested at the .01 level in the whole investigation.

[6] In Gooskens 1997 the ability of a group of Standard Dutch listeners to identify 6 Dutch language varieties is compared to similar English results. The number of answer categories was larger for the Dutch listeners (19 provinces) than for the English listeners (15 areas) which makes it difficult to compare the results directly. However, when correcting the results for chance we see that the English listeners perform even better than the Dutch listeners do (a difference of 4%).

[7] The recordings and transcriptions were made by Renée van Bezooijen, University of Nijmegen. I am grateful for her permission to use part of the material for the present purpose.

[8] A comparison between means and standard deviations for perceptual data as well would have been desirable. This is however not possible since no perception experiment was carried out with the 27 Dutch dialects.

[9] When we started our investigation, only 15 dialect recordings were available so that we were not able to choose another geographical distribution of the dialects. At present more than 50 dialects have been collected (see note 1).

[10] This time calculated on the basis of spectrograms instead of features, see Gooskens and Heeringa 2004 for details.

[11] In Gooskens 1997 a similar comparison of proportions was made between Dutch and English dialects, but only based on a group of standard speaking listeners from each country. These results showed the role of intonation to be only slightly more important for the English listeners than for the Dutch listeners (a non-significant difference of 3% as opposed to 9% when comparing Norwegian results to Dutch results for the exogenous listeners). Therefore we expect that a direct comparison between English dialects and Norwegian dialects would show a more important role for intonation in the Norwegian language area than in the English area.