Language Distance and its Role in the Relationship Between Exposure and Language Dominance in Dutch Bilingual Children

Research report

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Abstract

In research, bilingual language development differs from monolingual language development due to high variability present in bilinguals. This variance includes degrees of exposure to either language and language distance, which is the degrees in which language systems differ from each other. A distinction can be made between close language pairs (CLP) and distant language pairs (DLP). Disparities in research findings seem to indicate that there is no clear cut answer to the question of to which extent language distance influences the effects of exposure on language dominance. Using the dataset from the 2in1 project, this paper aims to investigate the research question of to which extent language distance influences the relationship between home exposure and the degree of dominance among Dutch bilingual children. The Sentence Repetition Task (SRT) and Cross-Linguistic Language Task (CLT) were administered among 147 bilingual participants between the ages of 5 and 10 years old. Using ratio scores in both languages, language dominance was calculated for each participant. Relative exposure was measured using the Bilingual Language Experience Calculator (BILEC). Results confirmed the effect of relative exposure on language dominance in both measures of proficiency. This paper also found that the interaction between relative exposure and language dominance seems to be present, but not within all measures of proficiency as it was found for SRT-dominance but not for CLT-dominance. Further research should include additional language proficiency measures

to test whether the interaction effect between relative exposure and language dominance could be present in other language domains.

Keywords: cross-linguistic effect, language dominance, language distance, language exposure, bilingual development

1. Introduction

Bilingual development contains higher degrees of variability compared to monolingual development, such as differences in relative exposure and similarities between both languages (Knopp, 2022). Furthermore, some researchers suggest that different language systems, that are present within bilinguals, influence each other (Antonieu et al., 2012). Due to these degrees of variability within bilingual language development, bilingual individuals are rarely 'balanced', meaning being equally proficient in both of their languages. Instead, it is more common for individuals to have a dominant language and a weaker language (Knopp, 2022). Researchers often operationalize language dominance as the relative proficiency of a bilingual individual in each language, meaning that the language scores of both languages are compared to each other in order to determine which language is more dominant (Birdsong, 2016; Knopp, 2022). A growing body of evidence suggests that relative language exposure is an acceptable proxy for language dominance (e.g. Unsworth et al., 2018). However, there is no true consensus on the operationalization of language dominance, as it cannot be understood as a static concept in which an individual is either fully dominant or non-dominant within a given language. Rather, it is a dynamic concept, which is relativistic, multidimensional, and gradient in nature (Birdsong, 2016; Knopp, 2022).

Research indicates that relative language exposure to each language in bilinguals correlates to the proficiency in the same language. Various researchers found that high exposure to the majority language has positive effects on both comprehension and production of this language, whilst having a negative effect on the minority language. These patterns were also found for exposure in the minority language (Thordardottir, 2011, 2019; Floccia et al., 2018). Furthermore, participants who were equally exposed to both languages, scored similarly in both languages (Thordardottir, 2011, 2019). This was found to be the case for both expressive and receptive scores in French and English

bilingual children. Thordardottir (2011) suggested that similar scores of the equal language exposure group may be due to the similarities of the languages that were tested, which is also referred to as language distance.

According to Radman et al. (2021), language distance is 'the extent to which two languages have different vocabulary, syntactic structure, phonemes, spelling and pronunciation, orthography and writing systems' (p.1). Language distance includes close language pairs (CLP), in which language systems are similar, and distant language pairs (DLP), in which language systems are less similar (Radman et al., 2021).

The distance between different language systems could be of equal importance as language exposure when looking at the language dominance of bilingual children, for example, when looking at cross-linguistic influence. This term describes the idea that the different language systems present within bilinguals influence each other (Antonieu, 2012). Various researchers have investigated whether language distance, combined with the degree of language exposure, affects language dominance in the languages spoken by a bilingual child.

Some researchers have found that cross-linguistic influence may cause the language systems to reinforce each other (e.g. Floccia et al., 2018; Blom et al., 2020). For one, there is evidence that bilingual toddlers have a larger production and comprehension vocabulary in their additional language if there is a greater overlap in phonology, typology and morphological complexity between the English language and their additional language (Floccia et al., 2018). This was measured through both production and comprehension tasks in English bilingual children. Other researchers found similar results for receptive language scores in non-English language pairs (Blom et al., 2020).

Other research, such as Knopp (2022), found that the overlap in language systems may not matter as much. Although CLP bilinguals had significantly more exposure to the majority language in comparison to DLP bilinguals, vocabulary scores showed that both groups were dominant in the majority language and had similar language scores (Knopp, 2022).

Alternatively, research suggests that cross-linguistic influence can interfere with language performance of bilingual individuals. This may be the case, for example, when two language systems within an individual are highly developed (Antonieu et al., 2012). Even when two language systems within bilingual individuals are highly developed, cross-linguistic influence remains. This influence allows bilinguals to co-activate different

language strategies when faced with a linguistic task. However, if these strategies are drastically different, which is often the case with highly developed DLP bilinguals, this also could result in difficulty to eliminate one of two strategies in favor of the other. This theory is supported by the work of Liu and Ning (2021), who investigated the selective attention of Cantonese-Urdu bilinguals during the processing of segments and tones in Cantonese. They found that Urdu-dominants classified Cantonese stimuli along segments rather than tones, maintaining their L1 strategy, whereas Cantonese-dominants employed similar language strategies to native speakers, being more attentive to tones. However, when the stimuli was manipulated to contain both characteristics of Urdu and Cantonese, Cantonese- dominants had a significantly lower reaction time compared to Cantonese natives and Urdu-dominants, suggesting that Cantonese-dominants had to actively repress their L1-strategy in favor of their L2-strategy.

In sum, there is an indication research that relative language exposure to each language in bilinguals correlates to the proficiency in the same language (Thordardottir, 2011, 2019). As for cross-linguistic influence, current research provides mixed support for its effect on language performance of bilingual children. Though there is evidence that closely related language pairs have a positive influence on the expressive and receptive language skills of the additional language (Floccia et al., 2018), others have found that distance between language pairs has a negative influence on skills in the additional language skills (Liu and Ning, 2021), or does not influence language dominance at all (Knopp, 2022).It seems that there is no clear cut answer to the question of how language distance influences the relationship between exposure and language dominance. This could be because researchers conceptualize language dominance in different ways, which complicates making comparisons between studies. Furthermore, countless combination of language pairs are possible for bilingual children, which makes comparing research on language pairs even more difficult. It is therefore necessary to further examine the relationship between exposure and language dominance, while focusing on language distance within the language pairs of bilinguals.

1.1 Current Research

Using the dataset from the 2in1 project (Unsworth et al., 2022), this paper investigates to which extent language distance influences the relationship between home exposure and the degree of dominance among bilingual children. In order to answer this question, two

measures are used. First, the question is answered by looking at the global effect of language distance in comparing CLP- and DLP bilinguals. Next, the different language pairs of the DLP-group will be examined to see if there is a difference in the degree of similarity between language pairs.

Based on the findings by Thordardottir (2011; 2019), it is expected that language pairs that are relatively more distant result in bilinguals being more dominant in either language compared to less distant- and closely related language pairs. This would translate into less discrepancy between the language scores of the CLP bilinguals versus DLP bilinguals.

2. Method

2.1 Participants

A total of 147 participants between the ages of 5 and 10 (*M* = 7,4) and their existing data from other studies of the 2in1 project (Unsworth et al., 2022) were used to answer the research questions. The distribution of studies that were used to form groups of language pairs can be seen in Table 1. The distribution of participants over the language groups can be seen in Table 2.

Table 1

Studies Used per Language Distance Pair (N=147)

Language distance pairs		**Studies**	**Number of participants**
CLP (N = 106)	English - Dutch	cvd1	40
		gjk1	36
		su1	30
DLP (N = 53)	Turkish - Dutch	cvd3	23
	Spanish - Dutch	su1	30

Total	**159**

Note. The number of participants displayed in the table shows the dataset before controlling for possible errors in the data.

Table 2

Distribution of Participants Among Language Groups and Tasks (N = 147)

Language distance pairs		**Scores**	
		CLT	**SRT**
CLP (N = 102)	English - Dutch	60	93
DLP (N = 45)	Turkish - Dutch	16	19
	Spanish - Dutch	29	X
Total		105	112

Note. This table displays the distribution of the combined test scores of the Cross-Linguistic Lexical Task (CLT) and the Sentence Repetition Task (SRT) in Dutch and the additional language among Close Language Pairs (CLP) and Distant Language Pairs (DLP). The SRT was not administered to the Spanish-Dutch children.

2.2 Procedure

Language dominance was calculated via relative proficiency in both languages. The language pairs were chosen using the available data from the 2in1 project. A language distance classification was created using the Universal Knowledge Core database (Dynamic graphs of lexical similarities, 2021), see Figure 1.

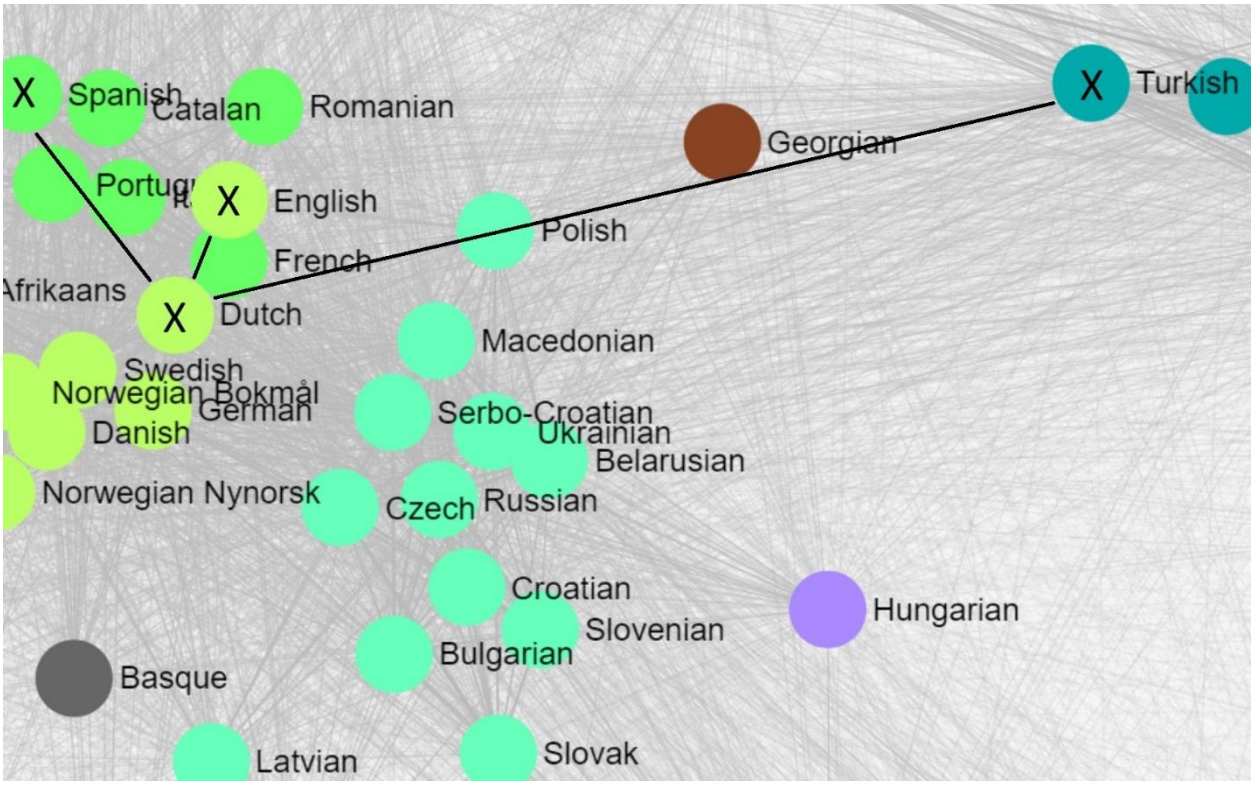
Relative proficiency was measured via the Sentence Repetition Task (SRT) and the Cross-Linguistic Language Task (CLT). The SRT measures proficiency through

vocabulary and morphology (Polišenská et al., 2015). Long-term linguistic knowledge has been shown to influence SRT-scores (Armon-Lotem et al., 2015). The CLT is a picture-naming task and measures proficiency via vocabulary capacity (Haman et al., 2015).

A ratio score that represents language dominance for each participant was calculated in the following way. First a percentage score of the right answers for both the SRT and CLT were measured. Secondly, ratio dominance was calculated via this formula: (NLD score / (NLD score + OL1 score)) x 100. Lastly, all scores above 50 were reversed to show the degree of language dominance, with a score of 50 corresponding with being

Figure 1

Dynamic Graph of Lexical Similarities



Note. This graph was retrieved from the Universal Knowledge Core Database on May 21st, 2023 (Dynamic graphs of lexical similarities, 2021). Markings have been added for clarification.

balanced in both languages and a score of 0 corresponding with begin dominant in either language. Before the last step, dominance scores ranged from 0 to 100, with a score of 50

corresponding with being balanced, a score of 0 meaning being dominant in Dutch and a score of 100 meaning being dominant in the other language. Because there was no initial interest in which language children were dominant in, the dominance scores were reformulated. The most convenient way to do this was to leave a score of 50 to mean being balanced and making a score of 0 mean being dominant in either language. For an overview of the formula used in this study, see Table 3.

Cumulative exposure to Dutch and Age of testing were taken from the Bilingual Language Experience Calculator (BILEC) questionnaire of each previous study. The two variables showed a strong, positive correlation (r = .433) and would create multicollinearity if they stayed separate variables in the same analysis (Allen, 1997).

Table 3

Steps of Calculating Language Dominance for the Sentence Repetition task (SRT) and the Cross-Linguistic Language Task (CLT)

	Sentence Repetition task (SRT)	**Cross-Linguistic Language Task (CLT)**
Step 1	$\frac{SRT\ NLD\ correct}{SRT\ NLD\ total}\ x\ 100$	$\frac{CLT\ NLD\ correct}{CLT\ NLD\ total}\ x\ 100$
Step 2	$\frac{SRT\ OL1\ correct}{SRT\ OL1\ total}\ x\ 100$	$\frac{CLT\ OL1\ correct}{CLT\ OL1\ total}\ x\ 100$
Step 3	$\frac{NLD\ CLT\ \%}{(NLD\ CLT + OL\ CLT)}\ x\ 100$	$\frac{NLD\ CLT\ \%}{(NLD\ CLT + OL\ CLT)}\ x\ 100$
Step 4	Scores between 50 – 100 are reversed. Scores between 0 – 50 remain the same.	Scores between 50 – 100 are reversed. Scores between 0 – 50 remain the same.

Therefore, cumulative exposure was combined with the age of testing and turned into a new, single variable: Relative Exposure, through the following formula: (Cumulative exposure to Dutch / Age of testing) x 100. Language distance is based on relative proficiency in both languages (Unsworth, 2018) via two separate percentage scores: CLT and SRT.

2.3 Data Analysis

The dataset of this current study contained the following variables: Participant number, Age of testing, Cumulative exposure, Relative exposure, Language distance (CLP/DLP), type of other language (ENG/TUR/SPA), Dutch SRT-score, other language SRT-score, SRT Dominance, Dutch CLT-score, other language CLT-score, and CLT Dominance. Three Univariate ANCOVA's were done to answer our questions.

The first analysis contained CLT-dominance as dependent variable, language distance as between subject-factor and relative exposure as covariate. The second analysis contained the same independent variables, but SRT-dominance as dependent variable. The third analysis used only the two types of DLP bilinguals. This analysis contained CLT-dominance as dependent variable, language distance (TUR/SPA) as between subject-factor and relative exposure as covariate. All analyses examined main effects of each independent variable and the interaction effect of language distance and relative exposure.

3. Results

3.1 Analysis 1: Cross-Linguistic Lexical Task

The ANCOVA showed a moderate significant effect for the relationship between relative exposure and language dominance ($F(101,1) = 19.151$; $p<.001$; $R^2 = .165$). There was no significant effect of language distance on language dominance ($F(101,1) = 0.346$; $p = .558$) The CLT-dominance scores did not differ between the CLP-group and DLP-group. This means that language distance did not seem to have an effect on how dominant children scored in either language. Furthermore, there is no interaction between relative exposure and language dominance, which can be seen in Figure 2. This figure shows that higher

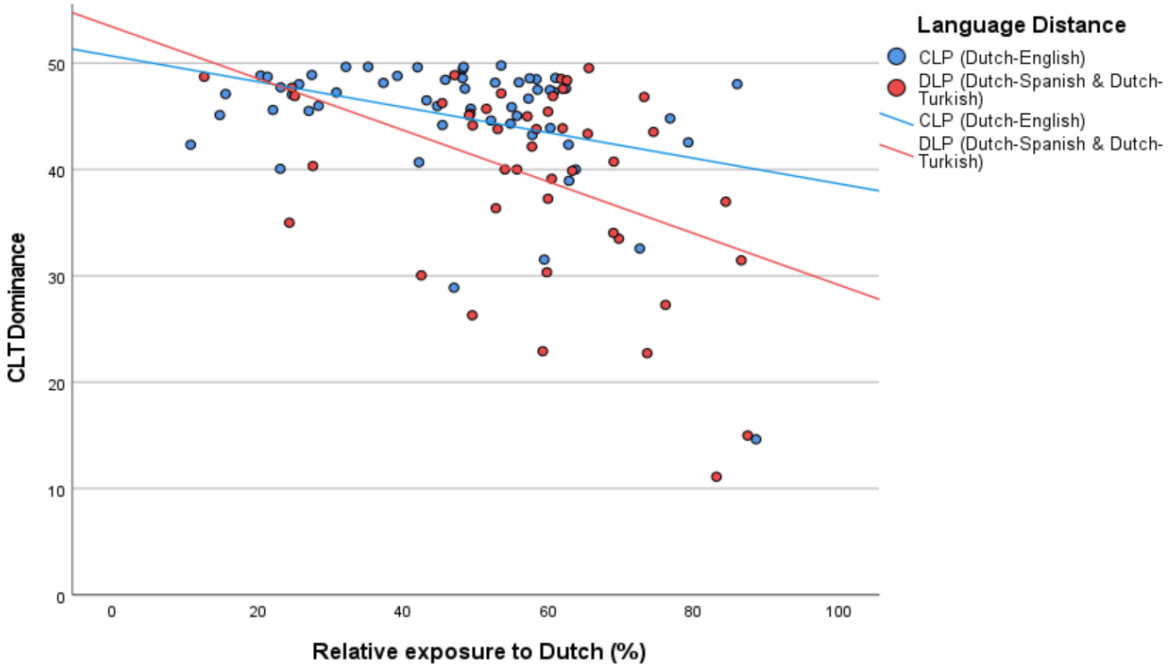
levels of exposure to Dutch coincide with a greater distance of CLT-dominance scores between the CLP-group and DLP-group. However, this increase in difference is non-significant.

3.2 Analysis 2: Sentence Repetition task

The analysis revealed a significant effect for the relationship between relative exposure and language dominance ($F(102,1) = 8.527$; $p = .004$). This effect was weak ($R^2 = .080$). There was a marginally significant effect from language distance on language dominance ($F(102,1) = 2.935$; $p = .090$). A significant effect of language distance on the relationship between relative exposure and language dominance was found ($F(102,1) = 4.274$; $p = .041$).

Figure 2

Relative Exposure to Dutch in Percentages and Language Dominance Scores in Bilinguals (CLT)



Note. This graph shows the relation between the relative exposure in Dutch and the language dominance scores. Scores closer to 50 mean that the NLD and OTL1 CLT-scores are similar, which reflects balanced bilingualism. Scores closer to 0 mean that there is a large discrepancy between the NLD and OTL1 CLT-scores, which means participants are dominant in one of two languages.

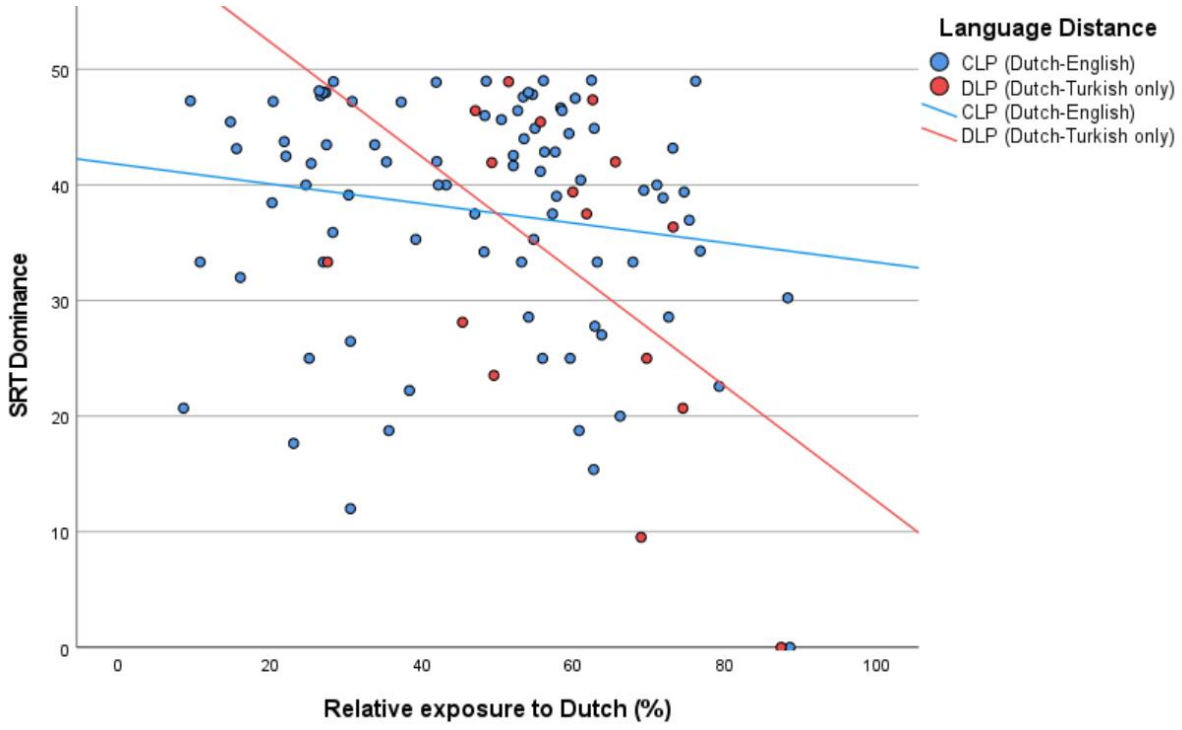
This effect was weak (R^2 = .042). There is a difference between the CLP-group and DLP-group in how SRT-dominance scores change as the exposure as the exposure to Dutch increases. The specific distribution of dominance scores can be seen in Figure 3. This figure shows that as exposure to Dutch increases, DLP-bilinguals become significantly more dominant in either language, whereas CLP-bilinguals stay more or less balanced, regardless of exposure to Dutch.

3.3 Analysis 3: Cross-Linguistic Lexical Task; DLP-group only

The ANCOVA revealed a significant effect of the relationship between relative exposure and language dominance with a moderate effect size ($F(45,1) = 7.765$; p = .008; R^2 = .159).

Figure 3

Relative Exposure to Dutch in Percentages and Language Dominance Scores in Bilinguals (SRT)

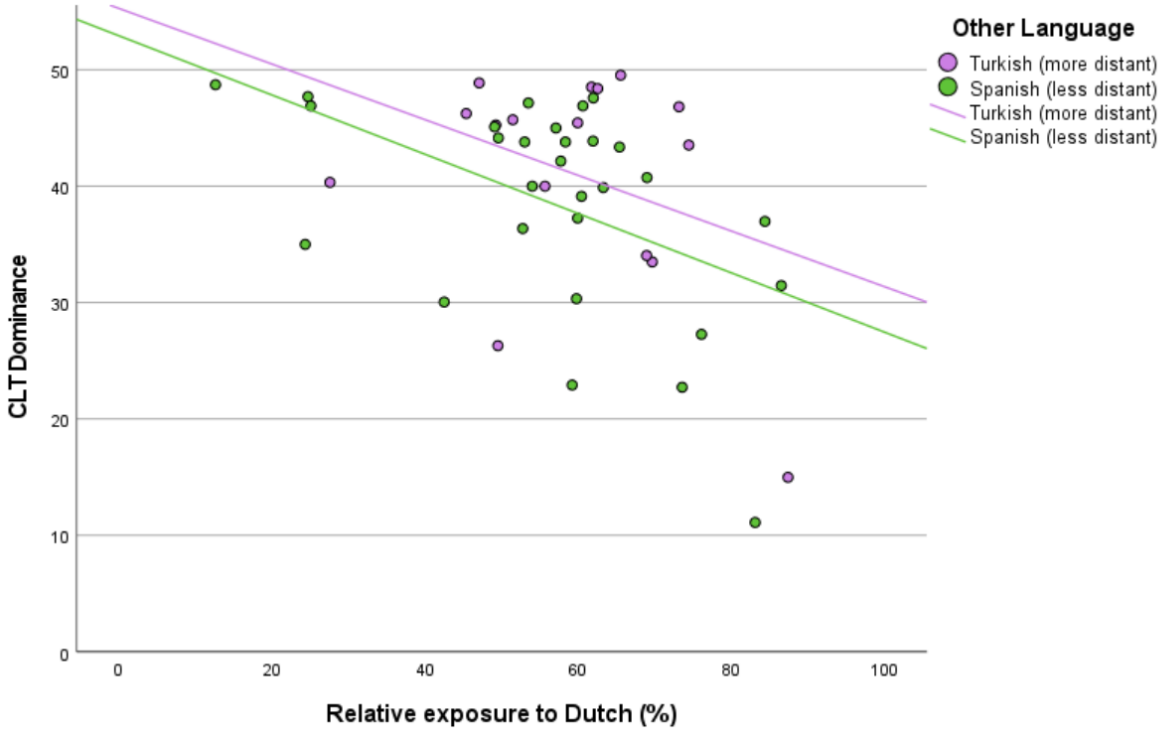


Note. This graph shows the relation between the relative exposure in Dutch and the language dominance scores. Scores closer to 50 mean that the NLD and OTL1 SRT-scores are similar, which reflects balanced bilingualism. Scores closer to 0 mean that there is a large discrepancy between the NLD and OTL1 SRT-scores, which means participants are dominant in one of two languages.

There was no significant effect of language distance on language dominance, when only looking within the DLP-group ($F(45,1) = 0.48$; $p = .827$). This means that between the two types of bilinguals within the DLP-group there seem to be no significant difference in CLT-dominance scores. The interaction between language distance and relative exposure was also non-significant ($F(45,1) = .008$; $p = .930$). The distribution of CLT-dominance scores can be seen in Figure 4. This figure shows that the changes in CLT-dominance as exposure to Dutch increases are quite similar between the Turkish bilinguals and Spanish bilinguals.

Figure 4

Relative Exposure to Dutch in Percentages and Language Dominance Scores in Distant Language Pairs (CLT)



Note. This graph shows the relation between the relative exposure in Dutch and the language dominance scores of the Dutch – Turkish and Dutch – Spanish participants. Scores closer to 50 mean that the NLD and

TUR/SPA CLT-scores are similar, which reflects balanced bilingualism. Scores closer to 0 mean that there is a large discrepancy between the NLD and TUR/SPA CLT-scores, which means participants are dominant in one of two languages.

4. Discussion and Conclusion

It was expected that language distance has a positive effect on the relationship between exposure and language dominance, specifically that as exposure to Dutch increases, DLP bilinguals become dominant in one language and CLP bilinguals stay more or less balanced. It was also expected that within the DLP-group, more distance between languages means a stronger effect compared to less distance.

These expectations were partly borne out. The interaction-effect of relative exposure and language distance was only significant on SRT dominance, but not CLT dominance. Relative exposure was significantly correlated to language dominance for both dominance measures, as expected. The analysis of SRT-dominance revealed that DLP bilinguals showed increased language dominance scores as exposure to Dutch increased. This was not true for the CLP-group as their dominance scores remained more or less similar, even when exposure to Dutch increased. These findings do support the idea that cross-linguistic influence may cause CLP language systems to influence each other and therefor create equal language scores in both languages and that this is not the case with DLP language systems (Floccia et al., 2018).

Closer examination revealed that CLP bilinguals have a more varied dominance pattern than DLP bilinguals, with individuals ranging from being dominant in Dutch to being dominant in English, whereas DLP bilinguals have dominance scores ranging between being balanced to being Dutch dominant. These patterns do not match exposure patterns shown by Knopp (2022), who found opposing results. These patterns do, however, support findings by Thordardottir (2011; 2019) and Floccia et al. (2018), who both found that higher amounts of exposure in one language leads to higher language scores in the same language.

One explanation of these findings is that the sample sizes of the CLP and DLP groups are disproportionate. Within the SRT-analysis, the sample size of the DLP-group only consisted of the Dutch-Turkish bilinguals (N = 19), as the SRT was not available for the Dutch-Spanish bilinguals. Compared to the sample size of the CLP-group (N = 93), this is quite small. A small sample size usually holds the limitation of the type II error

(Hackshaw, 2008), however this seems not to be the case, as the interaction effect was significant.

Another possible explanation for why only the SRT offers a significant result, is that the SRT and CLT measure different domains of language proficiency. The SRT is made to measure proficiency through vocabulary and morphology, whereas the CLT only measures vocabulary through picture-naming. Even though vocabulary size correlates with other aspects that are important for proficiency, such as grammatical ability, it is not as complete of a measure for proficiency as the SRT (Miralpeix & Muñoz, 2018; Van Wonderen & Unsworth, 2020). Furthermore, CLT scores in different languages do not lend themselves well to direct comparison, which is a limitation in this research project (Van Wonderen & Unsworth, 2020). As Birdsong (2016) states, language dominance is relative, multidimensional and gradient, meaning that there are many aspects to language dominance. The addition of morphology in the SRT in combination with the differences in methodology of both tests, may explain why the results differ between the two tests.

Within the DLP-group, no significant effect was found of language distance on the relationship between relative exposure and language dominance. The change in degree of dominance as exposure to Dutch increased was not different among the DLP-group. Dominance patterns of CLT-dominance revealed that the variation of both the Dutch-Turkish and Dutch-Spanish bilinguals were similar to each other, as they both ranged from being balanced to being Dutch-dominant.

These findings raise several questions that could be investigated in future research. First, it would be interesting if future research also includes other language domains that measure proficiency, as the differences in scores of the SRT and CLT could be due to the contents of the tests. In short, the SRT measures proficiency through vocabulary and morphology (Polišenská et al., 2015) and the CLT measures proficiency through vocabulary capacity only (Haman et al., 2015). Secondly, future research should investigate the boundary regarding language distance. This study found hardly any significant differences between the DLP and CLP groups, while other studies did find significant differences between them, such as Blom et al. (2020). Thirdly, it would be interesting to also zoom in on the CLP group by comparing two closely related language pairs. While this study only focused on the degree of variability within the DLP-group, a closer look at the degree of variability among CLP-bilinguals could reveal a broader pattern of language distance related to dominance in bilinguals. Lastly, as mentioned

above, it is interesting that the small size of the DLP-group within the SRT-analysis yielded a significant result for the interaction between language distance and relative exposure on language dominance. Future research could go into depth to what happens if both the DLP-group and CLP-group are similar in size.

Concluding, the interaction between relative exposure and language dominance seems to be present, further affirming the results found by Thordardottir (2011, 2019) and Floccia et al. (2018), who found that exposure to L1 increases dominance for L1 while decreasing dominance for L2. However, the effects of the interaction between relative exposure and language distance on language dominance is not present in all measures of proficiency. Moreover, these results are only present in the comparison between CLP bilinguals and DLP bilinguals, and not when looking at two different language pairs within the DLP-group.

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Context of research

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