Does German help speakers of Dutch to understand written and spoken Danish words? – The role of second language knowledge in decoding an unknown but related language

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ABSTRACT

This paper investigates whether L2 knowledge of German can help speakers of L1 Dutch to successfully process Danish words if they do not know any Danish. We report on the results of two experiments. In the first experiment we used written stimuli and in the second experiment we used spoken stimuli. In both experiments we used the same list with Danish stimulus words, of which half only had cognates in Dutch and half only had cognates in German. In both experiments we find that participants with a higher proficiency level of German are more successful at translating the Danish stimulus words than participants with a lower proficiency level of German. Furthermore, we find evidence for the existence of a foreign language mode. Participants with a high level of German translate more Danish-German than Danish-Dutch cognates correctly. However, this effect disappears when the words are placed in a context.

1. Introduction

Research has shown that people often transfer knowledge from their native language (L1) or another previously learned language (L2) while acquiring a new language (L3). A great amount of research has been done on language transfer in multilingual language acquisition (see for example De Angelis and Dewaele 2011; Aronin and Hufeisen 2009; Cenoz, Hufeisen and Jessner 2003; Dewaele 2001; Grosjean 2001) and the advantages of knowing more languages for acquiring a new language (see for example Dewaele 2010; Dewaele 2007; Targonska 2004; Kemp 2001).

In this paper we investigate whether second language knowledge also has a positive effect on receptive multilingualism, a way of communicating where people that speak different but related L1s communicate by each using their own L1 and trying to understand each other by focussing on the linguistic features their languages have in common instead of actively acquiring the other language.

Research on receptive multilingualism has been growing over the past few years. Since receptive multilingualism is a widely used way of communication in Scandinavia (Gooskens 2007), a great amount of research has been conducted on Scandinavian receptive multilingualism (see for example Schüppert 2011; Golinski 2007; Gooskens 2007; Delsing and Lundin Åkesson 2005; Zeevaert 2004; Braunmüller 2002; Lundin and Zola Christensen 2001), but receptive multilingualism in other language combinations in the Germanic language area has been investigated as well (see for example Berthele and Wittlin 2013; Swarte and Hilton 2013; Gooskens 2011; Gooskens, Kürschner and Van Bezooijen 2011; Impe 2010; Ten Thije and Zeevaert 2007; Van Bezooijen and Gooskens 2005). This research has uncovered several factors that play a role in receptive multilingualism. These factors can be linguistic, such as lexical and phonetic distances between languages (Schüppert 2012; Kürschner, Van Bezooijen and Gooskens 2008; Beijering, Gooskens and Heeringa 2008; Gooskens 2007; Tang and Van Heuven to appear), or extra-linguistic, such as language attitudes or language contact (Schüppert, Hilton and Gooskens to appear; Gooskens 2007; Delsing and Lundin Åkesson 2005; Bø 1978; Wolff 1959).

Gibson and Hufeisen (2003) showed that L2 knowledge also is a factor that plays a role in receptive multilingualism. In their study participants with different language backgrounds translated a text from Swedish into German or English. None of the participants had knowledge of Swedish, so Swedish was an unknown language to them. After the experiment the participants had to indicate whether they could use their native language and other learned languages to translate the text. Their results showed that previously acquired languages can help to understand an unknown language. Moreover, their results showed that the more languages people know, the better they are able to use their knowledge of other languages in order to understand an unknown language (Gibson and Hufeisen: 102).

Over the last few years a few teaching programmes were developed that investigate how L2-knowledge can help in understanding an L3 (Hufeisen and Marx 2007). An example of this is the EuroCom approach, which revolves around improving receptive multilingualism by using previously learned languages. This approach focusses for example on how a person with German as L1 and French as L2 can use this knowledge to learn to read and understand another Romance language (Hufeisen and Marx 2007: 316ff.).

Van Bezooijen, Gooskens and Kürschner (2012) suggest that knowledge of an L2 can help to translate non-cognates in receptive multilingualism. Speakers of Dutch would for example be able to correctly translate the Danish word *sennep* ('mustard') into the Dutch non-cognate *mosterd* through the L2 German cognate *Senf.* Berthele (2011) investigated the influence of multilingual knowledge on cognate recognition in receptive multilingualism. In line with Peirce (1931) and Eco (1984), he calls this process abduction, which means that people apply rules from a language they know in order to decode information from a language they do not know. In his study, Berthele investigated how well native speakers of German, French or Italian are able to decode cognates from other Germanic or Romance languages. One of his main findings was that the more languages participants knew, the better they were at cognate recognition in receptive multilingualism (Berthele 2011: 198). Kürschner (2013) confirmed this finding and showed that people use knowledge of other languages to recognise words from another language. In his study, L1 German participants reported to often use knowledge of English while trying to decode Dutch words.

Research questions

In this paper, we try to answer three research questions by reporting on the results of two experiments in which L1 Dutch participants with different levels of L2 German had to translate Danish words without knowing any Danish. In the first experiment participants had to translate written words, in the second experiment participants had to translate spoken words. One half of the Danish stimulus words only had cognates in German, the other half only had cognates in Dutch.

Our first research question is whether knowledge of L2 German can L1 Dutch participants in processing unknown Danish words. The three languages in question in our research are all part of the Germanic language family. However, since Dutch and German both belong to the West-Germanic language branch, they are more closely related to each other as they are to Danish, which belongs to the North-Germanic language branch. Heeringa et al. (2013) show that the mean orthographic distance between Danish and German is 35% and the mean orthographic distance between Danish and Dutch is 33,5%. The orthographic distance between Dutch and German is lower, namely 30%. So with respect to orthography, Dutch and German are closest to each other and Dutch is slightly more closely related to Danish than German is.

According to Gooskens and Heeringa (2004) there is a phonetic distance of 63.5% between Danish and German and a phonological distance of 63.4% between Danish and Dutch. The phonological distance between Dutch and German is 53.5% (Gooskens and Heeringa 2004: 20). With respect to pronunciation, Dutch and German are closest to each other and Dutch and German are equally closely related to Danish. Based on this information, we expect to find that participants with a high proficiency level of German profit from knowing both Dutch and German and will therefore translate more Danish stimulus words correctly than participants with a low proficiency level of German.

Our second research question is whether we can find evidence for Selinker and Baumgartner-Cohen's (1995) claim on the effect of a foreign language mode in our data. Grosjean (2001) points out the importance of the language mode a language learner is in while acquiring a new language. He defines this language mode as a continuous scale with a monolingual state at the beginning of the scale and a bilingual state at the end of the scale. According to Grosjean's model, the L1 is always fully activated and the L2 and L3 can be at low or high activation. When the L2 and L3 are in low activation, the learner is in a monolingual mode and less language transfer from the L2 or L3 will occur. When they are in high activation, the learner is in a bi- or multilingual mode and more language transfer from the L2 or L3 will occur. However, according to Selinker and Baumgartner-Cohen's (1995) *foreign language mode theory*, the L1 is not always the most dominant language and can sometimes easily be suppressed. They claim that L3 learners transfer more knowledge from their L2 than from their L1, when their L2 proficiency is high. This is mostly the case for the lexical domain. Fuller (1999) provides evidence for this theory in her case study about an L3 English learner that shows more lexical transfer from L2 German than L1 Spanish. Another study by Dewaele (1998) shows that learners of L3 French more often transfer knowledge from L2 English than L1 Dutch. In our study we want to investigate whether a foreign language mode can also be observed when people are confronted with a language they do not know, i.e. whether it is the case that our L1 Dutch participants with a high proficiency level in L2 German translate more Danish-German cognates than Danish-Dutch cognates correctly.

Our final research question concerns the influence of knowledge of semantic field on cognate recognition. Schwartz and Kroll (2006), for example, found that sentence constraint influences the amount of co-activation of bilinguals in cognate recognition. They offered their participants

cognates in low- and high-constraint sentences. In a low-constraint sentence, there is hardly any information that is related to the target word, whereas a high-constraint sentence contains more words that point in the direction of the target word. For the target word **piano** a low-constraint sentence would for example be: "When we entered the dining hall we saw the **piano** in the corner of the room" (Schwartz and Kroll 2006: 203). This sentence contains no words that are directly related to *piano*. In contrast, a high-constraint sentence for the target word **piano**, could be "Before playing, the composer first wiped the keys of the **piano** at the beginning of the concert" (Schwartz and Kroll 2006: 203). This sentence contains words like *playing, composer, keys* and *concert*, which are all related to the target word **piano**. The results of the study showed that high-constraint sentences decreased the influence of co-activation. In our study, we offered half of our participants a hint in the form of a semantic category to which the stimulus word belonged. Based on the findings of Schwartz and Kroll (2006), we hypothesise that the semantic categories we offered to half of the participants in our experiment will also have decreased the co-activation among our participants. We expect that the semantic categories will have helped our participants to only activate German when they had to translate a Danish-German cognate and to only activate Dutch when they had to translate a Danish-Dutch cognate.

2. Experiment 1

The first experiment, in which we used written stimuli, was carried out in the fall of 2012 at the University of Groningen, the Netherlands (see also Swarte, Schüppert and Gooskens 2013). In this experiment we investigated whether knowledge of German as an L2 helps native speakers of Dutch to decode unknown written Danish words. Also we investigated whether it is the case that participants with a high proficiency level of L2 German translate more Danish words that have a cognate in German than Danish words that have a cognate in Dutch correctly, i.e. whether we can find evidence for the foreign language mode theory. Finally, we were interested in the influence of semantic context on cognate recognition.

2.1 Design
2.1.1 Participants

Our test group consisted of 32 university students from the Faculty of Arts of the University of Groningen, the Netherlands. Twenty-three of them were women, nine were men. They were all between 18 and 29 years old. All participants spoke only Dutch as L1 and none of them had any prior knowledge of Danish or other Scandinavian languages.

All participants indicated that they had learned English. Almost all participants also indicated that they had learned French and German. This is not surprising, since English is a mandatory language in each year of Dutch secondary school and French and German are mandatory for at least the first or second year of Dutch secondary school and can be chosen as an optional subject after that. Other learned languages that were mentioned were Spanish (5 participants), Latin (13 participants), Greek (4 participants), Italian (2 participants), Finnish (1 participant), Afrikaans (1 participant), Arabic (1 participant) and Frisian (2 participants). The two participants that indicated they had learned Frisian were not native speakers of Frisian. Participants that were bilingual speakers of Frisian and Dutch since birth were excluded from the analyses.

The participants had different proficiency levels of German. At the end of the experiment the participants had to translate a number of German control words (cf. Section 2.1.3). The subjects' level of German was determined by the percentage of German control words they translated correctly. For our data analyses, we divided the participants into two groups. Participants who had a score of 50% or higher were considered to have a high level of German. Participants who scored below 50% had a low level of German. In total, 21 participants had a high level of German and 11 participants had a low level of German.

2.1.2 Stimuli

The stimulus material consisted of 28 Danish words, which were all singular nouns. Half of the words only had cognates, i.e. words that share the same etymology, in Dutch and not in German (e.g. Danish *vante,* Dutch *want*, German *Handschuh,* 'mitten'). These are henceforth referred to as the Danish-Dutch cognate list. The other half of the words only had cognates in German and not in Dutch (e.g. Danish *ferie,* German *Ferien,* Dutch *vakantie*, 'holiday'). These are henceforth referred to as the Danish-German cognate list. We also included 14 Danish control words that did not have any cognates in either Dutch or German (e.g. Danish *seng*, Dutch *bed*, German *Bett,* 'bed'). Those words were not taken into account in the analysis, but were used to

identify participants who had prior knowledge of Danish. None of our stimulus words had cognates in English. The complete list of stimulus words can be found in Appendix A.

Semantic categories

There were two versions of our experiment. Half of the participants got Version A in which they had to translate the isolated Danish words without any context. The other half of the participants got Version B of the experiment. They got the same list of stimulus words as the participants who completed Version A, but along with every stimulus word they got a hint as to the meaning of the stimulus word in the form of a semantic category to which the word belonged. These categories were offered to the participants in Dutch. The categories were presented in written form and were all nouns. An example is shown in Table 1.

Table 1: Example of a stimulus word and its semantic category

Danish stimulus word	Semantic category	Correct Dutch translation
gylp ('zipper')	kleding ('clothes')	*gulp*

We offered these semantic categories in our second experiment because it has been shown in literature that semantic context can influence cognate recognition (Schwartz and Kroll 2006). In contrast to Schwartz and Kroll (2006), we opted for a hint in the form of a semantic category instead of presenting the target words in a sentence. We did this because our participants were confronted with an unknown language, namely Danish, and would therefore not understand the sentences. This was also the reason why we presented the semantic categories in Dutch to the participants.

The reliability of the semantic categories was kept constant for the Danish-Dutch and Danish-German cognate list. The reliability of these categories was measured by means of an opinion scaling test in which 20 Dutch university students received a list with the Dutch target translations of the stimulus words that were going to be used in the real experiment along with the semantic categories. They indicated how well they thought each word fitted its semantic category on a scale from 1 (not at all) to 5 (very well). The two cognate lists and the Danish control words all had a mean of 3.8 on a scale of 1 to 5 (*SD* Danish control words = 0.71, *SD*

Danish-Dutch list = 0.64, *SD* Danish-German list = 0.68). An ANOVA showed that the lists did not differ significantly (*F*(2.39) = 0.11, *p* = 0.9).

Orthographic distances

The orthographic distances between the Danish-Dutch and the Danish-German cognate list were kept constant, in order to keep both lists as comparable as possible. If both cognate lists would have had different orthographic distances, the words in both lists would not be equally difficult and this could bias our results. The orthographic distances were calculated by means of the Levenshtein distance procedure. In this procedure two strings (in this case orthographic forms) are aligned. The distance is based on the number of operations (inserting, deleting or substituting a character) that has to be applied to go from one string to the other (Kessler 1995; Heeringa et al. 2004; Nerbonne and Heeringa 2010). Table 2 shows an example of the Levenshtein procedure. Here the orthographic distance between Danish *begejstring* and its German cognate *Begeisterung* is established. In order to transform the Danish form into the German form, the *j* is substituted by a *i*, an *e* is inserted and the second *i* is substituted by a *u*. There are no deletions. The number of operations (3) is divided by the length of the alignment (12), which in this case leads to a distance of 25%. We did not differentiate between uppercase and lowercase letters. Each operation had the weight of 1, except for differences in diacritics, which got the weight of 0.25 (for example Danish *å* in *påske* vs. Dutch *a* in *Pasen,* 'Easter').

   The Levenshtein calculations show that the two lists used in our experiment did not differ significantly (*t*(26) = -.25, *p* =0.79). The Danish-Dutch cognates had a mean orthographic distance of 30.6% (*SD* = 19.3). The Danish-German cognates had a mean orthographic distance of 28.5% (*SD* = 20.7). For an overview of the orthographic Levenshtein calculations, see Appendix C.

Table 2: Example of the Levenshtein procedure

b	e	g	e	j	s	t		r	i	n	g
B	e	g	e	i	s	t	e	r	u	n	g
0	0	0	0	1	0	0	1	0	1	0	0

Word frequencies

Research has shown that word frequency is a factor that influences the (mutual) intelligibility of languages. High frequency words are more easily recognised than low frequency words (Van Heuven 2008; Dahan, Magnuson and Tanenhaus 2001). Therefore, we checked the word frequencies of the Dutch and German target translations of our Danish stimulus words in Celex. Celex in an online frequency corpus for Dutch, German and English of the Max Planck Institute in Nijmegen, The Netherlands. The results showed, that the mean frequency of the German target translations in the Danish-German cognate list was 18.4^{1} ($SD = 16.1$) and that the mean frequency of the Dutch target translations in the Danish-Dutch cognate list was 16.6 ($SD = 42.2$). An independent samples t-test showed that the word frequencies for the target translations of the Danish-Dutch cognate list and those of the Danish-German cognate list did not differ significantly. Since none of our participants had prior knowledge of Danish, we did not check the frequencies of the Danish control words.

2.1.3   Procedure

The experiment was conducted with pen and paper. First, the participants filled in a list with questions about their personal background, including age, sex, educational background and language knowledge. After this, the experiment started. The participants read a list with 42 written Danish words, containing the 28 stimulus words and the 14 control words, where the Danish-Dutch cognates, the Danish-German cognates and the control words were mixed. We created four different orders of the words, each of which got filled out by eight participants. The participants' task was to translate every word into Dutch. There was no time limit. One of the researchers was present during the experiment to discourage cheating. As already described in section 2.1.2, half of the participants completed the experiment without the help of a semantic category (Version A) and the other half of the participants completed the experiment with the help of semantic categories to which the stimulus words belonged (Version B).

After finishing the experiment the participants had to translate 14 German control words into Dutch. These were the same Danish-German cognates as used in the experiment, but this time in

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[1] The frequencies are per 1.000.000 words. A frequency of 18.4 means that a word appeared 18.4 times per 1.000.000 words.

German. The percentage of correctly translated German control words was taken as a measure of the participants' proficiency level of German (see Section 2.1.1).

2.1.4   Scoring the data

The translations of the stimulus words as well as the German control words were scored in the following way. For a correct translation the participants received 1 point, for an incorrect translation 0 points. Half-correct translations were given 0,5 points. There were two types of half-correct translations. Either a singular noun was translated into its plural form (e.g. Danish *vante* ('mitten') was translated into Dutch *wanten* ('mittens')) or into a cognate belonging to a different word class (e.g. Danish *oversætter* ('translator') was translated into the Dutch verb *vertalen* ('to translate')).

2.2 Results

Research question 1: Does knowledge of German as an L2 help speakers of Dutch to decode written Danish words?

Our results show that knowledge of L2 German helps native speakers of Dutch to decode written Danish stimulus words. Participants with a high proficiency level of German decoded more Danish stimulus words correctly ($M = 55.0\%$, $SD = 9.9$) than participants with a low proficiency level of German ($M = 29.7\%$, $SD = 8.1$). A repeated measures ANOVA shows that this difference is significant ($F (1,28) = 58.4$, $p < 0.0001$). Our data thus shows that L2 knowledge helps decoding cognates from an unknown but related language.

Research question 2: Does the data of experiment 1 show evidence for the existence of a foreign language mode?

The results of the repeated measures ANOVA suggest that the L1 is not always the dominant language for our participants, and thus supports Selinker and Baumgartner-Cohen's (1995) interpretations of the foreign language mode. Figure 1 illustrates this finding. As expected, the participants with a low proficiency level of German translate more Danish-Dutch cognates than Danish-German cognates correctly. They clearly have more use of their L1 knowledge of Dutch.

However, participants with a high proficiency level decode more Danish-German cognates than Danish-Dutch cognates correctly. This interaction between proficiency level of German and cognate condition is significant (F (1,28) = 58.4, $p < 0.0001$). Since the mean word frequencies and the mean orthographic distances between the Danish-Dutch and the Danish-German cognate lists were kept constant, this effect cannot be due to those factors. Our findings are in line with findings by Grosjean (2001), Selinker and Baumgartner-Cohen (1995) and Dewaele (1998).
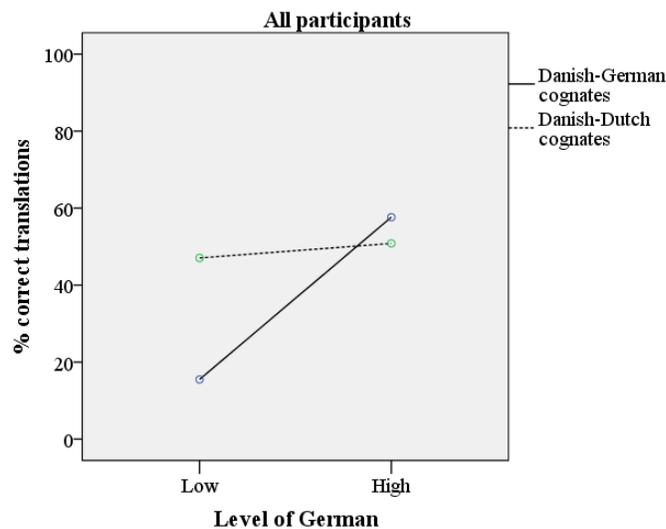

Figure 1: Translation accuracy (%) of written cognate words for participants with a low proficiency level in German and participants with a high proficiency in German

Interestingly, the influence of the foreign language mode disappears when the stimulus words are placed into a context, i.e. when participants get a hint in the form of a semantic category (in Dutch) to which the stimulus word belongs. Figure 2 shows a comparison of the results for the participants that translated the words with the help of semantic categories and the participants that translated the words without the help of semantic categories. A t-test shows that the results are significant for the participants with high proficiency of German who translated the words without help of a semantic category (left graph). They translate more Danish-German cognates ($M = 56.4\%$, $SD = 11.3$) than Danish-Dutch cognates ($M = 41.3\%$, SD = 10.6) correctly. This difference is significant ($t(8) = 2.7$, $p < 0.05$). However, the participants with a high proficiency level of German that translated the words with the help of a semantic category (right graph)

translate on average 57.8% of the Danish-German cognates correctly ($SD = 12.8$) and 52.2% of the Danish-Dutch cognates correctly ($SD = 13.3$). A t-test shows that this difference is not significant. A semantic context thus pulls the participant out of the foreign language mode and decreases the amount of co-activation, just as Schwartz and Kroll (2006) point out.
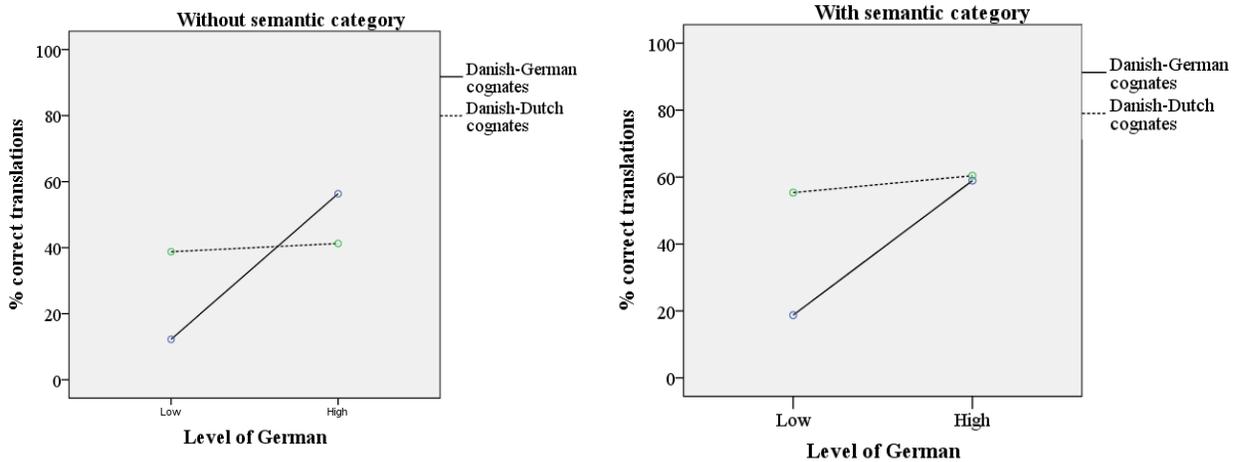

Figure 2: Translation accuracy (%) for participants who translated the written Danish words without the help from semantic categories (left graph) and participants who translated the written Danish words with the semantic categories (right graph)

3. Experiment 2

Research has shown that spoken Danish is harder to understand than written Danish for speakers of other Scandinavian languages (cf. Maurud 1976). Anecdotal evidence claims that this is also the case for speakers of other Germanic languages. Therefore, we investigated in our second experiment whether knowledge of German as an L2 also helps speakers of Dutch to decode spoken Danish words. Also, we tested again whether a foreign language mode can be observed in our data, i.e. whether participants with a high proficiency level of German translate more spoken Danish words that have a cognate in German than spoken Danish words that have a cognate in Dutch correctly. And finally, we investigated the influence of semantic context on spoken cognate recognition.

In this experiment we used the same stimulus list as in experiment 1 (cf. section 2.1.2), but this time in spoken form. The experiment took place in the spring of 2013 with students from the

Art Faculties of the Radboud University Nijmegen, the University of Amsterdam and the Leiden University in the Netherlands. None of the participants had participated in the experiment reported in Section 2. The experiment was conducted as an online web-experiment.

3.1 Design

3.1.1 Participants

96 Dutch university students from different Art Faculties in The Netherlands participated in the experiment. The participants were all between 18 and 30 years old. There were 75 female and 21 male participants. All participants only spoke Dutch as a native language. None of them knew Danish. Participants that had learned other Scandinavian languages were excluded. All participants indicated they had learned English and most of them also indicated they had learned French and German. As already explained in Section 2.1.1, this is not surprising, since these are languages that are normally taught in Dutch secondary school. Other learned languages that were mentioned were Afrikaans (5 participants), Latin (43 participants), Spanish (35 participants), Portuguese (3 participants), Italian (7 participants), Japanese (5 participants), Chinese (1 participant), Greek (6 participants), Russian (6 participants), Papiamento (1 participant), Lithuanian (3 participants), Arabic (2 participants), Hebrew (2 participants), Catalan (1 participant), Basque (1 participant), Hindu (1 participant), Turkish (1 participant) and Frisian (4 participants). The participants that indicated they learned Frisian, were no native speakers of Frisian.

Just as in experiment 1, the participants' proficiency level of German was determined by the percentage of German control words they translated correctly at the end of the experiment. In contrast to experiment 1, this time the participants got the German control words in spoken form. Participants that had a score of 50% or higher were considered to have a high proficiency level of German. Participants that scored below 50% were considered to have a low level of German.

3.1.2 Stimuli

The Danish stimulus and control words were recorded by a 50-year-old female native speaker of Danish. She lived in The Netherlands at the time of the recordings, but was originally from Jutland, Denmark. She spoke Danish without strong dialectal influences. The German control

words that were used to determine the participants' level of German were recorded by a 30-year-old female native speaker of German. She lived in The Netherlands, but originally came from Saxony, Germany. She spoke German without strong dialectal influences. Just like in experiment 1, there were two versions of the experiment; one in which the participants translated isolated Danish words and one in which the participants got a hint in the form of a semantic category in which the word fitted (see Section 2.1.2). As we already assessed in experiment 1, the mean word frequencies of the Danish-Dutch and Danish-German cognate list were the same (see Section 2.1.2).

Phonetic distances

Just as the orthographic distances were kept constant in experiment 1, the phonetic distances of the Danish-Dutch and the Danish-German cognate list were also kept constant in experiment 2. The phonetic distances were calculated by means of the Levensthein procedure (cf. Section 2.1.2). They were based on phonetic transcriptions that were checked by a native speaker of Danish, Dutch and German, respectively. The results showed that the Danish-Dutch cognates had a mean phonetic distance of 64.9% ($SD = 15.9$) from each other and that the Danish-German cognates had a mean phonetic distance of 52.9% ($SD = 20.0$) from each other. An independent samples t-test showed that this difference was not significant. For an overview of the phonetic Levenshtein calculations, see Appendix C.

3.1.3   Procedure

In contrast to experiment 1, which was conducted with pen and paper, experiment 2 was conducted online. The two questionnaires (with and without the semantic categories) were made in *SurveyGizmo*.[3] The words were presented in a fixed order, with the Danish-Dutch, Danish-German and control words mixed. The participants could listen to each word as often as they wanted, just as the participants in experiment 1 could read each word as often as they wanted. There was no time-limit. A difference with experiment 1 was that no researcher was present this time, because the participants took part online in experiment 2. However, since spoken Danish differs relatively strongly from the Danish orthographic system and because the participants had

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[3] Accessible through: www.surveygizmo.com.

no prior knowledge of Danish, it was almost impossible for the participants to google the words or look them up in a dictionary. Also, the participants were told in the introduction that they were not allowed to look up the words in a dictionary or on the internet. Therefore the risk of cheating was deemed to be low.

Version A of the experiment, where the participants had to translate the list without the help of the semantic categories, was completed by 67 participants. The 29 remaining students completed Version B of the experiment, in which they translated the same list of stimulus words, but with a semantic category to which the stimulus word belonged. In order to avoid confusion using more than one spoken fragment per item, we presented the semantic categories also in written form in experiment 2. Just as in experiment 1, we presented the semantic categories in Dutch.

The level of German of the participants was determined by the number of German control words they translated correctly. The participants were confronted with these control words after the experiment. The control words were presented in spoken form. These words were the same Danish-German cognates as used in the experiment, but this time the German counterpart had to be translated into Dutch. At the end of the questionnaire the participants had to fill out a list with background questions pertaining to their age, sex, educational background and knowledge of languages. Participants with another L1 or more L1's than Dutch and participants who had knowledge of Danish were excluded from the analysis.

3.1.4   Scoring the data

The data was scored in the same way as in experiment 1. Correct translations were awarded 1 point, incorrect translations 0 points. Participants received 0.5 points for half-correct translations (cf. Section 2.1.4 for examples of half-correct translations).

3.2 Results

Research question 1: Does knowledge of German as an L2 help speakers of Dutch to decode spoken Danish words?

Our data shows that knowledge of German as an L2 helps native speakers of Dutch in decoding spoken Danish words without having any prior knowledge of Danish. Participants with a high proficiency level of German (M = 29.0%, SD = 13.8) translate more spoken Danish words

correctly than participants with a low proficiency level of German (M = 16.6%, SD = 7.8). A repeated measures ANOVA shows that this difference is significant (F (1, 92) = 37.2, p < 0.0001). The results are thus in line with the findings from experiment 1 (cf. Section 2.2.).

Research question 2: Does the data of experiment 2 show evidence for the existence of a foreign language mode?

Just as the results for the written stimuli, the results for the spoken stimuli support the notion of a foreign language mode. Participants with a lower proficiency level of German translate more Danish-Dutch cognates correctly than Danish-German cognates, while the results are reversed for the participants with a higher proficiency level of German. Interestingly, they translate more Danish-German than Danish-Dutch cognates correctly. The repeated measures ANOVA shows that the interaction of proficiency level of German and cognate condition is significant (F (1, 92) = 37.2, p < 0.0001). Figure 3 illustrates this finding.
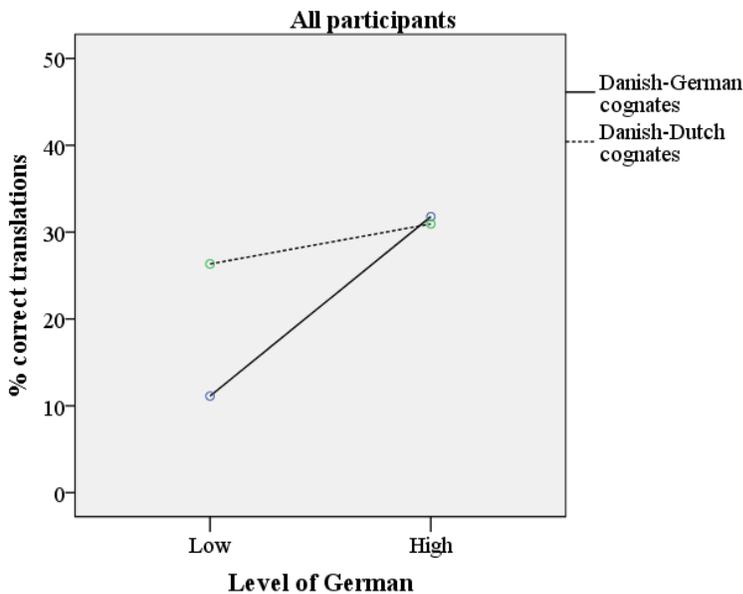

Figure 3: Translation accuracy (%) of both spoken cognate lists for participants with a low proficiency level in German and participants with a high proficiency in German.

The effect seems to be smaller than in experiment 1 (cf. Section 2.2). This could be due to the fact that the groups are not equally distributed in both experiments. In experiment 1, 65.6% of the participants had a high proficiency level of German and 34.43% of the participants had a low

proficiency level of German. In experiment 2, 21.9% of the participants had a high proficiency level of German and 78.1% of the participants had a low proficiency level of German. With groups that were more equally distributed in both experiments the effects might have looked more similar. The smaller effect could also be due to the fact that experiment 2 was more difficult than experiment 1. The Levenshtein distances between the stimulus words and the target translations were larger in experiment 2 (64.9% for the Danish-Dutch list and 52,9% for the Danish-German list) than in experiment 1 (30.6% for the Danish-Dutch list and 28.5% for the Danish-German list).

Just as as for experiment 1 (cf. Section 2.2), the effect of the foreign language mode disappears when the spoken stimulus words are placed in a context in the form of a semantic category to which the stimulus word belongs. Figure 4 shows a comparison of the participants who translated the words without semantic categories and the participants who translated the words with semantic categories. Separate t-tests show again that the effect of the foreign language mode is only significant for the participants who translated the words without the help of a semantic category. Participants with a higher proficiency level of German that took the experiment without the semantic categories translated 24.7% ($SD = 10.8$) of the Danish-German cognates and 18.1% ($SD = 6.9$) of the Danish-Dutch cognates correctly. This difference is significant ($t(12) = 2.3$, $p < 0.05$).
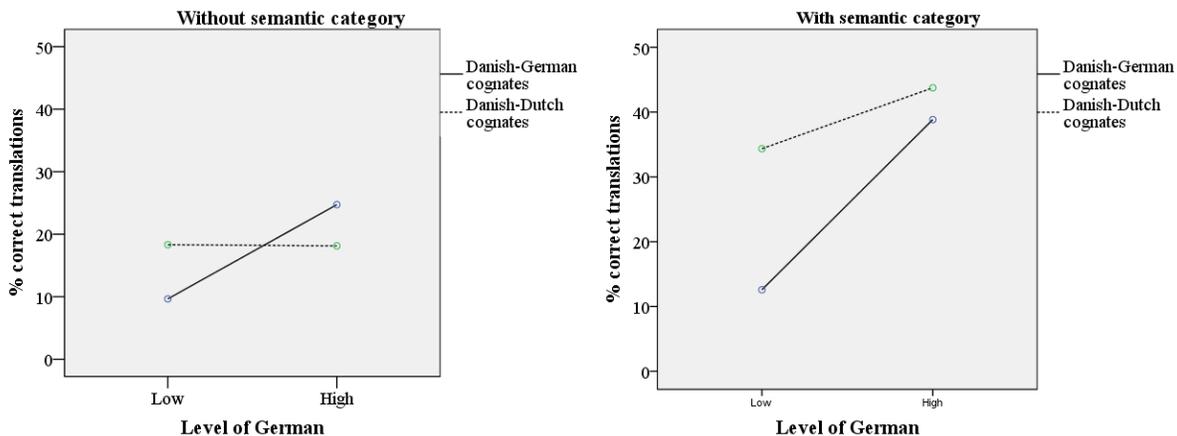

Figure 4: Translation accuracy (%) for participants who translated the spoken Danish words without the help semantic categories (left graph) and participants who translated the spoken Danish words with the semantic categories (right graph).

4. General discussion

Firstly, we find that knowledge of German as L2 helps native speakers of Dutch who do not have any prior knowledge of Danish to decode written as well as spoken Danish words. These results show that L2 knowledge can help in receptive multilingualism. These results are in line with findings by Berthele (2011) and Kürschner (2013).

Secondly, we were able to observe a foreign language mode in the data of both experiments. The effect is slightly smaller in the data of experiment 2, but this is probably due to the fact that the two groups are not entirely comparable or the fact that the written stimuli were more difficult due to larger phonetic than orthographic distances between the languages. In the group that participated in experiment 1, there were twice as many participants with a high proficiency level of German as participants with a low proficiency level of German. In contrast, in the group that participated in experiment 2 there were more than twice as many participants that had a low proficiency level of German than participants with a high proficiency level of German. We assume that the effect of the foreign language mode might have been larger for the spoken stimuli if more participants with a higher level had participated in the experiment.

Nevertheless, in both experiments participants with a higher proficiency level of German translated more Danish-German cognates than Danish-Dutch cognates correctly. It seems that for the participants with a high proficiency level of German, their L2 German is more influential than their L1 Dutch. We think this is due to the fact that the higher someone's proficiency level of an L2 is, the higher the amount of co-activation of the two languages is and the more the L2 will compete with the L1. Our findings are in line with findings by Sandoval, Gollan, Ferreira and Salmon (2010), who tested English-speaking monolinguals and English-Spanish-speaking bilinguals in a semantic task. The task was to come up with as many words belonging to a certain semantic category as possible within a predefined time-limit. The results showed a cross-competition for the bilingual participants. They were slower in naming the words and the number of correct answers was lower than for the monolingual participants.

A striking result of our study is that the effect of the foreign language mode disappears in both experiments when the words are placed in a context. Even though we used a different design, our findings remind of findings by Schwartz and Kroll (2006), who showed that a high-constraint context decreases the amount of co-activation of the L1 and L2. In our experiments the

words are not presented in a context sentence, but the participants got pushed in the right direction by being given a semantic category to which a words belongs, and from our results we can see that this makes it easier to activate the language in which the cognate of the stimulus exists than the language in which no cognate exists. We can illustrate this by outlining the processing of one of our Danish stimulus words, the word *vante* ('mitten'). This word has a Dutch cognate, *want* ('mitten'), but also a German word that has a similar orthographic form, namely *Wand* ('wall'). It is therefore possible that participants with a high proficiency level in German would translate the target word into *muur*, the Dutch translation of the German word *Wand*. Sometimes this was also the case among our participants with a high proficiency level of German that took the experiment without the semantic categories. However, the participants with a high proficiency level of German that took the experiment with the semantic categories, got the hint that the translation of Danish word *vante* should belong to the semantic category *kleding* ('clothing'). This activated the Dutch lexicon, reduced the amount of co-activation of Dutch and German and prevented the participants from translating the target word into *muur* or *wand*, the Dutch translation of the German word *Wand* ('wall').

Another aspect that might have contributed to the disappearance of the foreign language mode effect when the words were placed into a context, is that the semantic categories were offered in Dutch. Grosjean (1998) claims, that the conversational context, which includes factors such as the topic of conversation but also the language of communication, affects the language mode participants are in. It is therefore possible that presenting the categories in Dutch might have pulled the participants out of the foreign language mode.

A final point that should be mentioned is that, next to German, our participants also knew other L2's. All the participants spoke for example English. This could of course have pushed the participants with a low level of German into a foreign language mode as well, but we one we were not able to observe in our data, since we did not include Danish words that had cognates in English (or any of the other languages the participants claimed to have learned) in our stimulus list. But of course knowledge of other L2's might have made it more complicated for our participants to recognise the Danish-Dutch cognates. This might also explain the fact that participants with a high level of German and participants with a low level of German translate nearly the same amount of Danish-Dutch cognates correctly.

Our results are not only interesting from a psycholinguistic point of view, but also for mutual intelligibility research. A lot of factors influencing mutual intelligibility have been investigated. These include linguistic factors, such as lexical and phonetic differences between languages (Gooskens 2007; Van Bezooijen and Gooskens 2005, Tang and Van Heuven to appear), as well as extra-linguistic factors, such as language attitudes and language contact (Delsing and Lundin Åkesson 2005; Schüppert, Hilton and Gooskens to appear). In this paper we have uncovered a new extra-linguistic factor affecting mutual intelligibility, namely L2 knowledge. In our experiments we tested the influence of L2 knowledge at the word level. At the moment a large-scale investigation, *Mutual intelligibility of closely related languages in Europe: linguistic and non-linguistic determinants* (Gooskens 2011) is carried out at the University of Groningen, The Netherlands. In this investigation the mutual intelligibility of 16 European languages is tested at the word and text level. Also background data is gathered, including information about language knowledge. When this data is analysed, we will be able to also investigate the influence of L2 knowledge on receptive multilingualism at the text level.

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Appendix A: List with stimulus and target words used in the experiment.

Danish words that only have cognates in Dutch

	Danish target word	German translation	Dutch translation	English translation
1.	vante	Handschuh	want	mitten
2.	paraply	Regenschirm	paraplu	umbrella
3.	påske	Ostern	Pasen	Easter
4.	tolk	Dolmetscher	tolk	interpreter
5.	pakhus	Lager	pakhuis	warehouse
6.	gab	Gähnen	gaap	yawn
7.	redskab	Werkzeug	gereedschap	tools
8.	gylp	Hosenschlitz	gulp	zipper
9.	kapring	Entführung	kaping	hijack
10.	undervisning	Unterricht	onderwijs	education
11.	ligtorn	Hühnerauge	likdoorn	corn
12.	skur	Schuppen	schuur	shed
13.	passer	Zirkel	passer	pair of compasses
14.	forplejning	Krankenpflegung	verpleging	nursing

Danish words that only have cognates in German

	Danish target word	German translation	Dutch translation	English translation
1.	oversætter	Übersetzer	vertaler	translator
2.	bogstav	Buchstabe	letter	letter
3.	anstrengelse	Anstrengung	inspanning	effort
4.	rør	Rohr	pijp, buis	tube
5.	rabat	Rabatt	korting	discount
6.	ferie	Ferien	vakantie	holiday
7.	afsnit	Abschnitt	alinea	paragraph
8.	spalte	Spalte	kolom	column
9.	begejstring	Begeisterung	enthousiasme	enthusiasm
10.	kartoffel	Kartoffel	aardappel	potato
11.	elfenben	Elfenbein	ivoor	ivory
12.	maler	Maler	schilder	painter
13.	fjernsyn	Fernseher	televisie	television
14.	anstændighed	Anstand	fatsoen	decency

Danish control words (no cognates in Dutch and German)

	Danish target word	German translation	Dutch translation	(English translation)
1.	pige	Mädchen	meisje	girl
2.	emne	Thema	thema	topic
3.	dreng	Junge	jongen	boy
4.	lejlighed	Appartement	appartement	apartment
5.	værelse	Zimmer	kamer	room
6.	seng	Bett	bed	bed
7.	får	Schaf	schaap	sheep

8.	ørred	Forelle	forel	trout
9.	ørken	Wüste	woestijn	dessert
10.	kjole	Kleid	jurk	dress
11.	kæreste	Freund(in)	vriend(in)	boy-/girlfriend
12.	nøgle	Schlüssel	sleutel	key
13.	trussel	Drohung	dreigement	threat
14.	skæg	Schnurrbart	snor	moustache

Appendix B: List with German control words

	German target word	English translation
1.	Übersetzer	translator
2.	Buchstabe	letter
3.	Anstrengung	effort
4.	Rohr	tube
5.	Rabatt	discount
6.	Ferien	holiday
7.	Abschnitt	paragraph
8.	Spalte	column
9.	Begeisterung	enthusiasm
10.	Kartoffel	potato
11.	Elfenbein	ivory
12.	Maler	painter
13.	Fernseher	television
14.	Anstand	decency

Appendix C: Orthographic and phonetic Levenshtein calculations

Danish-Dutch cognate list

Danish word	Danish X-	Dutch word	Dutch X-	Orthogra-	Phonetic

	SAMPA transcript-tion		SAMPA transcription	phic Levenshtein distance (%)	Leven-shtein distance (%)
vante	vEnd@	want	vAnt	40	60
paraply	pAAply	paraplu	paRaply	14	43
påske	pOsg@	Pasen	pas@n	38	50
tolk	tQlg	tolk	tOlk	0	50
pakhus	pAghus	pakhuis	pAkh9ys	14	43
gab	g{b	gaap	xap	50	100
redskab	REDsg{b	gereedschap	x@ReitsxAp	55	80
gylp	gylb	gulp	xYlp	25	75
kapring	k{bREN	kaping	kapIN	14	67
undervisning	On6visneN	onderwijs	Qnd@RvEIs	54	75
ligtorn	lito6n	likdoorn	lIkdORn	38	71
skur	sgu6	schuur	sxyR	50	75
passer	pas6	passer	pAs@R	0	60
forplejning	f6plAjneN	verpleging	feRpleixIN	36	60

Danish-German cognate list

Danish word	Danish X-SAMPA transcript-tion	German word	German X-SAMPA transcription	Orthogra-phic Levenshtein distance (%)	Phonetic Leven-shtein distance (%)
oversætter	Qu6sEd6	Übersetzer	yb6zEts6	40	62
bogstav	bOgsdEu	Buchstabe	buxStab@	56	88
anstrengelse	ansdREN@ls@	Anstrengung	anStRENUN	33	55

rør	R96	Rohr	Ro6	50	33
rabat	RAbEd	Rabatt	Rabat	17	60
ferie	fe6i@	Ferien	fe6i@n	17	17
afsnit	ausnid	Abschnitt	apSnIt	44	67
spalte	sbEld@	Spalte	Spalt@	0	67
begejstring	begAjsdREN	Begeisterung	b@gaist@RUN	31	55
kartoffel	kAtQf@l	Kartoffel	katOfl	0	43
elfenben	Elf@nben	Elfenbein	Elfnbain	11	33
maler	m{l6	Maler	mal6	0	25
fjernsyn	fj{6nsyn	Fernseher	fE6nze6	50	62
anstændighed	ansdEndiheD	Anstand	anStant	50	73