

## Chapter 1

# Introduction

Swedish nurse:	hon ringde te maj i morges, hon kunde inte finna sina dörrnycklar när hon skulle gå ti skolan <i>she called me this morning, she couldn't find her doorkeys when she was leaving for school</i>
Danish patient:	hendes: ø:h? <i>her uhm</i>
Nurse:	dörrnøjle <i>door key [Danish]</i>
Nurse:	nycklarna <i>the keys [Swedish]</i>
Patient:	nå nøglen til døren ja <i>oh the key to the door I see</i>
Nurse:	jahh <i>yes</i>

Ridell (2008:129), my translation in italics

Native speakers of Danish and Swedish can generally communicate with each other using their native languages. The two languages are closely related and generally mutually intelligible. However, as anecdotally illustrated in the conversation above, which was recorded at a Danish nursing home, this theoretical possibility is not always entirely successful. Given that Danish and Swedish have been regarded as separate languages for several hundred years, this is not entirely surprising. What is striking about the success and failure of Danish-Swedish oral communication, however, is the fact that the mutual intelligibility between spoken Danish and Swedish is asymmetrical. Danes tend to encounter fewer problems when they hear a Swedish person speak Swedish, than vice versa. This is a surprising tendency, as from a purely phonetic point of view, one could state that native (L1) speakers of Danish encounter the same sort of problems when they are confronted with spoken Swedish as the other way around, because the phonetic distance between the items in the two languages must be symmetrical. This thesis investigates which factors cause the

asymmetry in mutual intelligibility of spoken Danish and Swedish and thereby hopes to shed some light on which factors influence mutual intelligibility between closely related languages in particular and spoken language recognition in general. More specifically, the general impact of extra-linguistic factors for the asymmetry in mutual intelligibility between Danish and Swedish will be investigated and, subsequently, one of them, namely *language attitude* is thoroughly investigated in chapters 3 and 4. A second extra-linguistic factor, namely *literacy*, the knowledge of language-specific orthographic systems will also be investigated, as will the role of two linguistic factors that have hitherto not been investigated in the Danish-Swedish intelligibility context, namely the *tempo of speech* and the *number of reduction processes* in spoken language. In the closing chapter, a summary of the research results will be given and the general conclusions will be drawn as to which factors cause or boost the asymmetry in mutual intelligibility between spoken Danish and Swedish. In the present chapter a summary of previous research on mutual intelligibility of the mainland Scandinavian languages Danish, Norwegian and Swedish will be given.

### **1.1. Mutual intelligibility of Danish and Swedish**

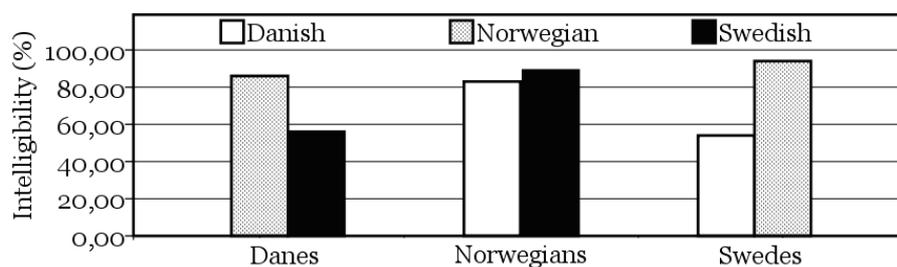
The Nordic countries Denmark, Finland, Iceland, Norway and Sweden as well as their associated territories Åland, the Faroe Islands and Greenland share history events as well as contemporary cultural and political norms. Their political and economic systems are characterised by generous welfare criteria and among other things emphasise gender equality and egalitarian benefit levels. The Nordic countries have co-operated officially in the Nordic Council since 1952 and in the Nordic Council of Ministers since 1972. Both authorities have strongly promoted inter-Nordic collaboration, e.g. by implementing the *Nordic passport union* in 1954 which allows Nordic citizens to travel and reside in any of the Nordic countries without a valid passport, by maintaining an inter-Nordic job exchange platform (*Nordjobb*, founded in 1985) and by emphasising the importance of using Nordic languages in inter-Nordic communication situations rather than a *lingua franca* such as English. Among other incentives, this was secured by the *Språkkonvention* ('language convention') that ensured that citizens of the Nordic countries are entitled to use their native language in written communication with authorities. Also, pupils in Finland, Iceland, Greenland, and the Faroe Islands learn at least one of the mainland Scandinavian languages in school, namely Swedish in Finland and Danish in the three remaining territories.

Particularly within mainland Scandinavia, i.e. the countries Denmark, Norway and Sweden, communicating across linguistic borders using the language of the speaker is a habit strongly encouraged by the authorities. Danes, Norwegians and Swedes are likely to use their native language rather than a *lingua franca* when speaking to each other. This manner of communication has been called *receptive bilingualism* by Hockett (1958) and *semicommunication* by Haugen (1966).

The first researcher to investigate mutual intelligibility in mainland Scandinavia was Haugen (1953). He elicited data on inter-Scandinavian communication patterns by asking Danish, Norwegian and Swedish members of *Föreningen Norden*<sup>1</sup> ('The Nordic Society') how much of the neighbouring language they thought they could understand. By this, he elicited self-reported intelligibility abilities. Haugen (1953) reports promising intelligibility scores for most of the six communication situations (Danish in Norway and Sweden, Norwegian in Denmark and Sweden, and Swedish in Denmark and Norway), as intelligibility is above 80% for four of the language pairs (see Figure 1). However, communication between Danes and Swedes seemed to be problematic. More specifically, the Danish participants in his study report understanding only 56% spoken Swedish, while the Swedish participants reported 54% spoken Danish. Haugen's 1953 publication was written in Norwegian, but 13 years later, he published his findings in English as Haugen (1966).

Haugen's (1953; 1966) study was pioneering work and documented communication patterns (or rather, self-reports hereover) in Scandinavia of the early 1950's. In the 1970's, several short articles were published dealing with linguistic influence between the mainland Scandinavian languages, such as Bergman's *Svenska lån från danskan, norskan och finskan* ('Swedish loan words from Danish, Norwegian and Finnish', 1971), Karker's *Om svensk og norsk indflydelse på moderne dansk* ('Swedish and Norwegian influences on contemporary Danish, 1971) and Lindegård Hjorth's *Nabosprogene i den højere danske skole* ('Neighbouring languages in Danish high school, 1972). However, while the 1970's experienced a great scientific and popular interest in this topic, Denmark seemed to take a big step away from the Scandinavian community politically in 1973, when the country was the first of the Nordic countries to join the European Economic Community (EEC), the precursor of the European Union (EU).

**Figure 1.** Self-reported intelligibility scores reported by Haugen (1966).

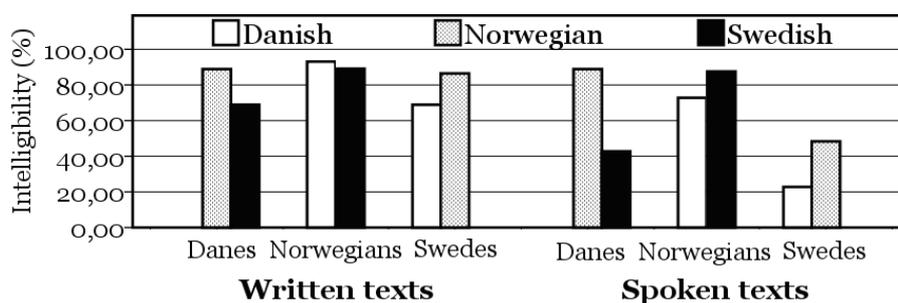


After Haugen's (1966) publication, it took a decade before the topic of mutual intelligibility was picked up in an experimental investigation. This was done by Maurud (1976). In contrast to Haugen (1966), who based his study on the participants' self-reported comprehension abilities, Maurud (1976) conducted an

<sup>1</sup> Föreningen Norden is a non-governmental organisation which promotes cooperation between the five Nordic countries Denmark, Finland, Iceland, Norway and Sweden and their associated territories Åland, the Faroe Islands and Greenland.

experimental investigation to assess exactly how much of their neighbouring languages Danes, Norwegians and Swedes could understand. He did so by presenting the participants from the three capital cities Copenhagen, Oslo and Stockholm with the neighbouring languages in a translation task. The highest intelligibility scores for spoken language reported by Maurud (1976) were achieved by Norwegians confronted with Swedish (median = 78.8 from 90 points, i.e. 87.5%), while the lowest scores were obtained by Swedish listeners confronted with Danish (median = 20.5 from 90 points, i.e. 22.7%). The intelligibility scores as elicited by Maurud (1976) are given in Figure 2.

**Figure 2.** Intelligibility scores reported by Maurud (1976) transformed into percent.



Importantly, not only the manner of data elicitation differed from Haugen, but so did his results, particularly those on Danish-Swedish communication. According to Maurud (1976), Danes and Swedes still seemed to encounter the biggest problems when communicating with each other. However, while the Danish-speaking participants in his study could understand about 43% of spoken Swedish, the Swedish-speaking participants only understood 23% of spoken Danish. That means, while Haugen (1966) reported that Danes and Swedes (thought that they) could understand a similar amount of their neighbouring language, Maurud (1976) reported that Danes actually comprehend more spoken Swedish than vice versa. Interestingly, the intelligibility asymmetries reported for written texts are much less pronounced than those for spoken texts.

One of the major criticisms of Maurud's (1976) investigation (Gregersen 2004), however, has been the fact that he compared the intelligibility of Swedish among Danes in Copenhagen to intelligibility of Danish among Swedes in Stockholm. As Copenhagen is located only 30 kilometres from the Swedish border, while Stockholm is located about 570 kilometres from the Danish border, there is a substantial geographical asymmetry in the data (see Figure 3). This geographical asymmetry is likely to be linked to an asymmetry in patterns of contact with the neighbouring language, such as through travelling to the neighbouring country, talking to people visiting their own country, or even watching television in the neighbouring language. While people living in Copenhagen in the 1970s could access Swedish broadcasting programmes and could easily visit the neighbouring country, people living in Stockholm neither could watch nor listen to Danish broadcasting programmes, nor

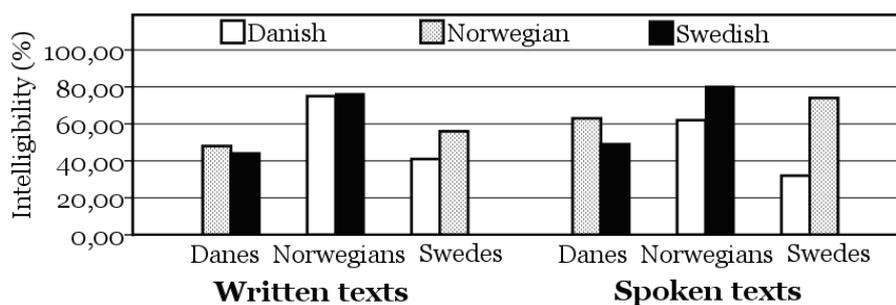
could they cross the border to Denmark within a couple of hours. The fact that Swedish participants had a lower intelligibility score than the Danish participants might partly be linked to the geographical asymmetry. However, Maurud's (1976) conclusion was that "Swedes' low understanding of the neighbour languages is a sign that the habit of hearing them and the attitude towards the need for understanding them are of major importance for the Scandinavians' ability to communicate with each other in their respective languages" (Maurud 1976: 71), thereby suggesting that attitudes towards a specific language held by the listener are linked to the listener's intelligibility of that language.

**Figure 3.** Map of Scandinavia.



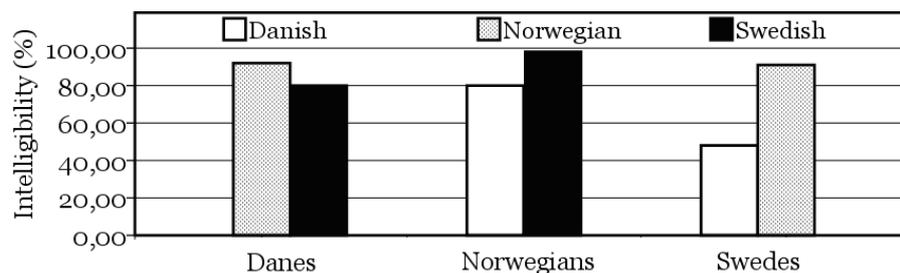
Two years after Maurud's study was published, a third investigation of mutual intelligibility of Danish, Swedish and Norwegian (Bø 1978) saw the light of the day. Interestingly, this study picked up the factor that was considered to distort Maurud's (1976) data, namely the amount of contact with the neighbouring languages. In all three Scandinavian countries, the subjects in Bø's (1978) study were chosen to form two groups, one living inside and one living outside the border regions. Indeed, the group of subjects living in the border regions not only had more opportunities to visit the neighbouring country, but also had access to television programmes in the neighbouring language. Overall intelligibility scores per group of L1 speakers as reported by Bø (1978) are given in Figure 4.

**Figure 4.** Intelligibility scores reported by Bø (1978).



Bø (1978) found that subjects living near the border had fewer difficulties decoding the neighbouring variety than subjects living outside the border region, thereby indicating that a high degree of contact enhances intelligibility abilities, and, at the same time, confirming that Maurud's (1976) data has to be interpreted with caution. After publication of Bø's (1978) study, the interest in mutual intelligibility between the Scandinavian languages seemed to decrease. Not much research was conducted in this field in the 1980's. In 1991, Börestam Uhlmann elicited self-reported intelligibility of the three Scandinavian languages in Danes, Norwegians and Swedes. The intelligibility results are given in Figure 5. Three years later, just before Sweden followed Denmark into the European Union with a 22-year delay in 1995, Börestam Uhlmann (1994) published a monograph entitled *Skandinaver samtaler* ('Scandinavians communicate') and picked up the topic of inter-Nordic communication again. Her work focuses on communicative strategies such as linguistic accommodation by the speaker, i.e. repetitions, clarifications, confirmations or paraphrases used towards the listener. She analysed ten videotaped discourses between speakers of Danish, Norwegian and Swedish.

**Figure 5.** Intelligibility scores reported by Börestam Uhlmann (1991).



Börestam Uhlmann (1991) reported a Danish-Swedish asymmetry similar to the one found in the experimental studies by Maurud (1976) and Bø (1978). One of the main findings from Börestam Uhlmann (1994) on accommodation towards the listeners was that Swedish speakers and listeners seemed to create the majority of misunderstandings in communication situations between two or three speakers of different languages.

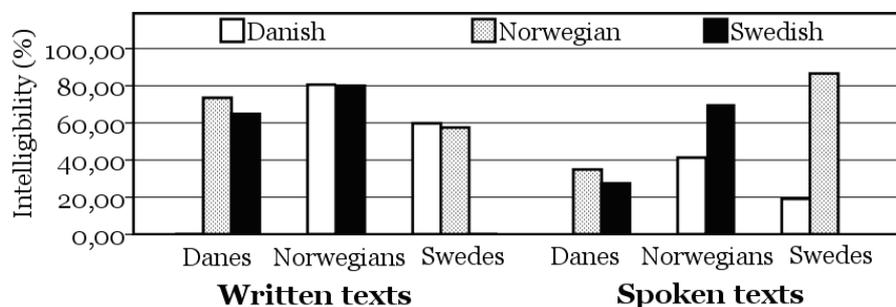
In 2001, an investigation by Lundin & Zola Christensen was published, which investigated mutual intelligibility of written texts by Danish and Swedish high school students. Again, it was reported that Danish participants comprehended more Swedish (namely 79.4%) than vice versa (69.6%), this time in a translation task of a newspaper article which was used in its original Danish form, and a version that had been translated to Swedish. However, this asymmetry is not as pronounced as has been typically reported for spoken language recognition.

At the same time, a large-scale project was initiated outside of Scandinavia, namely at the University of Hamburg in Germany. In the context of the

Sonderforschungsbereich Mehrsprachigkeit ('Collaborative Research Centre Multilingualism'), funded by the German Research Foundation (DFG), a group of researchers started to investigate mutual intelligibility in Scandinavia. The focus in this group has been on discursive strategies such as accommodation of the speakers towards each other (Braunmüller 2002, Zeevaert 2004, Golinski 2007), rather than quantifying success and failure of semi-communication.

Isochronically with the ending of the Hamburg project in 2005, a large-scale investigation of inter-Nordic communication patterns and abilities was published by Delsing and Lundin Åkesson (2005). To avoid repetition of the shortcomings of Haugen's (1966) and Maurud's (1976) studies, such as diverging attitudes or contact patterns across the groups of subjects, they elicited language attitudes held towards the fellow Nordic languages as well as contact patterns among different groups of participants from the Nordic countries, along with spoken and written text comprehension. The groups of participants hailed from at least two different sites per country, except for Finland, Åland, Greenland and the Faroe Islands. Danes were tested in Århus (340 km from Sweden via land route and 170 km via sea route) and Copenhagen, while Swedes were tested in Malmö (40 km from Danish mainland) and Stockholm. Thereby, the geographic asymmetry was somewhat neutralised, although Stockholm is still roughly two to three times as far from Denmark as Århus is from Sweden. Figure 6 gives intelligibility scores for the three Scandinavian languages.

**Figure 6.** Intelligibility scores reported by Delsing & Lundin Åkesson (2005).



Confirming Maurud's (1976), Bø's (1978), and Börestam Uhlmann's (1991) findings, Delsing & Lundin Åkesson (2005) reported an asymmetry in mutual intelligibility between Danish and Swedish, where Danes have fewer difficulties in decoding Swedish than vice versa. In line with Gregersen's (2004) comment, they found that Danes from Copenhagen reported to have more contact with Swedish than Swedes from Stockholm have with Danish. The contact scores were calculated on the basis of the participants' self-reported contact patterns with regard to TV, visit, and newspapers. However, Swedes living on the other side of the Öresund in Malmö (i.e. very closely to Denmark) have even more contact with Danish. It has to be born in mind, however, that the Öresund Bridge was opened in 2000, closely connecting Malmö and Copenhagen. That means that the contact indices, particularly those for

Malmö and Copenhagen inhabitants, are likely to be higher in Delsing and Lundin Åkesson's (2005) study compared to Maurud's (1976) study due to the enhanced access to the neighbouring country. Delsing and Lundin Åkesson (2005) report a significant link between intelligibility and the amount of contact. However, two limitations to this result have to be pointed out. Firstly, they do not report correlation coefficients, but significance values only. The effect that the amount of contact has on intelligibility can therefore not be derived from their publication. Secondly, although they collected data from four sites which were shown to differ substantially with regard to the amount of contact to the neighbouring country (Århus and Copenhagen in Denmark and Malmö and Stockholm in Sweden), Delsing and Lundin Åkesson (2005) correlated intelligibility and contact in two subgroups (Danish participants and Swedish participants) only, thereby merging a high-contact and a low-contact group into the same analysis. It is possible that there is no causality in the correlation between contact and intelligibility they report, as there could be more factors involved. Evidence that attitude and intelligibility are not directly linked to each other but may be highly intercorrelated comes from Gooskens & Hilton (in press). In their investigation of Danish intelligibility in Norwegian pupils from the northernmost province Finnmark (2000 km from Denmark) and the southernmost province Buskerud (300 km from Denmark) they report that geographical distance was not significantly correlated with intelligibility, but instead, with language attitude. Participants who lived closer to Denmark had been to Denmark more often than participants who lived further away from Denmark. Importantly, however, they also turned out to hold more positive attitudes towards Danish. Even if Delsing and Lundin Åkesson's data (2005) report significant correlation coefficients, it can therefore not be concluded that there exists a causal relationship between intelligibility and contact.

A second focus of Delsing and Lundin Åkesson's (2005) study was an empirical investigation of the proposed link between intelligibility and the attitudes held towards the neighbouring language and the neighbouring country. The participants were asked how much they liked the sound of the neighbouring language, and whether or not they were willing to move to the neighbouring country. They reported that Danes found the Swedish language more beautiful than vice versa, while Swedes were more positive towards moving to Denmark than Danes were towards moving to Sweden. They also report that Danes' comprehension abilities correlate significantly and positively with their judgment of how beautiful the Swedish language sounds and that Swedes' comprehension abilities correlate significantly and positively with their willingness to move to Denmark, while neither Danes' comprehension of Swedish and their willingness to move to Sweden correlated, nor Swedes' comprehension of Danish and their judgment of the beauty of the Danish language. Unfortunately, no correlation coefficients were reported in this subsection either, which makes it difficult to determine the amount of the variance explained by this factor. For the first time, however, empirical evidence was presented supporting the assumption that intelligibility and language attitudes are linked within the Scandinavian language

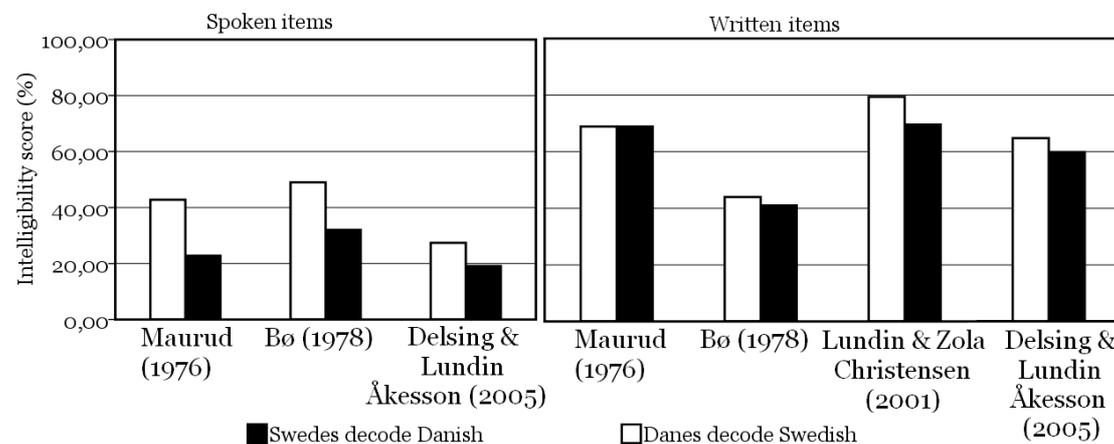
area – although the nature of this link is still unclear. It is possible that listeners holding positive attitudes make a greater effort to understand the language in question than those holding negative attitudes, but it might also be the case that those participants who understand the language better, simply perceive the language as being more beautiful because their comprehension makes them feel as part of the speech community and facilitates a development of positive feelings towards a said variety. It is also possible that language attitude and intelligibility are not directly linked, but covary with the amount of contact, i.e. that listeners who live close to the border hold more positive attitudes towards their neighbouring country and therefore make a greater effort to understand its speakers. Intelligibility scores reported by Delsing and Lundin Åkesson (2005) are given in Figure 6. Again, it can clearly be seen that this study confirmed earlier findings that Danes understand more spoken Swedish than vice versa, while this asymmetry seem less clearly pronounced for written texts (Maurud 1976, Bø 1978).

Another large project on mutual intelligibility between the Scandinavian languages entitled *Linguistic determinants of mutual intelligibility in Scandinavia* was located at the University of Groningen from 2006 to 2011. Funded by the Netherlands Scientific Organization (NWO), the focus in this project has been on assessing how well speakers of Danish, Norwegian and Swedish understand each other and which linguistic factors influence their comprehension abilities (see below). Within this project, Gooskens (2006) reanalysed a subset of the data elicited by Delsing and Lundin Åkesson's (2005) which was chosen to keep the educational background of the participants similar across the language groups. In this subset, Gooskens (2006) could not confirm any significant correlation between contact and intelligibility. She reported only a limited correlation between language attitudes and intelligibility, so the question as to whether language attitudes and contact with the neighbouring language plays a role for the degree of mutual intelligibility still remains. Within the framework of the project, a series of experiments has been conducted. This thesis has been written as a part of this project.

To sum up, Norwegians tend to have the fewest problems understanding their fellow Scandinavian languages, while communication between Swedes and Danes is somewhat more difficult. In previous investigations, mutual intelligibility between spoken Danish and Swedish has been reported to be asymmetrical, in that Danes have fewer problems decoding spoken Swedish than Swedes have decoding spoken Danish (see Figure 7). A number of factors have been suggested to cause the asymmetry in mutual intelligibility of spoken Danish and Swedish. Maurud (1976) suggested that the asymmetry in mutual intelligibility is due to extra-linguistic factors such as different attitudes towards the neighbouring language and/or an asymmetric amount of contact to the neighbouring language. Bø (1978) presented evidence in favour of the latter hypothesis and reported that access to broadcast programmes in the neighbouring language enhances intelligibility of that language, while Delsing & Lundin-Åkesson (2005) concluded that contact as well as language attitudes correlate

with intelligibility. However, Gooskens (2006) could not confirm the link between intelligibility and the amount of contact.

**Figure 7.** Danish-Swedish intelligibility scores for reported by Maurud (1976), Bø (1978), and Delsing & Lundin Åkesson (2005).

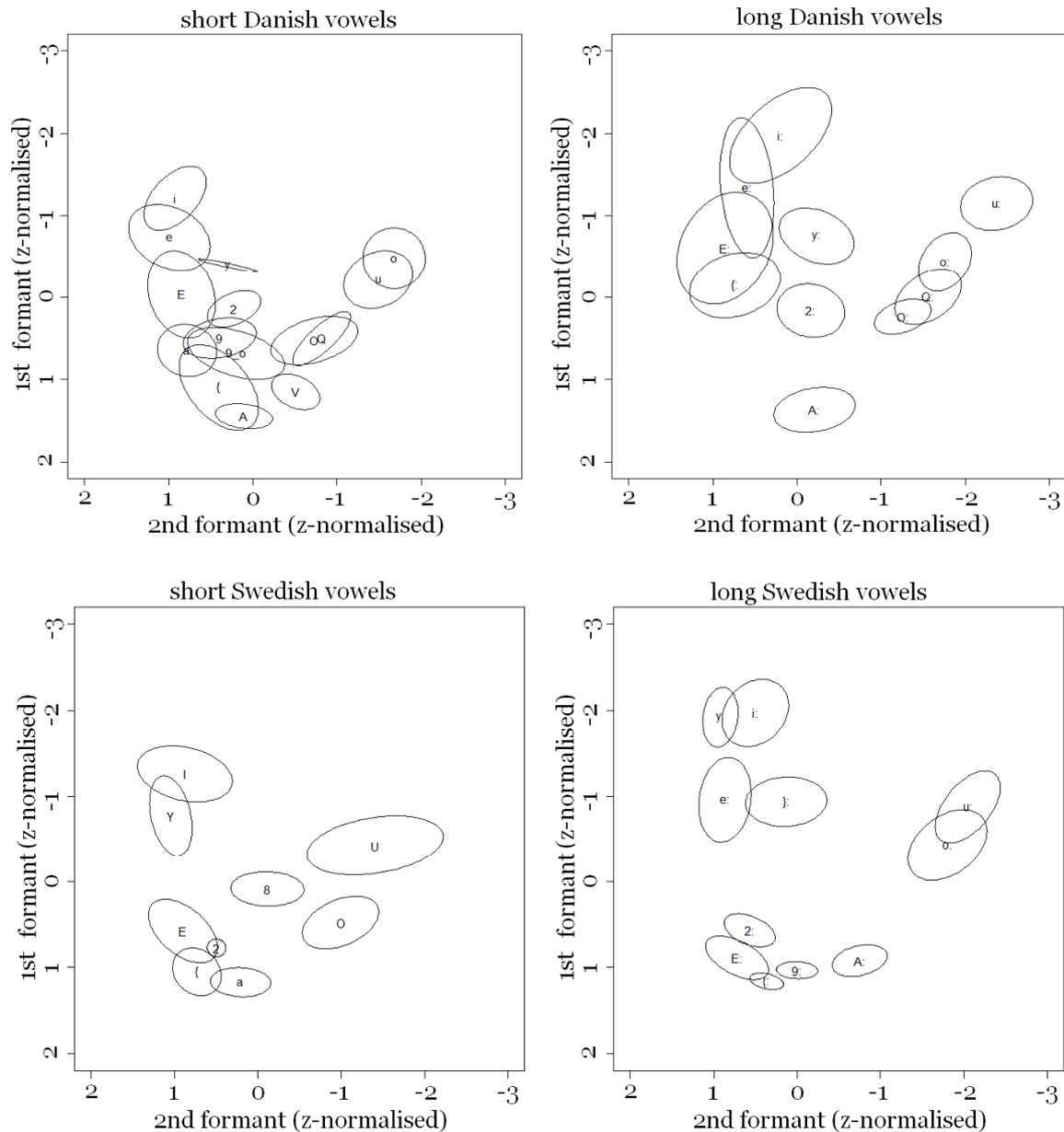


Interestingly, the consistently reported asymmetry between Swedish and Danish-speaking listeners is not as strong in intelligibility of written texts (Maurud 1976, Bø 1978, Lundin & Zola Christensen 2001, Delsing & Lundin Åkesson 2005; see Figure 7). This seems to suggest that the asymmetry between the spoken forms is mainly caused by factors that are inherent in spoken language. Danish and Swedish differ in a number of linguistic features such as vowel space (Disner 1978, Vanhove et al. 2010) and some suprasegmental features such as *stød* and tone accents. These linguistic factors might also play a role in the asymmetry in mutual intelligibility. Some studies that have investigated the link between these factors and mutual intelligibility of Danish and Swedish are summarised below.

Gooskens & Kürschner (2010) investigated the role of different suprasegmental factors for the asymmetry in mutual intelligibility. In contrast to Danish, Swedish is a pitch-accent language and has two different tonal patterns, either of which is assigned to every word (accent 1 or accent 2). Gooskens & Kürschner (2010) report that Swedish listeners have more difficulties to decode Danish words which have accent 2 in Swedish, than those that have accent 1, while none of the Swedish accents has a detrimental effect on Danish listeners.

Furthermore, the phonemic vowel inventory of Standard Swedish generally consists of nine long and nine short distinctive vowels (e.g. Leinonen 2010), while the Danish phoneme inventory is mostly described as consisting of more contrastive vowels than that with 12 distinctive long vowels and 13 distinctive short vowels (e.g. in Basbøll, 2005:50). What is more, Vanhove et al. (2010) found that this asymmetry is not counterbalanced in realisation of the vowels by narrowing each Danish vowel space in comparison to Swedish vowel spaces, which generally leads to much more overlap between the specific vowels in Danish than in Swedish (see Figure 8).

**Figure 8.** Z-normalised vowel spaces of long and short vowels in Danish and Swedish (Vanhove et al. 2010). The vowels are labelled with XSAMPA characters (Wells 1995).



**Conversion table XSAMPA – IPA**

XSAMPA	i	e	E	y	2	a	9	9_0	{	A	V	O	Q	u	o	I	8	}
IPA	i	e	ɛ	y	ø	a	œ	ø	æ	ɑ	ʌ	ɔ	ɒ	u	o	ɪ	ə	ʊ

Figure 8 shows z-normalised vowel spaces of long and short vowels in Danish and Swedish (Vanhove et al. 2010) based on formant measurements for every transcribed vowel type. It can be seen that the variance in realisation of the different vowels differed across vowel types, vowel lengths and language. For example, in Danish, the tokens for the vowel type transcribed with the IPA character /ɛ/ (XSAMPA character /E/) actually differed more in their formants than the tokens for the vowel /ɑ/

(XSAMPA character /A/) did, i.e. the realisation of /ɛ/ seems more variable than the realisation of /ɑ/. Also, in Danish, the long vowel /ɛ:/ occupied a somewhat larger space than the short vowel /ɛ/ did, i.e. the realisation of /ɛ/ is more variable when the vowel is long. Finally, it can be seen that the vowel spaces occupied by Danish vowel types are roughly the same size as the ones for Swedish vowel types. As there are more vowel types in Danish than in Swedish, this leads to a significantly larger overlap of Danish vowels compared to Swedish vowels, which in turn makes it more difficult to recognise a vowel in Danish, than in Swedish.

In addition to differences in the vowel inventory, Danish has a supra-segmental feature that is not found in Swedish, namely the *stød*. *Stød* is generally described as a realisation of creaky voice or laryngealisation (Grønnum 1998: 179; Basbøll 2005: 83). There are monosyllabic and polysyllabic minimal pairs which differ only with regard to absence or presence of *stød*; however, in some Danish regiolects no *stød* is employed. Gooskens & Kürschner (2010) showed that the presence or absence of *stød* does not significantly impact intelligibility. This is the case for Danish subjects listening to Swedish, i.e. expecting the *stød* in certain words, as well as for Swedish subjects listening to Danish, i.e. confronted with an unfamiliar phenomenon.

On a phonological level, reduction processes such as schwa-assimilation and the vocalisation of consonants are well-documented phenomena in Danish (Basbøll, 2005; Grønnum, 1998; Grønnum, 2007). Doetjes (2010) pointed out that the word-final /d/ has been deleted in the Danish word *land*, which is pronounced /lɛn<sup>?</sup>/ in contemporary speech, while it is still pronounced /land/ in Swedish. Deletion processes are still ongoing in contemporary Danish (Pharao 2010), where e.g. words such as *helt* /he:l<sup>?</sup>d/ ‘completely’ are increasingly reduced to /he: <sup>?</sup>l/. This is not the case in Swedish. Bleses et al. (2008) suggested that the high number of reduction and assimilation processes in Danish causes or boosts the delay in vocabulary development in Danish infants and children compared to that of their peers from ten European countries and from the US and Mexico. They point out that schwa-deletion and the vocalisation of consonants result in long vocalic stretches, making the Danish sound structure unclear with weak, or even no, cues for word and syllable boundaries. The number of reduction processes therefore has to be considered an important linguistic factor that differs across Danish and Swedish.

Doetjes & Gooskens (2009) suggested that literacy plays an important role for the asymmetry. Danish orthography is more conservative than Swedish orthography is, and generally reflects a pronunciation which is closer to its East Nordic root. As spoken Swedish has stayed closer to this root, it could be hypothesised that Danish listeners can use their orthographic system as an additional cue when they hear spoken Swedish. By calculating phoneme-grapheme consistencies for written Danish and spoken Swedish as well as written Swedish and spoken Danish, they confirm that Danes generally have more advantages from their native orthography than Swedes have. For example, it is likely that literate Danes confronted with the Swedish word /land/ can use their orthographic knowledge to match this word to their native correspondent *land*, while this is not the case for Swedish listeners confronted with

Danish /len/, as there is a phoneme missing which is present in Swedish pronunciation as well as orthography. However, it is not clear whether or not L1 orthography actually can be accessed during word recognition of a closely related L2, so the question remains whether Danish orthography serves as an additional cue during spoken language recognition of Swedish in Danish listeners.

Another linguistic factor linked to reduction is speaking rate. The faster an utterance is completed, the more segments have to be assimilated, lenited or deleted. Vice versa, the more reduction processes that are found in an utterance, the shorter the time must be to complete it. As previous research has shown that a higher speech rate impairs intelligibility (Vaughan & Letowski 1997, Gordon-Salant et al. 2007), the suggested higher amount of reduction in contemporary Danish might cause or increase the asymmetry in comprehension by impairing the intelligibility of spoken Danish for Swedish-speaking listeners.

## **1.2. Overview of the thesis**

This thesis focuses on the question why mutual intelligibility between Danish and Swedish is asymmetrical. As indicated in this chapter, previous research has suggested asymmetries in extra-linguistic factors such as languages attitudes and contact with the neighbouring language and country. These factors will be revisited, but linguistic factors that might play a role will also be investigated. The structure of the thesis is as follows:

CHAPTER 2 investigates the impact of extra-linguistic factors for the asymmetry in mutual intelligibility between Danish and Swedish. Given the results from previous investigations (Delsing & Lundin Åkesson 2005, Gooskens 2006), we hypothesised that extra-linguistic factors such as the amount of contact a listener has had to the neighbouring language or the attitude he or she holds towards it play a minor role in his or her ability to decode the neighbouring language. Rather, we hypothesised that linguistic factors are the main cause of the asymmetry. Linguistic factors are features that are based in the languages involved, e.g. differences in word length or different prosodic features across the two languages. For example, there is evidence that the supra-segmental *stød*, which is very frequent in Danish but does exist in Swedish, is interpreted as an additional syllable by Swedish listeners (Bannert 1981). This systematic difference between Danish and Swedish prosody would presumably lead to lower intelligibility of spoken Danish to Swedish-speaking listeners. The hypothesis that linguistic factors account for a large part of the asymmetry was tested by conducting an experiment with illiterate Danish and Swedish-speaking pre-schoolers from outside the border regions, thereby keeping the extra-linguistic factors contact, attitude and literacy constant across the two groups of listeners. The linguistic features of the stimulus material were kept similar to the features of the material used in the experiment reported by Kürschner et al. (2008) who report asymmetric intelligibility scores in adults. The participants were selected so that the amount of contact they had had to the neighbouring language did not differ across

the two groups of participants. Neither did the attitude that the participants held towards the neighbouring language, nor the degree of literacy differ across the two groups. The results from this first experiment clearly falsified our initial hypothesis that the asymmetry is mainly caused by linguistic factors, as the asymmetry could not be reproduced in the participants in this study. The finding that intelligibility of the neighbouring language is symmetric in illiterate pre-schoolers indicated that extra-linguistic factors do play a role in the asymmetry observed in adult participants.

Subsequently, one of the extra-linguistic factors, namely *language attitudes* is investigated in depth in CHAPTERS 3 and 4. CHAPTER 3 investigates the data elicited in the experiment reported in CHAPTER 2 more thoroughly and extends this data set with data from adult participants, while the data reported in CHAPTER 4 was elicited in a separate experiment using the matched-guise technique (cf. section 4.3.1.). The claim that the attitude that Danes hold towards Sweden and Swedish is more positive than the attitude Swedes hold towards Denmark and Danish is confirmed by our data, at least for the adult participants. At the same time, adult Danish listeners perform better in the picture-pointing task when confronted with spoken Swedish items than adult Swedish listeners do when confronted with spoken Danish items. Interestingly, however, there is only a weak correlation between the factors attitude and word recognition, explaining less than 4% of the variance. The fact that no strong correlation between language attitudes and intelligibility scores was found in two different experiments (the ones reported in CHAPTER 3 and 4) indicates that this variable does not have a major impact on the asymmetry in mutual intelligibility of spoken Danish and Swedish. We can conclude, at this stage, that children and adults perform differently when they are presented with the neighbouring language in word recognition tasks and, importantly, that the asymmetry in mutual intelligibility of Danish and Swedish develops in the age range between approximately 5 and 8 years. However, it is not clear at this point which factors cause this development.

By that time, we had observed that the two sets of stimulus materials (Danish and Swedish items) which were used in the experiments reported in CHAPTERS 2, 3 and 4 shared an interesting asymmetry themselves: Danish words and sentences tended to be pronounced in a shorter amount of time than Swedish words and sentences were. This led us to the study reported in CHAPTER 5, where we investigate speaking tempo in Danish, Norwegian and Swedish. As we assumed that news presenters are speakers talking in a manner which makes them easily intelligible to the majority of the speakers of their language community, we measured the number of syllables produced per second in 55 news readers from the three countries. Our measurements confirmed that speakers of Danish produced significantly more phonological syllables per second than speakers of Norwegian and Swedish did. Here, we finally captured a difference between spoken Danish and Swedish that could serve as an explanation why spoken Danish is more difficult to decode for Swedes than spoken Swedish is for Danes. However, the question remained why Danish and Swedish children performed equally well when hearing their neighbouring language. If a specific message is transferred more quickly in one language compared to the

other, this should degrade intelligibility in adult as well as child listeners, as the task of interpreting the 'extra' information the Danish listeners get when listening to spoken Swedish (namely sounds or syllables that are not pronounced in spoken Danish) can be assumed to be equally demanding as the task of decoding items which lack information. Surprisingly, we also found that, in contrast to the number of phonological syllables produced per second, the number of phonetic syllables produced per second did *not* differ across the languages, which indicates that significantly more syllables are deleted in spoken colloquial Danish compared to the other two languages. In other words, spoken Danish has more reduction processes than the other two languages have.

Interestingly, many of these reduction processes are not reflected in Danish orthography. Elbro (2006) pointed out that Danish orthography was already outdated when a spelling norm was first introduced around the year 1200. At that point, Danish orthography already reflected some obsolete pronunciations such as words like *lov* (Engl. law) that had been pronounced with the word final approximant /v/ for generations, were spelled *logh*, reflecting the archaic pronunciation. Elbro (2006) also states that spoken Danish has changed more than spoken Swedish since the 13<sup>th</sup> century. We hypothesised, therefore, that literate speakers of Danish can use their language-specific orthographic knowledge when confronted with spoken Swedish, as spoken Swedish is close to written Danish. If this proved to be the case, it could serve as an explanation why Danes have fewer difficulties to decode spoken Swedish than vice versa, since Doetjes & Gooskens (2009) reported that spoken Swedish is closer to written Danish than spoken Danish is to written Swedish. This hypothesis is tested in an ERP experiment which is reported in CHAPTER 6. In this experiment, Danish-speaking adults were confronted with spoken Swedish items in a translation task, while their brain responses were recorded using electroencephalography (EEG). The results revealed that Swedish words which were inconsistent with Danish spelling (such as spoken Swedish /jifd/ and written Danish *gift*) elicited significantly lower voltages on central-posterior electrodes than Swedish words which were consistent with Danish spelling (such as spoken Swedish /mild/ and written Danish *mild*) did. This is interpreted as evidence confirming our hypothesis that literate speakers of Danish use their language-specific spelling knowledge when listening to spoken Swedish. As Doetjes & Gooskens (2009) showed that the distances between spoken Swedish and written Danish are smaller than between spoken Danish and written Swedish, this finding explains the asymmetry in mutual intelligibility between spoken Danish and Swedish. Importantly, it also explains why mutual intelligibility of written texts is generally symmetric, and why illiterate Danish and Swedish pre-schoolers perform equally well on intelligibility tasks of their neighbouring language.

CHAPTER 7 summarises these findings and their relevance for research on receptive bilingualism as well as intelligibility research. It also attempts a synthesis and points out remaining questions and suggestions for future research foci on this topic.

## References

- Bannert, R. 1981. Referat av diskussionen Talperceptionsforskning och nordisk hörförståelse. [Report of discussion on speech perception and Nordic comprehension of spoken language.] In C.-C. Elert (Ed.), Internordisk språkförståelse [Inter-Nordic language comprehension]. Umeå: Acta Universitatis Umensis, 37-45.
- Basbøll, H. 2005. *The Phonology of Danish*. Oxford: University Press.
- Bergman, G. 1971. *Svenska lån från danskan, norskan och finskan*. [Swedish loans from Danish, Norwegian and Finnish.] *Språk i Norden*, 49–56.
- Bleses, D., W. Vach, M. Slott, S. Wehberg, P. Thomsen, T. O.Madsen & H. Basbøll. 2008. Early vocabulary development in Danish and other languages: A CDI-based comparison. *Journal of Child Language* 35, 619-650.
- Bø, I. 1978. *Ungdom og naboland. En undersøkelse av skolens og fjernsynets betydning for nabospråksforståelsen*. [Youth and neighbouring country. An investigation of the influence of school and TV on inter-Scandinavian comprehension.] Stavanger: Rogalandsforskning.
- Börestam Uhlmann, U. 1991. *Språkmöten och mötesspråk i Norden*. [Language meetings and meeting languages in the Nordic countries.] [Nordisk språksekretariats rapporter 16. Oslo: Nordisk språksekretariat.
- Börestam Uhlmann, U. 1994. *Skandinaver samtalar. Språkliga och interaktionella strategier i samtal mellan danskar, norrmän och svenskar*. [Scandinavians communicate. Linguistic and interactive strategies in discourse between Danes, Norwegians and Swedes.] Uppsala: Institutionen för Nordiska språk.
- Braunmüller, K. 2002. Semicommunication and accommodation: observations from the linguistic situation in Scandinavia. *International Journal of Applied Linguistics*, 12, 1, 1-23.
- Delsing, L. O. & K. Lundin Åkesson. 2005. *Håller språket ihop Norden? En forskningsrapport om ungdomars förståelse av danska, svenska och norska*. [Does the language keep together the Nordic countries? A research report of mutual comprehension between young speakers of Danish, Swedish and Norwegian.] Copenhagen: Nordiska ministerrådet.
- Disner, S. 1978. Vowels in Germanic Languages. *UCLA Working Papers in Phonetics*, 40:1-79.
- Doetjes, G & C. Gooskens. 2009. Skriftsprogets rolle i den dansk-svenske talesprogsforståelse. [The role of orthography in spoken language comprehension between Danish and Swedish.] *Språk och stil*.
- Doetjes 2010. *Akkommodation und Sprachverstehen in der interskandinavischen Kommunikation*. Ph.D. thesis, Universität Hamburg.

- Elbro, C. 2006. Literacy Acquisition in Danish: A deep orthography in cross-linguistic light. In: M. Joshi & P.G. Aaron (Eds). *Handbook of Orthography and Literacy*. Mahwah, NJ: Lawrence Erlbaum.
- Golinski, B. 2007. *Kommunikationsstrategien in interskandinavischen Diskursen*. [Communication strategies in inter-Scandinavian discourse.] Hamburg: Kovač.
- Gooskens, C. 2006. Linguistic and extra-linguistic predictors of Inter-Scandinavian intelligibility. In J. van de Weijer & B. Los (eds.), *Linguistics in the Netherlands*, 23, Amsterdam: John Benjamins, 101-113.
- Gooskens, C. & S. Kürschner. 2010. Hvilken indflydelse har danske stød og svenske ordacenter på den dansk-svenske ordforståelse? [What influence do the Danish stød and the Swedish tonemes have on Danish-Swedish word recognition?] In C. Falk, A. Nord, R. Palm (eds.), *Svenskans beskrivning 30. Förhandlingar vid Trettionde sammankomsten for svenskans beskrivning, Stockholm den 10 och 11 oktober 2008*, 82-92.
- Gooskens, C & N.H. Hilton. In press. The effect of social factors on the comprehension of a closely related language. Proceedings from the 24th Scandinavian Conference of Linguistics, Joensuu.
- Gordon-Salant, S., P. J. Fitzgibbons & S. Friedman. 2007. Recognition of Time-Compressed and Natural Speech With Selective Temporal Enhancements by Young and Elderly Listeners. *Journal of Speech, Language, and Hearing Research*, 50, 1181-1193.
- Gregersen, F. 2004. Hvorfor kan vi københavnere ikke forstå svensk når jyder kan forstå københavnsk? [Why can't we Copenhageners understand Swedish while Jutlanders can understand Copenhagen Danish?] *Sprogforum* 29, 2004: 31-34.
- Grønnum, N. 1998. *Fonetik og fonologi. Almen og dansk*. [Phonetics and phonology. General and Danish.] Copenhagen: Akademisk forlag.
- Grønnum, N. 2007. *Rødgrød med fløde - En lille bog om danska fonetik*. [Rødgrød med fløde – A little book on Danish phonetics.] Copenhagen: Akademisk forlag.
- Haugen, E. 1953. *Nordiske språkproblemer – en opinionsundersökelse*. *Nordisk tidskrift för vetenskap, konst och industri*. [Nordic language problems – a poll.] *Nordisk tidskrift för vetenskap, konst och industri* 29, 225-49.
- Haugen, E. 1966. Semicommunication - The Language Gap in Scandinavia. *Sociological Inquiry*, 36, 2, 280-297.
- Hockett, C. F. 1958. *A course in modern linguistics*. New York: Macmillan.
- Karker, A. 1971. Om svensk og norsk indflydelse på moderne dansk. [Swedish and Norwegian influence on modern Danish.] *Språk i Norden*, 29-36.

- Kürschner, S., C. Gooskens, & R. Van Bezooijen. 2008. Linguistic determinants of the intelligibility of Swedish words among Danes. *International Journal of Humanities and Arts Computing*, 2, 83–100.
- Leinonen, Therese. 2010. *An Acoustic Analysis of Vowel Pronunciation in Swedish Dialects*. Ph.D. thesis, University of Groningen.
- Lindgård Hjorth, P. 1972. Nabosprogene i den højere danske skole. [Neighbouring languages in Danish high-school.] *Språk i Norden*, 25-44.
- Lundin, K. & R. Zola Christensen. 2001. *Grannspråksförståelse i Öresundsregionen år 2000. Gymnasisters läsförståelse*. Nordlund 22:1. Institutionen för Nordiska Språk, Lunds Universitet.
- Maurud, Ø. 1976. *Nabospråksförståelse i Skandinavia. En undersøkelse om gjensidig forståelse av tale- og skriftspråk i Danmark, Norge og Sverige*. [Neighbouring language comprehension in Scandinavia. An investigation of mutual comprehension of written and spoken language in Denmark, Norway, and Sweden.] Stockholm: Nordiska rådet.
- Pharao, N. 2010. *Consonant Reduction in Copenhagen Danish. A study of linguistic and extra-linguistic factors in phonetic variation and change*. Unpublished Ph.D. dissertation, University of Copenhagen.
- Ridell, K. 2008. *Dansk-svenska samtal i praktiken. Språklig interaktion och ackommodation mellan äldre och vårdpersonal i Öresundsregionen*. [Danish-Swedish communication in practice. Linguistic interaction and accomodation between elderly and nursing staff in the Oresund region.] Ph.D. thesis, Uppsala Universitet.
- Vanhove, J., T. Leinonen, V. J. van Heuven, C. Gooskens & A. Schüppert. 2010. Comparing the acoustic distinctiveness of Danish and Swedish vowels. Paper presented at *Experimental Approaches to Perception and Production of Language Variation (ExAPP2010)*, Groningen.
- Vaughan, N. E. & T. Letowski. 1997. Effects of age, speech rate, and type of test on temporal auditory processing. *Journal of Speech, Language, and Hearing Research*, 40(5), 1192-1200
- Wells, J. 1995. *Computer-coding the IPA: a proposed extension of SAMPA*. Web document, revised version 1995. Retrieved on 26 May 2011 from <http://www.phon.ucl.ac.uk/home/sampa/ipasam-x.pdf>.
- Zeevaert, L. 2004. *Interskandinavische Kommunikation - Strategien zur Etablierung von Verständigung zwischen Skandinaviern im Diskurs*. Hamburg: Kovač.