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Swedish is beautiful, Danish is ugly? Investigating the link between language attitudes and spoken word recognition

Abstract: This paper investigates the hypothesis that attitudes towards a linguistic variety and intelligibility of that variety are linked. This is done by eliciting language attitudes and word recognition scores in 154 Danish and Swedish schoolchildren and adolescents between 7 and 16 years. Language attitudes towards the neighboring language are elicited by means of a matched-guise experiment while word recognition is tested by auditorily presenting the participants with 50 spoken stimuli in their neighboring language (Danish for Swedish children and vice versa) in a picture-pointing task. Results revealed that while Danish children held more positive attitudes towards Swedish than vice versa and their word recognition scores were generally higher than those of their Swedish peers, the correlation between these two variables is very low, indicating that the two variables are only loosely linked.

Keywords: Danish, Swedish, Language attitudes, matched-guise technique, spoken word recognition

1 Introduction

Most people have strong ideas about whether a language variety sounds pleasant or not. Attempts to explain these language attitudes have been done either with a focus on the intrinsic value of linguistic features of the target language (*inherent value hypothesis*, Giles et al. 1974; Giles et al. 1979), or with a focus on cultural norms (*imposed norm hypothesis*, Giles et al. 1974; Giles et al. 1979).

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The inherent value hypothesis argues that some languages are evaluated more positively than others because they are inherently more correct, more logical, or more aesthetically pleasing than others. The imposed norm hypothesis argues that no language variety is inherently beautiful or ugly and that such judgments are based solely on non-linguistic factors such as stereotypical ideas that are adopted by someone without critical evaluation, e.g., the notion that French is a romantic language or Dutch sounds harsh. Trudgill and Giles (1978) extended the imposed norm hypothesis to include social norms as well (social connotations hypothesis). In their view, language attitudes can also be based upon individual experiences that form individual social connotations, e.g., if a person has had a negative encounter with a speaker of Italian, this person's attitude towards the Italian language might be more negative than after encountering a neutral or positive speaker of Italian.

Yet another hypothesis about the formation of language attitudes is put forward by Boets and De Schutter (1977), who presented Belgian Dutch regional dialects to listeners from a geographically centrally situated village in Belgium. They report that there is a link between intelligibility of a dialect and its aesthetic pleasantness in such a way that dialects that are judged as beautiful are more intelligible to the judges, and vice versa. Deprez and De Schutter (1980) and Van Bezooijen (1994) report findings that are in line with these results.

Many investigations testing the validity of these hypotheses report results supporting the social connotations hypothesis. Giles et al. (1974) report no systematical differences in attitudes in their study of English informants judging several (both standard and nonstandard) varieties of Greek. Giles et al. (1979) report similar results for varieties of French among listeners from Wales. These findings, which indicate that listeners with no previous exposure to regional varieties of a language do not make meaningful evaluative distinctions between them, were interpreted as evidence against the inherent value hypothesis. Investigating classification of US, British and New Zealand English accents, Milroy and McClenaghan (1977) and Ladegaard (1998), on the other hand, failed to confirm conclusions from the above studies. In his experiment, Ladegaard (1998) presented speech samples from five male native speakers of different regional varieties of English (US American, Scottish, Australian, Cockney and Received Pronunciation) to 96 Danish judges, who were instructed to identify the speakers' geographic background and to judge the speakers with regard to status, competence, personal integrity, social attractiveness and linguistic attractiveness. Ladegaard (1998) reports that a large number of participants judged the accents heard in the same manner as native speakers did (e.g., Australian English as laid-back or Cockney as having a low social status) despite the fact that the majority was not able to identify the variety's geographical origin. Importantly, their classifi-

cation reflected common stereotypes of the accents and its speakers as held in the English speaking community. Ladegaard (1998) interprets this finding as negative evidence for the social connotations hypothesis. Van Bezooijen (1994) investigated language attitudes towards four different varieties of Dutch (standard, urban, and two rural dialects from the Netherlands and Belgium) among Dutch schoolchildren and adults. She reports evidence that conflicts with the social connotations hypothesis, as she found that listeners have a tendency to evaluate the rural dialects as less attractive than the urban variety, while the social connotations hypothesis formulated to account for the aesthetic evaluation of English varieties predicts the reverse – namely the most negative attitudes towards the urban variety (Trudgill and Giles 1978).

To summarize, within sociolinguistics, it has been proposed that language attitudes are based on (a) linguistic features of the target language, (b) stereotypical ideas about the target language held by a group of people, (c) personal experience, or (d) the intelligibility of the target language to the speaker. One of these hypotheses, the intelligibility hypothesis, states that the intelligibility of a linguistic variety is linked significantly to the listener's attitude. Interestingly, within intelligibility research, a similar hypothesis has been put forward. It is similar in the way that it supposes a link between the attitudes held towards a linguistic variety and how intelligible the variety is to the listener. The hypothesis is different, however, in the causal relationship it assumes. While the intelligibility hypothesis put forward by sociolinguistic researchers assumes that specific linguistic features of a language variety influence the attitude towards that variety, researchers within intelligibility research propose that attitudes held towards a specific language variety influence the effort the listeners make for decoding that variety.

Wolff (1959) investigated mutual intelligibility between the closely related Nigerian Ijo languages Kalabari and Nembe, and reports that Nembe speakers claim to understand Kalabari, while speakers of Kalabari judge Nembe unintelligible to them. Wolff (1959) suggests that this asymmetry in mutual intelligibility is linked to an asymmetry in language attitudes. He states that when his study was conducted, the Kalabari were the most prosperous group in the Eastern Niger Delta, and that they regarded other Ijo speaking groups as inferior to them. Whether the Kalabari actually have difficulties understanding their neighboring languages, or if they merely claim to have so for prestige reasons, is irrelevant according to Wolff (1959). He suggests that the intelligibility evidence simply underscores the Kalabari ascendancy and thereby links together the two factors language attitude and intelligibility. His assumptions, however, are not based on empirical data, but solely on anecdotal evidence. In their review of language attitudes reflected in nonprofessional literature, Giles and Niedzielski (1998: 87)

pick up on Boets and De Schutter's (1977) hypothesis and argue that an impaired intelligibility of a specific variety can cause a negative attitude towards the variety in question. Boets and De Schutter's (1977), Deprez and De Schutter's (1980), Wolff's (1959) and Giles and Niedzielski's (1998) hypotheses are similar in that they assume a relationship between the intelligibility of a language and the attitudes that are held towards that language, but as noted above they are different in the causal relationship they assume. While Wolff (1959) suggested that attitudes held towards a specific linguistic variety influence the effort that listeners make for decoding that variety, Boets and De Schutter (1977), Deprez and De Schutter (1980), and Giles and Niedzielski (1998) hypothesize that specific linguistic features of a language variety influence the attitude towards that variety.

This paper aims at re-investigating the intelligibility hypothesis. Specifically, we are interested in finding out whether "asymmetric" attitudes held by Scandinavians towards neighboring, closely related Scandinavian languages are linked to "asymmetric" intelligibility of these neighboring languages. This link has been suggested by several researchers, whose studies are summarized in the following section.

2 Inter-Nordic communication

The Nordic countries Denmark, Finland, Iceland, Norway and Sweden as well as their associated territories Åland, the Faroe Islands and Greenland share some important historic events and contemporary cultural and political norms. Their political and economic systems are characterized by generous welfare criteria and among other things emphasize gender equality, egalitarian benefit levels and economic systems similarly to the basic principles of Keynesian economics, but developed independently by the Stockholm School around the same time as Keynes started to publish his ideas. The Nordic countries cooperate in the Nordic Council since 1952 and the Nordic Council of Ministers since 1972. Both authorities strongly promote inter-Nordic collaboration, e.g., by implementing the *Nordic passport union* in 1954, which allows Nordic citizens to reside in any of the Nordic countries without a valid passport, by creating an inter-Nordic job exchange platform (*Nordjobb*, founded in 1985), and by emphasizing the ideological role 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), which ensured that citizens of the Nordic countries are entitled to use their native language in written communication with authorities. In this case, authorities adopt the language of the client. Another communication pattern that also eliminates the use of a

lingua franca such as English is communication in the native language of the speaker. This is possible in language communities of closely related languages, and the closer the language varieties involved are to each other, the more effortless the communication works. An example would be a Dane speaking Danish to a Norwegian, who then replies in Norwegian. Haugen (1966) called this type of communication *semi-communication*. Danes, Norwegians, and Swedes especially are likely to use their native language when communicating with each other and mutual intelligibility of Scandinavian language varieties has been a focus of linguistic research in Scandinavia over the past decades. Some of the investigations are summarized below.

Haugen (1966) investigated mutual intelligibility between the Nordic languages by asking members of *Föreningen Norden* (The Nordic Society) how much of the neighboring language they understood. Föreningen Norden is a non-governmental organization that promotes cooperation between the Nordic countries. Haugen (1966) found that Danes reported to have slightly more difficulties understanding spoken Swedish than vice versa. He also elicited language attitudes from his participants and found that 42% of the Danish participants thought that Swedish sounded more beautiful than their own language, while none of the Swedish participants thought that Danish sounded more beautiful than their own language. His data thus does not provide support in favor of the hypothesis that language attitude and intelligibility are linked, as the group that held a more positive attitude towards the neighboring language turned out to self-report that they understand less than the group that held a more negative attitude.

In contrast to Haugen (1966), who based his study on the participants' self-assessment of their comprehension abilities, Maurud (1976) investigated mutual intelligibility between Danish and Swedish by testing the participants' performance in a translation task and a multiple-choice test. He reports that, while Danes understand on average 60% of spoken Swedish, Swedes only understand 48% of spoken Danish. That means, in contrast to Haugen (1966), Maurud (1976) finds a trend that Danes comprehend more spoken Swedish than vice versa. One of the major criticisms on Maurud's (1976) investigation (Gregersen 2004), however, has been the fact that he compares comprehension of Swedish among Danes in Copenhagen to comprehension of Danish among Swedes in Stockholm. This means a substantial geographical asymmetry in the data as Copenhagen is located only 30 kilometers from the Swedish border, while Stockholm is located about 570 kilometers from the Danish border. It can be assumed that people living in border regions have a higher amount of cross-border contact, such as travelling to the neighboring country, talking to people visiting their own country, or even watching television in the neighboring language. Maurud (1976), however, does not mention this geographic asymmetry as a factor that might cause or boost the

comprehension asymmetry he reports, but rather hypothesizes that attitudes towards the neighboring languages are of major importance for Scandinavians' ability to communicate with each other in their native languages, thereby indirectly subscribing to Wolff's (1959) view.

In a large-scale investigation, Delsing and Lundin Åkesson (2005) elicited text comprehension as well as language attitudes among different groups of participants from the Nordic countries. These groups hailed from at least two different sites per country, except for Finland (three sites) and Åland, Greenland and the Faroe Islands (each one site). 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 neutralized, although Stockholm is still roughly two to three times as far from Denmark as Århus is from Sweden. Delsing and Lundin Åkesson (2005) confirmed Maurud's (1976) finding that Danes understand more spoken Swedish than vice versa. They also report that Danes rate the Swedish language as more beautiful than vice versa. Delsing and Lundin Åkesson (2005) correlated linguistic performance and attitudes held towards the neighboring language and the neighboring country. They report that Danes' comprehension abilities correlate significantly with their judgment of how beautiful the Swedish language sounds and that Swedes' comprehension abilities correlate significantly 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 their study, which makes it difficult to assess the degree of correlation. 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, which is what Wolff (1959) suggests. It might also be the case, however, 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. The latter causality is in line with Giles and Niedzielski's (1998) hypothesis.

In a recent study, Schüppert and Gooskens (2011) investigated attitudes towards the neighboring language among Danish and Swedish 4- to 6-year-old preschoolers as well as among adolescents aged between 17 and 20, all hailing from towns that were located at about 200 km from the Danish-Swedish border. They reported that preschoolers held neutral and, importantly, symmetric attitudes

towards the neighboring language, while the Swedish language was rated as significantly more pleasant by Danish adolescents than the Danish language was rated by their Swedish peers. This suggests that the asymmetry in attitude towards the neighboring language starts to develop in the age range of about 6 to 18 years. Schüppert and Gooskens (2011) also investigated auditory word recognition in a picture-pointing task in their participants and analysed reaction times to correctly recognized items. While Danish preschoolers recognized Swedish items as quickly as Swedish preschoolers recognised Danish items, the by now well-established asymmetry in comprehension scores was found among adolescents. Swedish adolescents had a significantly longer reaction time than Danish adolescents had. As it is generally assumed that the time it takes a participant to make a decision reflects the processing time and thereby the degree of complexity of the task (Gass and Mackey 2007), these results indicate that Swedish adolescent participants had more difficulties to decoding the Danish stimuli than Danish participants had with the Swedish stimuli. Importantly, however, no significant correlation between a subject's mean reaction time of correctly translated items and his or her attitude towards the neighboring language could be found. These findings are in conflict with Delsing and Lundin Åkesson (2005) who report a significant correlation between intelligibility of and attitude towards the neighboring language in adolescents in the two countries. Instead, linguistic factors were identified as the cause of the asymmetry in mutual intelligibility, i.e., an asymmetric speaking rate (Hilton et al. 2011), less distinct vowel articulation (Vanhove et al. 2010), or an asymmetric amount of reduction processes (Bleses et al. 2008: 624). Doetjes and Gooskens (2009) report that Danish orthography, which has preserved proto-Nordic pronunciation more accurately than Swedish orthography has, is closer to Swedish pronunciation than Swedish orthography is to Danish pronunciation. They suggest that this might work as an extra cue for Danish listeners when confronted with spoken Swedish. Schüppert et al. (submitted) have confirmed this experimentally by analyzing event-related potentials evoked in Danish participants in a translation task.

The studies of language attitudes reported above (Haugen 1966; Maurud 1976; Delsing and Lundin Åkesson 2005; Schüppert and Gooskens 2011) are all characterized by insufficient stimuli control in the test situations. The participants in the studies might have referred to different speech samples (from different speakers with different voices in different settings etc.) when making evaluative judgments about a language. For example, in Schüppert and Gooskens' (2011) study, the Danish participants were confronted with a native speaker of Swedish and the Swedish participants were confronted with a native speaker of Danish in the word recognition experiment. After the experiment, they were asked whether they liked the language they had heard (a) more than their native language, (b) as

much as their native language or (c) less than their native language. It is possible that the Swedish speaker accidentally happened to have more voice features that are generally judged as being more beautiful by native as well as non-native speakers of Swedish (such as a more variable intonation) than other speakers of Swedish have. This would result in low generalizability of the data.

The aim of this paper is to test whether intelligibility of a closely related language and the language attitudes held towards it correlate. This is done by linking mutual intelligibility between the two languages Danish and Swedish to Danes' and Swedes' attitudes towards their neighboring language, respectively. To address the shortcoming of the studies previously conducted, language attitudes of Danish and Swedish-speaking children and adolescents are elicited in a way that ensures that voice quality is kept constant across the two language samples. This is done by using the matched-guise technique (see Section 3.1), which, to our knowledge, has not been used hitherto to investigate language attitudes between Danish and Swedish-speaking listeners. After the attitude elicitation, the participants are tested on word recognition of the neighboring language. By correlating individual attitudes with individual intelligibility scores, the intelligibility hypothesis, which states that a person's attitude towards a language variety is linked to the intelligibility of that language variety, is investigated.

3 Method

3.1 Matched-guise experiment

Within sociolinguistics research, it has been attempted to minimize biases due to differences in speech quality in voice evaluation tasks by employing the matched-guise technique (Lambert et al. 1960). This technique uses speech samples that are matched with regard to speech features. This is done primarily by using two speech samples from the same speaker. For instance, Lambert et al. (1960) used the technique to investigate stereotypical prejudices about English and French speaking Canadians held by people in bilingual Quebec. Lambert et al. (1960) investigated less consciously held language attitudes by instructing participants to rate English and French speakers with regard to personal speaker attributes, such as kindness, richness, or beauty. All stimuli were produced by the same speaker, but this fact was not made clear to the participants, who believed that they judged different speakers – an Anglophone speaker and a Francophone speaker. Lambert et al. (1960) found that the participants' judgments of personality traits of the bilingual speaker were strongly influenced by the language that was spoken. Both English and French-speaking participants rated English more

positively on status and solidarity traits, which is assumed to reflect the English language's higher status in Quebec.

3.1.1 Stimulus material

The auditory stimulus material for the matched-guise experiment was a short text, selected from the children's book *Can't You Sleep, Little Bear?* (Waddell and Firth 2005) and consisting of six sentences. Besides recordings by the same speaker of Danish and Swedish, recordings were also made by speakers of four other languages, namely Norwegian, Dutch, Frisian, and Indonesian, that served as distracter stimuli. In total, the stimulus material thus comprised six different audio fragments representing six different languages. The six texts were presented to the Danish and Swedish participants in the following order: Norwegian, Dutch, native language (Danish or Swedish, respectively), Frisian, Indonesian, neighboring language (Swedish or Danish, respectively). In other words, the order in which the languages were presented to the children was adapted to the country in which the experiment was held, but the two guises which where the focus of the present study were always separated by two distracters.

3.1.2 Bilingual speaker

The Danish and the Swedish texts were produced by the same speaker: a young female Dane who had grown up in Southern Sweden but consistently spoke Danish with her Danish parents and siblings at home. A crucial factor in using the matched-guise technique is that reactions are attributable to the language itself. Therefore, much care was taken to ensure that the bilingual speaker sounded natively Danish and Swedish. This was done by organizing two so-called *voice parades*, which investigated whether the bilingual speaker sounded as native to listeners with both language backgrounds as other native speakers of the two languages did. It involved presenting native listeners (none of which participated in the matched-guise experiment) with a number of recordings of native speakers, including one by the bilingual, and instructing them to pick out one speaker that sounded non-native. We assumed that if the bilingual speaker is not chosen as the foreigner more often than on chance level, he or she sounds sufficiently native for our purpose. Two voice parades were conducted, a Danish and a Swedish one. Five recordings were presented to 30 Danish and 15 Swedish listeners. For the Danish version, the four other recordings were produced by native female Danish speakers from the greater Copenhagen area, the same geographical area that the

Table 1: Results of the *voice parade* for the Danish-Swedish bilingual speaker. Grey shaded cells indicate speakers that were picked at or above chance level. Note that each distracter represents two different speakers, i.e., one Danish and one Swedish.

	Bilingual speaker		Distracter 1		Distracter 2		Distracter 3		Distracter 4		Chance level	Total
	N	%	*N*	%	*N*	%	*N*	%	*N*	%	%	*N*
Danish listeners	0	0	0	0	3	20	12	80	0	0	20	15
Swedish listeners	3	10	5	17	0	0	13	43	9	30	20	30

bilingual hailed from. The distracter recordings in the Swedish version were all recordings of female speakers from Southern Sweden. In both voice parades, the bilingual speaker was presented as the third speaker of five. The results of the tests are shown in Table 1, which demonstrates that the bilingual speaker was not judged as sounding less native than the distracter recordings. In the Swedish voice parade, the bilingual speaker was selected by none of the listeners as having a foreign accent; in the Danish voice parade, she was chosen by 10% of the listeners, which is still clearly below chance level. Table 1 demonstrates that the recordings of the bilingual speaker were not rated significantly less native sounding than the other recordings by neither Danish or Swedish listeners. This suggests that both guises recorded for the experiment are perceived as native Danish and Swedish.

3.1.3 Procedure

The children were provided with separate rating questionnaires for every language consisting of six 5-point Semantic Differential Scales (Osgood et al. 1957).

Figure 1 shows the semantic differential scales employed. Semantic differential scales are similar to Likert scales in that several items can be used to evaluate the same target. An advantage of this technique is that, unlike with Likert scales, no explicit statements have to be formulated by the researcher, such as "The speaker sounds intelligent". This way writing statements can be avoided; instead, respondents are asked to indicate their answers by marking a scale between two bipolar adjectives as extreme values.

Before the experiment started, every participant was familiarized with using semantic differential scales by listening to an oral introduction. This introduction was given by an experimenter living in the same region where the experiment was run, i.e., a Danish experimenter supervised the conduction of the experiment

How do you think the speaker sounds?

strange	o	o	o	o	o	normal
ugly	o	o	o	o	o	beautiful
dumb	o	o	o	o	o	smart
old-fashioned	o	o	o	o	o	intelligent
unfriendly	o	o	o	o	o	friendly
poor	o	o	o	o	o	rich

Fig. 1: Semantic Differential Scale that were provided for every text fragment.

in Denmark and a Swedish experimenter did so in Sweden. The instructions were given as suggested by Dörnyei (2010), which call for the inclusion of a friendly and involved local during all testing sessions. It was also ensured that detailed oral instructions were given and that the listeners had the opportunity to ask questions prior to the test. The children were instructed to judge six personality traits of the speaker on a five-point semantic differential scale (see Figure 1). These six personality traits were chosen in such a way that three different dimensions were represented by two traits each. These three dimensions, namely dynamism (strange/normal, old-fashioned/modern), attractiveness (ugly/beautiful, unkind/kind) and superiority (stupid/smart, poor/rich), are regarded as representative for eliciting attitudes (Zahn and Hopper 1985). Each speaker was to be judged while the fragment was played to the participants.

As can be seen in Figure 1, we chose to present our participants consistently with "positive" adjectives on the right-hand side of the sheet and their negative equivalents on the left. This has advantages and disadvantages. On the one hand, it is likely to produce a halo effect, i.e., a higher correlation between judgments on the variables strange/normal, old-fashioned/modern, ugly/beautiful, unkind/kind, stupid/smart and poor/rich than would occur if the positive adjectives were presented counterbalanced between left and right. On the other hand, by keeping positive adjectives consistently on the same side, it is easier for the participants to fill in the scales. As we test rather young subjects, we opted against a counterbalanced presentation to make the task as easy as possible for the participating children and accept the consequences of the halo effect. After having judged all six audio sequences, the children were instructed to provide personal information such as date of birth, native language(s), how often they had been to the neighboring country, and how often they had heard the neighboring language via television.

All children remained anonymous. The experiment was conducted individually for the youngest (i.e., first grade) children, and with all pupils at once in all other grades. There was no indication that any participant in the matched-guise experiment became aware of the fact that they heard the same speaker twice, which is crucial for the experiment's validity.

3.1.4 Participants

In total, 159 children participated in the matched-guise experiment. Five of these were excluded from further analysis for various reasons: One Swedish child had only lived in Sweden for a year, and therefore did not speak Swedish at the level of a native speaker of the same age; two Swedish children did not complete the questionnaire; one Danish child produced unreliable answers, indicating, for example, that she had heard Portuguese while the text was presented in her native language (i.e., Danish); and similarly, one Danish child claimed he did not recognize his own language. After excluding these five children, 154 children were left for further analysis of the matched-guise experiment.

The Danish children ($N = 86$) were 12.0 years on average, while the Swedish children ($N = 68$) had a mean age of 11.9 years. We elicited data from children aged between 7 and 16, thereby filling the gap that Schüppert and Gooskens' (2011) study left. The participants attended five grades: 1st grade, 3rd grade, 5th grade, 7th grade and 9th grade. Mean age and number of children per grade and language are indicated in Table 2.

All children were tested during school time. The schools were financially compensated for the time that they allocated to the experiment. The experiment was conducted in Odense Municipality (Denmark) and Kronoberg County (Sweden), both at approximately 200 km from the Danish-Swedish border.

Table 2: Mean age and number of children that participated in the matched-guise experiment per grade and language.

	Danish		Swedish	
	N	*Mean age*	*N*	*Mean age*
1st grade	10	8.1	11	7.8
3rd grade	22	10.1	15	9.8
5th grade	20	11.8	14	11.7
7th grade	22	13.8	15	14.1
9th grade	12	15.9	13	15.6
total	86	12.0	68	11.9

3.2 Word recognition experiment

3.2.1 Stimulus material

The stimulus material for the word recognition experiment consisted of 50 auditorily presented nouns and was derived in the following way. In a pre-experiment, 112 pictures, selected from the picture database developed at the Max Planck Institute for Psycholinguistics, were shown to five four-year-old Danish and five four-year-old Swedish children. None of these children participated in the word recognition experiment or the matched-guise experiment. The children were asked to label the depicted objects as spontaneously as possible. Then, a labeling consistency was calculated per picture for the most frequent label. For example, the object depicted in Figure 2 was labeled *kænguru* 'kangaroo' by four Danish children and *känguru* by two Swedish children. One Danish child labeled it *mus* 'mouse' and the remaining three Swedish children labeled it *struts* 'ostrich', *hare* 'hare' and *mammahare* 'mommy hare'. That means that the Danish labeling consistency for the most frequent label *kænguru* was 80 percent, while the Swedish labeling consistency was 40%.

  To be selected for the experiment, a picture had to fulfil two criteria: It had to have a labeling consistency of at least 80 percent in both languages, i.e., it had to be given the same label by at least four of five children (*intra-language criterion*), and it had to be labeled with cognate words (*inter-language criterion*). Cognate words are words that share their etymology, such as Danish *hoved* and Swedish *huvud* 'head'. By selecting target pictures (i.e., the pictures that corresponded to the auditory stimuli in the actual experiment) according to these two criteria, it was ensured that they were recognized and produced by children even younger than the age group tested in the experiment and that they were labeled unambiguously and with cognate words by these children. The example picture from Figure 2 thus met the inter-language criterion, but not the intra-language criterion and was therefore rejected. However, 53 pictures met these two criteria. Their

Fig. 2: Example of one picture employed as target picture in the word recognition experiment.

labels were used as auditory stimuli, which were recorded by two female native speakers: one Danish and one Swedish speaker. Recordings took place in sound-attenuated rooms and the sound files were digitized at 44100 Hz and down-sampled to 22050 Hz. The 59 pictures that had not met both criteria were supplemented with further 100 pictures from the same database and served as distracter pictures for the word recognition experiment. Three of the selected 53 target pictures were used in a demo version, leaving 50 stimuli for the experiment.

3.2.2 Participants

Of the 154 children that participated in the matched-guise experiment, 116 children (54 Danish and 64 Swedish) participated in the word recognition experiment. Mean age and number of participants per grade and L1 are shown in Table 3. Apart from the 9 Danish 7th-graders, all other groups contained at least 10 participants.

3.2.3 Procedure

The intelligibility experiment followed the matched-guise experiment. All children were tested individually and were presented with the 50 auditory stimuli in a picture-pointing task. The children were seated in front of a touch screen (LG L1510SF). Before the experiment started, the children were familiarized with the task through a short training session. The demo version of the experiment consisted of two trials with stimuli in the children's native language, followed by one trial with a stimulus in the test language. Four pictures per stimulus were

Table 3: Mean age and number of children that participated in the intelligibility experiment per grade and language.

	Danish		Swedish	
	N	**Mean age**	**N**	**Mean age**
1st grade	10	8.1	11	7.8
3rd grade	12	10.1	14	9.8
5th grade	10	11.9	14	11.7
7th grade	9	13.6	13	14.1
9th grade	12	15.9	11	15.6
total	*53*	*11.9*	*63*	*11.8*

presented on the touch screen and remained on the screen until the participants touched the screen or for 10 000 ms. The children were instructed to point to the picture that best corresponded to the stimulus. Before the word-recognition experiment started, it was ensured that the children had understood the task, and, if necessary, further instructions were given. The auditory presentation of the stimuli was random, but every stimulus was presented together with the same set of four pictures across sessions and across languages.
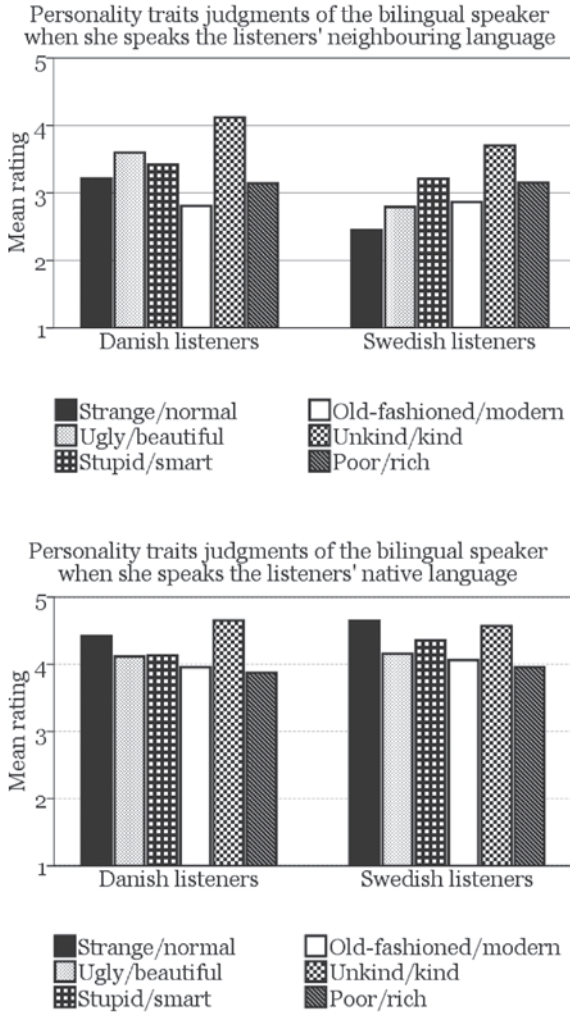
4 Results

4.1 Matched-guise experiment

For all six fragments that were presented to them, the children indicated on a 5-point semantic differential scale how normal, beautiful, smart, modern, kind and rich they think the speaker sounded. We coded the data by assigning the lowest score (1) for strange, ugly, stupid, old-fashioned, unkind and poor, the highest score (5) to normal, beautiful, smart, modern, kind and rich, and the remaining scores for answers given for any of the points between the extremes. Figure 3 shows the mean ratings of the six personality traits of the bilingual speaker when she spoke the neighboring language (top graph) and the native language (bottom graph).

If the top and the bottom graphs in Figure 3 are compared, it can be seen that the children judge the bilingual speaker more positively when she speaks the children's native language (bottom graph) than when she speaks the neighboring language. This is confirmed by six pairwise *t*-tests between ratings of the bilingual speaker when she speaks the native and the neighboring language (all $p < .001$). Furthermore, six independent *t*-tests revealed that ratings of the bilingual speaker when she speaks the native language of the children are similar in the L1 groups (all $p > .1$). For three of the personality traits, however, namely normality, beauty, and kindness, the ratings of the bilingual speaker when she speaks the *neighboring* language differ significantly (all three $p < .01$) across the two L1 groups. As indicated by Figure 3 (top graph), Danish participants rate the bilingual speaker consistently as being kinder sounding, more normal sounding, and more beautiful sounding when she speaks Swedish, than Swedish participants do when she speaks Danish.

Figure 4 shows mean ratings of all six personality traits of the speaker when she speaks the neighboring language as a function of age for both L1 groups. It can be seen that there is a trend that children rate the speaker more negatively the

Personality traits judgments of the bilingual speaker
when she speaks the listeners' neighbouring language

Personality traits judgments of the bilingual speaker
when she speaks the listeners' native language

Fig. 3: Mean judgments of the bilingual speaker when speaking the neighboring language (top graph) and when speaking the listeners' native language (bottom graph).

older they are. Often, but not always, the highest mean is reached by the youngest group per L1, and the lowest mean is found in the oldest group per L1. Interestingly, Swedes and Danes rate the speaker in a similar manner when they judge richness and modernity, but rather differently when they judge kindness, intelligence, normality and beauty.

Another trend we can detect is that the speaker is rated more positively by the Danes when she speaks Swedish than by the Swedes when she speaks Danish.
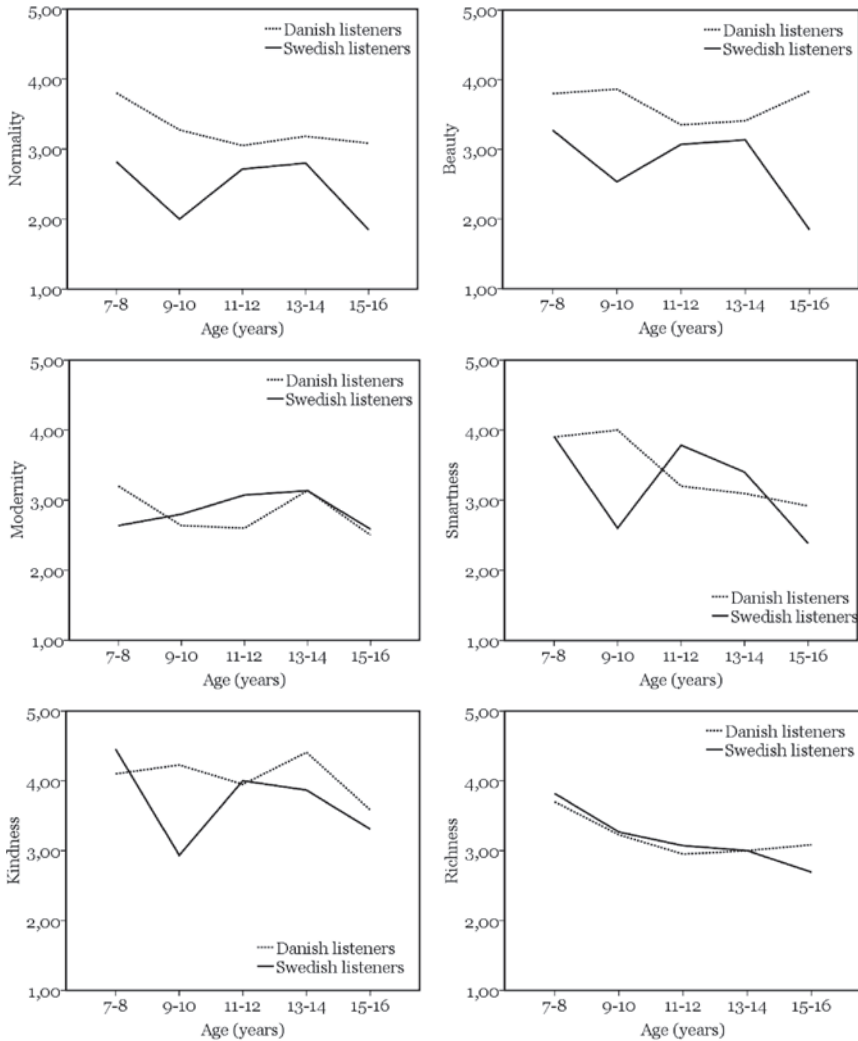
Fig. 4: Mean personality trait ratings from Danish (dotted line) and Swedish children (solid line) of the bilingual speaker speaking the neighboring language as a function of age.

This trend is particularly pronounced in the older groups, while the youngest group (7 to 8 year old children) often gives similar judgments, especially for richness, kindness, and intelligence.

Finally, the Swedish-speaking group of 9 to 10 year old children seems to behave differently than would be expected from the overall trend in their L1. They

rate the speaker almost as negatively as the oldest group for two of the personality traits (intelligence and normality), and even more negatively than the oldest group for one trait (kindness).

The overall trends detected were that (i) younger children give more positive judgments than older children, (ii) Danes rate the bilingual speaker speaking the neighboring language more positively than the Swedish speakers do and (iii) younger children tend to give more similar ratings in both groups of L1 than older groups do. To test these trends and to evaluate our hypothesis that language attitude correlates positively with intelligibility, we reduced the data by conducting a principal component analysis (PCA) on the overall ratings on the six personality traits normality, beauty, intelligence, modernity, kindness and richness, which served as input variables. It revealed that most of the six variables were significantly interrelated, but correlation coefficients never exceeded $r = .55$. The only variable that only correlates significantly with three of the remaining five variables (namely normality, beauty, and richness) is modernity. This suggests that the five variables normality, beauty, intelligence, kindness and richness measure the same phenomenon without entirely consisting of redundant information, which would be the case if the variables would correlate too highly.[1]

Two principal components have an eigenvalue of more than 1 and were extracted for further analysis. The first component has an eigenvalue of 2.64 and correlates highly (all $r \geq .70$) with the ratings for beauty, intelligence, kindness and normality, medium with richness ($r = .57$) but low ($r = .34$) with modernity. This component therefore represents most personality traits well and seems to measure "overall attractiveness". The second component has an eigenvalue of 1.05 and correlates highly with modernity but much less highly with the remaining five personality traits (see Table 4). This component seems to measure mainly "modernity".

Figure 5 displays the six eigenvalues for the maximum number of extractable components as a function of these six components (components 1 to 6). It can be seen that the "elbow" of the graph is located at the second extracted component. This suggests that this component could be excluded from further components (Field 2005), as should components 3 to 6, and that extraction of component 1 is a meaningful way to reduce the data (Hatcher 1994). However, as the second component has an eigenvalue of slightly more than 1, we opted for the extraction of the two first components. Together, both extracted components explain 61.6% percent of the variance.

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1 This is confirmed by the fact that, for all six variables together, Bartlett's test of sphericity resulted in $\chi^2(10) = 198.57$ ($p < .001$), and that the Kaiser-Meyer-Olkin measure of sampling adequacy was .75.

Table 4: Component matrix with correlation coefficients between the two extracted principal components "attractiveness" and "modernity" and the ratings of the bilingual speaker when she spoke the neighboring language with respect to the six personality traits.

|	Attractiveness	Modernity
Ugly/beautiful	0.80	0.13
Stupid/smart	0.74	−0.33
Unkind/kind	0.72	−0.39
Strange/normal	0.70	−0.01
Poor/rich	0.57	0.28
Old-fashioned/modern	0.34	0.84

Now data from six variables are reduced to two components representing "attractiveness" and "modernity". Both components consist of standardized values (z-scores), which means that the mean value for all 154 participants is 0 and the standard deviation for all participants is 1. These components form the basis of the remaining analyses and represent the ratings of the bilingual speaker when she speaks the neighboring language with regard to six personality traits.

Figure 6 shows an error bar plot of both components for the L1 groups of participants (Danish and Swedish). Circles represent the mean value while error bars represent the 95%-confidence interval. In other words, 2.5% of the values fall above the upper part of each error bar and 2.5% of the values are found below the lower part of each error bar. The Danish listeners' mean value given for the attractiveness of the bilingual speaker when she speaks Swedish is $\bar{x} = 0.2$, the Danish
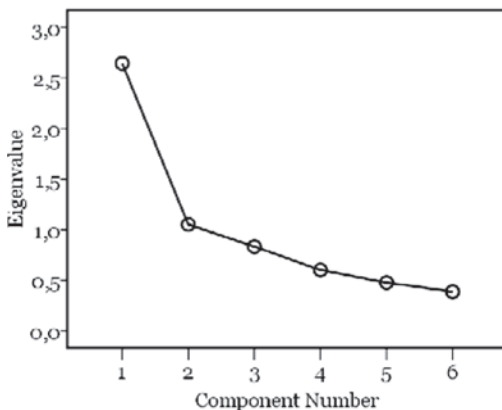
**Fig. 5:** Scree plot showing eigenvalues per component.
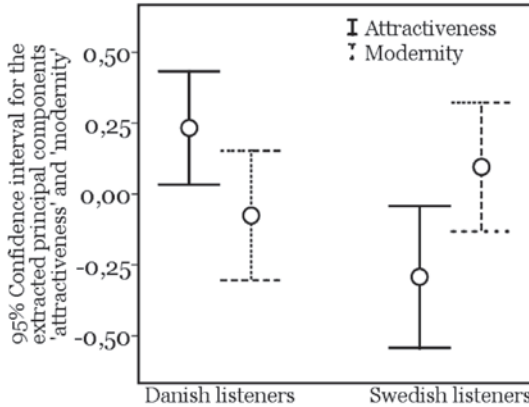
Fig. 6: Error bars (95% CI) of the extracted principal component (representing the ratings of the bilingual speaker when she speaks the neighboring language with regard to five personality traits) broken down by L1.

listeners' mean value for modernity is $\bar{x} = -0.1$. The Swedish listeners' mean value given for the attractiveness of the bilingual speaker when she speaks Danish is $\bar{x} = -0.3$, the Swedish listeners' mean value for modernity is $\bar{x} = 0.1$. In other words, Danes find the bilingual speaker attractive but old-fashioned when she speaks Swedish, while Swedes find her modern but unattractive when she speaks Danish.

    An independent *t*-test on both components revealed that the difference between Danish and Swedish judgments of the speaker's attractiveness are significantly different $t(149) = 3.3$, $p = .001$, two-tailed), while the bilingual speakers' modernity was not judged significantly different across the two L1 groups. That means that Danish children judge the bilingual speaker as being more attractive when she speaks Swedish than Swedish children judge the same speaker when she speaks Danish. This result confirms findings by Delsing and Lundin Åkesson (2005) and Schüppert and Gooskens (2011), who report that language attitudes were significantly more positive in Danish participants than in Swedish participants.

    Figure 7 shows line diagrams of the extracted components "attractiveness" and "modernity" of the bilingual speaker speaking the neighboring language as a function of age for both L1s. It can be seen that both Danish and Swedish children tend to judge the speaker as sounding less attractive when she speaks the neighboring language as they get older. Indeed, the variables "age" and "attractiveness" correlate to a low degree but significantly negatively ($r = -.23$, $p = .004$), indicating that, generally, the attractiveness score decreases with increasing age.
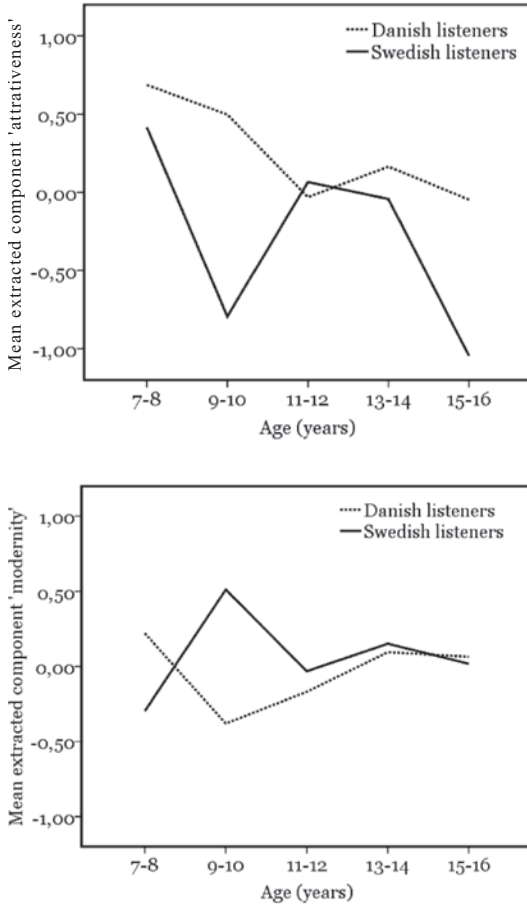
Fig. 7: Mean values of the extracted component "attractiveness" (top graph) and "modernity" (bottom graph) as a function of age for Danish (dotted line) and Swedish (solid line) participants.

The extremely negative judgments of the Swedish-speaking group of 9 to 10 year old children are reflected very clearly in this graph. While they are the second youngest group, their ratings are almost as negative as the ratings from the oldest Swedish-speaking group. There are no indications as to why they behave the way they do, however. The ratings regarding the modernity of the bilingual speaker when she speaks the neighboring language do not change with age, as this variable does not correlate significantly with attended grade. Before correlating our extracted component "attractiveness" with intelligibility scores, the intelligibility scores are investigated more closely.
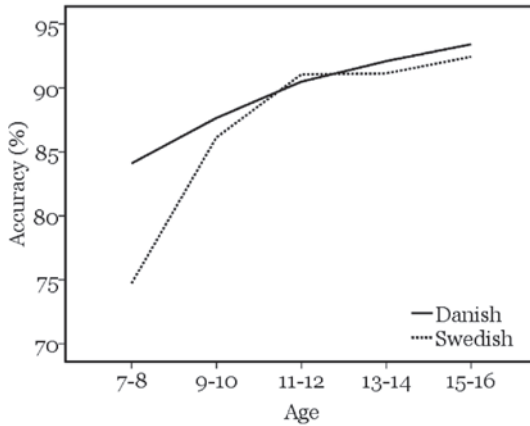
Fig. 8: Mean word recognition accuracy of the neighboring language as a function of attended grade for both L1s.

4.2 Word recognition experiment

Of the 154 children whose data was analyzed in the matched-guise experiment, 116 participated in the word recognition experiment. As the experiment was designed in such a way that all groups of participants could conduct it successfully, the older children (from grade 5 onwards) correctly identified more than 90% of the stimuli and thus performed near ceiling. The already well-documented asymmetry between Danish and Swedish-speaking listeners (Maurud 1976; Delsing and Lundin Åkesson 2005; Schüppert and Gooskens 2011; Schüppert 2011) was confirmed by our data. Danes decoded more items ($\bar{x} = .90$) than Swedes did ($\bar{x} = .87$) when confronted with the neighboring language ($t(114) = 1.71$, $p = .04$, one-tailed). Mean word recognition scores per L1 and per grade are illustrated in Figure 8, which also suggests that word recognition gets better with age. This is confirmed in a correlation analysis between the factor "age" and "word recognition" which results in $r = .61$ ($p = .004$).

4.3 Correlation between language attitudes and word recognition

A Pearson correlation conducted on the factors word recognition accuracy and the extracted principal components "attractiveness" and "modernity" reveals that they do not correlate significantly. Neither do word recognition scores and

any of the personality traits. This is true for the group of 116 participants, as well as for subsets defined by L1 (two subsets), grade (five subsets) or both (ten subsets, all $p > .01$). However, two of three investigated factors, namely attractiveness of the speaker when speaking the neighboring language and word recognition of this language, change significantly with age. Attractiveness of the bilingual speaker correlates negatively with age, which means that attitudes get more negative with age, while word recognition correlates positively with age, meaning that children have fewer difficulties to decode the neighboring language the older they get.

In a last step, we test the hypothesis that language attitudes and word recognition are linked to each other. As both variables correlate significantly with age in opposite directions, a correlation analysis across all age group is likely to yield misleading results. To avoid this, we normalize the data for age by calculating z-scores of three factors (attractiveness, modernity, word recognition) for all five age groups (7–8, 9–10, 11–12, 13–14, 15–16) separately. The standardized values of these variables show similar patterns to the nonstandardized values: Danish participants have fewer difficulties decoding spoken Swedish than Swedish participants have decoding spoken Danish ($t(114) = 1.9$, $p = .03$ one-tailed), and Danish participants find the bilingual speaker more attractive when she speaks Swedish than Swedish participants do when she speaks Danish ($t(149) = 3.3$, $p = .001$). The speaker was judged equally modern in both L1 groups when she spoke the neighboring language.

If the age factor is controlled for in this way, a Pearson correlation between these three factors (word recognition and the two extracted principal components "attractiveness" and "modernity") results in a low, but significant positive correlation between "attractiveness" and "word recognition" ($r = .19$, $df = 114$, $p = .04$) but no significant correlation between "modernity" and "word recognition". That means that, in our population, listeners' attitudes towards the neighboring language explain 3.6% of their word recognition variance.

5 Discussion and conclusion

5.1 The development of language attitudes

One important finding in this study has been that for both groups of participants (Danish and Swedish), attitudes towards the neighboring language become more negative with age (confirming findings reported by Schüppert and

Gooskens 2011). What is more, it can be concluded that while the youngest participants hold symmetric attitudes (i.e., Danish and Swedish 7 to 8 year old children are equally neutral), the older participants hold asymmetric attitudes, Danish listeners having a more positive attitude towards Swedish than vice versa. This development of negative language attitudes seems to happen relatively independently of the development in comprehension ability, as no statistically significant correlation between the two factors in our data could be established if the age factor was not controlled for.

The age period in which language attitudes develop is difficult to pinpoint on the basis of our data. It could be reasoned from our data that the asymmetry in language attitudes emerges in the age range between 12 and 15 years. This is in contrast to findings reported by Day (1982), who reviews studies investigating the age factor in language attitudes. Day reports that children develop the association of nonstandard with low socio-economic status (SES) and standard with high SES between the ages of 3 and 7, and that, at the same age, children who speak a nonstandard variety generally change from a positive or neutral attitude towards their own variety to a positive attitude towards the standard variety. The studies reported by Day (1982), however, all investigated attitudes toward the children's L1 and not a closely related language.

An exception from the general trend that (a) attitudes held towards the neighboring language become more negative with age and (b) younger participants hold rather neutral and symmetric attitudes towards the neighboring language is the group of 9 to 10 year old children. We assume that it is the behavior of this group that deviates from that of the other groups. We cannot exclude that their mood and subsequently their evaluations may have been due to such factors as a particularly stressful day or a test in a previous class.

5.2 The relationship between language attitudes and intelligibility of a closely related language

The main aim of this article was to investigate the relationship that exists between people's attitudes towards a linguistic variety and their ability to comprehend that variety. Previous literature has suggested a link between attitudes held towards a specific language variety and the ability to decode that variety. Wolff (1959) and Giles and Niedzielski (1998) suggest opposing causal relationships. While Wolff (1959) suggested that a negative attitude might have a detrimental effect on intelligibility and vice versa, Giles and Niedzielski (1998) hypothesized that attitudes towards a specific language may be influenced by the degree of intelligibility of that language. In the current investigation we attempted to shed

light on the relationship between attitudes and intelligibility by investigating the development of language attitudes alongside mutual intelligibility of a neighboring language (Danes for Swedes and Swedish for Danes) in Scandinavia. The causal relationship between these two factors was not investigated, however.

Our data indicate discrepancies both in language attitudes and in comprehension scores between the two groups of children (Swedish and Danish). In a matched guise test, Danish participants find a bilingual speaker more attractive when she speaks Swedish than Swedish participants do when she speaks Danish. This suggests that Danish children hold a more positive attitude towards Swedish than Swedish children hold towards Danish and confirms earlier findings by Maurud (1976), Delsing and Lundin Åkesson (2005) and Schüppert and Gooskens (2011) who also concluded that Danes are more positive towards Swedish than Swedes are towards Danish. Importantly, we found that attitudes become slightly more negative with age, while intelligibility scores increase with age. We assume that these two trends are to be seen as independent processes. While the development of attitudes in general is part of establishing one's own identity and defining oneself and others, the ability to decode closely related varieties is associated with cognitive processes. It is quite likely linked to the development of general language-related skills, such as verbal fluency, literacy, foreign language knowledge, and familiarity with different linguistic varieties and registers in the native language.

Contrary to Schüppert and Gooskens (2011) and in line with Delsing and Lundin Åkesson (2005), we found a low but significant positive correlation between attitudes and intelligibility. Participants with a positive attitude towards the neighboring language perform better in the word recognition experiment than those with a negative attitude and vice versa. Although our data cannot answer the question on the causal relationship between intelligibility and attitude, a weak link seems to exist between these two factors. This means that, at least indirectly elicited, language attitudes seem to have some bearing upon the degree to which adolescents comprehend a closely related linguistic variety.

It is important to note, however, that the effect of language attitude in our experimental setting was very limited, as it merely explains 3.6% of the variance. That means that more than 95% of the variance is explained by factors other than language attitude. These factors might be general verbal talent, the amount of contact that the listeners have had with the neighboring language, or mental access to other foreign languages (such as Norwegian). It is possible that L1 orthographic knowledge is activated during spoken word recognition of the neighboring language. Pattamadilok et al. (2008) and Perre and Ziegler (2008) reported that French listeners show different brain responses when listening to French words spelt in a consistent way, as opposed to words that are spelt in an

inconsistent way. Doetjes and Gooskens (2009) showed that Danes have an advantage from having learnt a spelling that reflects a proto-Nordic variety when confronted with spoken Swedish. Schüppert et al. (submitted) reported that Danes activate their L1 orthography when listening to spoken Swedish, which results in higher word recognition scores.

It has also been suggested that linguistic factors could play a role in explaining the asymmetry in intelligibility. Hilton et al. (2011) found that Danish newsreaders produce more syllables per second than Swedish newsreaders do. As both groups of speakers produced equally many phonological syllables, this finding suggests that phonological syllables are reduced to a larger degree in spoken Danish than in spoken Swedish. Findings reported by Vanhove et al. (2010) indicate that Standard Danish vowels occupy larger spaces in the articulatory area than Swedish vowels do, and that there are more overlaps found between Danish vowel spaces than between Swedish vowel spaces. However, Schüppert and Gooskens (2012) provide evidence that these linguistic factors might play a role only in combination with extra-linguistic factors, as Danish and Swedish preschoolers in their experiment performed equally well in a spoken-word recognition task in the neighboring language. An example for a combination of linguistic and extra-linguistic factors is the relatively high amount of reduction in Danish compared to Swedish, which is not reflected in conservative Danish orthographic rules. As Danish orthography generally reflects pronunciation closer to the proto-Nordic pronunciation, orthographic rules might serve as additional cues for literate speakers of Danish when confronted with spoken Swedish, while this is not the case for literate speakers of Swedish, as their orthography is more adapted to current pronunciation of standard Swedish. For example, the morpheme *bad* in Danish *badekar* /bɛːðəkɑː/ 'bathtub' is spelled word finally with a letter that also represents a dental plosive such as in *dal* /dɛːl/ 'valley'. When literate Danes are confronted with the spoken Swedish cognate *badkar*, pronounced with a dental plosive (/bɑːdkɑːr/), it might be easier for them to match /bɑːdkɑːr/ to *badekar* than is it for Swedish-speaking listeners confronted with the unfamiliar approximant /ð/ in the Danish item *badekar*, which is likely to be interpreted as an approximant or a vowel. This mismatch for Swedish listeners, where a consonant in their native language corresponds to an approximant in the neighboring language might hamper intelligibility of the item particularly strongly. Schüppert et al. (2012a, 2012b) investigated the role of articulation rate and syllable deletion for the intelligibility of spoken Danish by native speakers of Danish. They report that increased pronunciation accuracy does not enhance sentence recognition, but a low articulation rate does.

A limitation of the present study is the fact that no specific language-inherent features are analyzed separately. Therefore, no valid conclusions can be drawn as

to whether the differences in attitude towards the neighboring language are due to inherent features, thereby supporting or falsifying the inherent value hypothesis (Giles et al. 1979. By eliciting attitudes towards our material from a completely different group of listeners (for example speakers of Chinese that are neither familiar with Danish nor with Swedish), the role of language inherent features could be investigated more independently of stereotypical ideas about the languages and its speakers. Still, this would only give indications about this specific group of listeners. It is possible that native speakers of Chinese (a tone language) find Swedish (a pitch-accent language) more pleasant sounding than Danish (a stress language). However, these questions must be left for future research.

All in all this study has given strong indications that language attitudes and comprehension ability are two variables that develop relatively independently of each other, but that certain age-specific attitudes are linked to intelligibility. A thorough investigation of the causal relationship between intelligibility and language attitudes is highly desirable.

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