The nominal domain in Dutch-English code-switching: insights from acceptability judgments

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Abstract

Objectives/research questions: This thesis looks at Dutch-English determiner-noun code-switches and investigates whether there is a preference for the language of the determiner, whether the position of the switched nominal construction and language dominance affect these preferences; and whether these preferences support the predictions of the Minimalist Program (MP), which predicts that the languages with more phi features provides the determiner, or the Matrix Language Frame Model (MLF), which predicts that the determiner will come from the Matrix Language (ML). This thesis also investigates how grammatical gender assignment is resolved in a code-switch involving a Dutch determiner followed by an English noun, and how language dominance affects this.

Methodology: The participants (N = 68, aged between 20 – 77) were split into a Dutch-dominant group, an English-dominant group, and a balanced Dutch-English bilingual group, based on their dominance score, which was calculated from their global language score as measured by the Bilingual Language Profile questionnaire. Participants completed two two-alternative forced-choice acceptability tasks (2AFC); one where they evaluated the acceptability of sentences with code-switches between the determiner and the noun that reflected the predictions of the MP, the MLF, of both, or none. The second task tested which Dutch grammatical gender the participant assigned to an English noun.

Data and analysis: Results from the first 2AFC were analysed using Thurstone's Law of Comparative Judgment, while the results of the second 2AFC task were used to create a frequency distribution of Dutch grammatical gender marking.

Results: A general preference for an English determiner followed by a Dutch noun was found, though this preference is influenced by the matrix language of the sentence, the position of the code-switch in the sentence, as well as language dominance of the bilingual. The first task provided evidence supporting both the predictions of the MLF and the MP, as participants preferred a Dutch determiner followed by an English noun in pre-verbal position, which is what the MLF predicts, but participants preferred an English determiner followed by a Dutch noun in post-verbal position, which is what the MP predicts. Results from the second task suggest the common determiner *de* is preferred for English nouns by all participants, regardless of language dominance and regardless of the grammatical gender of the translation equivalent.

Originality: Following Parafita Couto and Stadthagen-González's methodology (2019), this study is one of the first studies to use the 2AFC acceptability judgment task analysed using

Thurstone's Law of Comparative Judgment to directly contrast the predictions of the MP and MLF, and is the first study to do so while controlling for language dominance. Furthermore, this study investigates a language pair that has yet to be researched extensively, in addition to investigating how grammatical gender assignment is resolved.

Implications: Results provide evidence for a default gender assignment strategy, as well as evidence for a difference in code-switching preferences depending on language dominance. Furthermore, the results support Parafita Couto and Stadthagen-González's (2019) suggestion that a theory that combines both the MLF and MP would be more useful to explain Dutch-English code-switches than either framework separately.

Keywords: Code-switching, Dutch, English, Matrix Language Framework, Minimalist Program, grammatical gender assignment strategy, Determiner, Comparative Judgments

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1. Introduction

Bilinguals, people who are able to use two or more languages, can code-switch, which is the ability to alternate between two or more languages in one utterance (Bullock & Toribio, 2009). In a determiner-noun code-switch, the language of the determiner is different from the language of the noun, for example in the *Dutch*-**English** code-switch in (1a), (1b) and (1c):

(1) *Dutch*-**English**

a. *het* **book**
"the.neuter book"

b. *de* **book**
"the.common book"

c. **the** *boek*
"the book"

In (1a) and (1b), the determiner is in Dutch while the noun is in English, and vice-versa for (1c).

Proponents of the Matrix Language Frame (MLF) model and the Minimalist Program (MP) have long debated about what code-switches are possible. The MLF (Myers-Scotton, 1993) assumes that the two languages fulfil different roles in a mixed sentence construction, with one language being the Matrix Language, providing the morpho-syntactic frame of the utterance and thereby supplying system morphemes, while the other language, being the Embedded Language, supplies content morphemes (Myers-Scotton, 1993; Myers-Scotton & Jake 2000; Myers-Scotton 2002a). The MLF predicts that, for determiner-noun code-switches, the Matrix Language provides the language of the determiner, as the determiner is a system morpheme. An utterance with a Dutch-English code-switch and with a Dutch Matrix Language, will have a Dutch determiner, as in (2b), whereas an utterance with an English-Dutch code-switch and with an English Matrix language will have an English determiner, as in (2c). The MLF would not predict (2a) or (2d) since the language of the determiner does not

match the Matrix Language; in the case of (2a), the determiner is Dutch while the ML is English, and in the case of (2d), the determiner is English while the ML is Dutch.

(2) *Dutch*-**English**

a. **I have** *het* **book**
"I have the book"

b. *Ik heb het* **book**
"I have the book"

c. **I have the** *boek*
"I have the book"

d. *Ik* heb **the** *boek*
"I have the book"

Contrary to the MLF, the Grammatical Features Spell-Out Hypothesis by Liceras et al. (2005), within the Minimalist Program (MacSwan, 1999), assumes that the language with the most uninterpretable phi features such as gender marking, will be providing the language of the determiner. This hypothesis proposes that the patterns of production are syntactically motivated, in such a way that the morphemes that spell-out a greater array of abstract grammatical features are preferred (Liceras et al. 2005). English has no gender and only one definite determiner, *the*, whereas Dutch distinguishes between two grammatical genders, namely common and neuter, and has two definite determiners: *de* for common gender and *het* for neuter gender. Dutch nouns are either common or neuter, but grammatical gender is only marked overtly on definite determiners in Dutch, with common gender being marked as *de* and neuter gender being marked as *het* (Audring, 2006). As Dutch requires grammatical gender agreement, the grammatical gender of the determiner adheres to the grammatical gender of the noun following it, so that a common noun takes the definite determiner *de* and a neuter noun takes the definite determiner *het* (Audring, 2006). The MP predicts that, in a Dutch-English determiner-noun code-switch, the determiner will always be Dutch followed

by an English noun, regardless of the Matrix Language of the utterance. This is because of the grammatical gender marking on Dutch determiners, which English determiners do not have, and the grammatical features spell-out hypothesis which stipulates that the language with the most uninterpretable features, such as gender marking, will be dominant. The MP would therefore predict that bilinguals would produce code-switches such as in (2a) and (2b) because of the Dutch determiners, and not produce (2c) and (2d) due to their English determiners. The predictions regarding Dutch-English determiner-noun code-switches from the MLF and MP can therefore be summarised as follows:

Table 1. MLF and MP predictions for Dutch-English determiner-noun code-switches

Predictions		*Dutch*-**English** determiner-noun code-switch
MLF	MP	
-	+	**I have** *het* **book** "I have the book"
+	+	*Ik heb het* **book** "I have the book
+	-	**I have the** *boek* "I have the book"
-	-	*Ik* heb **the** *boek* "I have the book"

Note. A plus sign (+) means that the code-switch meets the predictions of the model while a minus sign (-) means that the code-switch does not meet the predictions of the model

As Dutch requires grammatical gender agreement between the determiner and the noun, a Dutch-English determiner-noun code-switch creates a conflict between the Dutch determiner, which distinguishes between common and neuter grammatical gender, and the English noun, which does not have grammatical gender. This conflict can be resolved through two strategies: the default agreement strategy and the analogical gender assignment strategy (Vanden Wyngaerd, 2021). In the analogical gender strategy, the noun is assigned the gender of the translation equivalent of the noun, while in the default strategy, a default gender is always assigned to the determiner, regardless of the translation equivalent. This is further explained in section 2.2.6. It is also possible for the bilingual to use phonological

clues to resolve gender assignment (Parafita Couto et al., 2015). For example, in Spanish nouns ending in *-o* are often masculine nouns, while nouns ending in *-a* are often feminine nouns. Because this is not applicable to Dutch-English code-switching, using phonological cues to determine grammatical gender will not be discussed in more detail. The default agreement strategy assigns all English nouns a default gender, either common or neuter, so the bilingual will always use the corresponding Dutch determiner with all English nouns; the analogical gender assignment strategy, on the other hand, assigns the gender of the noun based on the gender of the translation equivalent of the noun (Vanden Wyngaerd, 2021). Taking example (1a), *het* ***book*** "the book" translates to neuter *het boek* in Dutch; using the default gender assignment strategy would create *het book* "the book" or *de book* "the book" depending on whether the default gender is neuter *het* or common *de* while using the analogical gender assignment strategy to assign a determiner to the English noun *book* would create *het book* "the book".

This thesis will provide insights into the rules governing decisions made by Dutch-English bilinguals regarding determiner-noun code-switches, specifically with regards to the language of the determiner, and contribute to the growing body of code-switching research by investigating whether Dutch-English code-switching supports the predictions of the Matrix Language Frame (MLF) or the Minimalist Program (MP), as well as how grammatical gender assignment, through the default agreement strategy or analogical gender assignment strategy, is resolved in a Dutch-English determiner-noun code-switch.

This section, section one, has introduced the topic of this thesis by introducing the MLF and MP, as well as grammatical gender assignment strategies.

Section two provides the theoretical background. Firstly, the concept of bilingualism is explained and the linguistic situations of the Dutch language and of the English language are discussed.

Secondly, the concept of code-switching is further explained by giving examples of different types of code-switching. This is in addition to discussing the word order in the determiner phrase in English and Dutch, as well as the methodologies used in other code-switching research. Next, previous studies on Dutch-English bilingualism are discussed. Furthermore, an overview of grammatical gender assignment is given, as well as a discussion of multiple studies that have investigated gender assignment and grammatical gender assignment strategies. Moreover, an overview of conflict sites in code-switching is given. Thirdly, a detailed overview of the two different theoretical models of code-switching that will be tested, the Matrix Language Frame model, and the Minimalist Program, is given, in addition to discussing several studies that have compared these two opposing models. Finally, the research questions and hypotheses are presented.

The methodology is explained in section three, by first going into detail about the participants and how they were recruited, as well as how they were split into three groups: the Dutch-dominant group, the balanced group, and the English-dominant group. Second, the materials, including the first and second task as well as the background questionnaire, are described. Third, the procedure used to analyse the data, including the calculation of Thurstone's Measure with Thurstone's Comparative Law of Judgment is explained.

Section four presents the findings of this study. First, the results for the first research question regarding the preference for the language of the determiner, across all participants and a comparison between Dutch-dominant participants and English-dominant participants, are presented. This is followed by a comparison between pre-verbal and post-verbal code-switches, after which a summary will be provided on whether the results provide evidence for the Matrix Language Frame model or the Minimalist Program. Secondly, the results for the second research question are presented by showing the preference for the gender of the Dutch determiner when followed by an English noun, exploring which gender assignment strategies

are preferred and comparing the preferences and gender assignment strategies across all three participant groups, and by showing a comparison between the Dutch-dominant and English-dominant participants specifically.

In section five, the results of this study are discussed and related to findings of previous studies on determiner-noun code-switches, while the conclusion in section six explores possible explanations for the findings and suggests the implications of the results, in addition to discussing the limitations of this study and suggesting possible avenues for future research.

2. Theoretical background

2.1. Bilingualism

The ability to use of two languages, bilingualism, has been studied extensively over the past decades. Bilingualism is a complex concept and there is not one simple definition of bilingualism. Bullock and Toribio (2009) discuss multiple possible types of bilinguals: those who have been exposed to two languages from birth or early childhood, or those who acquire their first language and then a second language at any point in their life, or those who are equally fluent in both languages, and even those who are able to communicate in any way in multiple languages, which includes sign languages.

Bilinguals can vary greatly in their proficiency for various reasons, including but not limited to their age at the start of bilingual acquisition, as well as the quality of the linguistic input they received, or the language most used, and the status of the language in the community (Bullock & Toribio, 2009). This thesis focuses on bilinguals defined as someone who can use two languages comfortably in casual conversation; this definition of a bilingual therefore also includes second language learners, who fully acquired their first language before the start of the acquisition of their second language.

2.1.1. Linguistic situation of Dutch and English

A brief overview of the linguistic situations of Dutch and English are provided below, before explaining the language contact phenomenon of code-switching.

2.1.2. The linguistic situation of Dutch

Dutch is the official language of the Netherlands and Suriname, and one of the official languages of Belgium, though there are also other countries where speakers of Dutch live,

such as Indonesia, the United States, Canada, Australia, and New Zealand (Eberhard, Simons, & Fennig, 2021).

Dutch is the third most spoken Germanic language, after English and German. There are approximately 25 million speakers of Dutch in the European Union, with approximately 8 million second language speakers of Dutch; over half a million second language speakers of Dutch reside in the United States, Canada, and Australia (Eberhard, Simons, & Fennig, 2021).

The majority of the population of the Netherlands is at least bilingual. Research done by the European Commission (2012) found that 94% of the Dutch population speaks at least one language other than their native language, with 75% having two other languages, and 35% three other languages. Additionally, 90% of the Dutch population indicated that they are able to have a conversation in English. In short, Dutch-English bilinguals are a substantial part of the population of the Netherlands.

2.1.3. The linguistic situation of English

English is the official language of 67 countries and 27 non-sovereign entities, with the majority of the native speakers of English residing in The United Kingdom, the United States, Australia, and New Zealand (Eberhard, Simons, & Fennig, 2021). English has the largest number of speakers in the world, and is the third most-spoken native language, after Standard Chinese and Spanish. It also is the most widely learned second language, as there are more second language learners of English (978209920) than there are native speakers of English (36993593) for a total of 1.348.145.850 speakers of English across the world (Eberhard, Simons & Fennig, 2021).

In the next section code-switching is further explained: the two different theoretical models of code-switching that are the focus of this study will be elaborated on. Grammatical

gender assignment strategies will be explained and the word order in the determiner phrase for Dutch and English are discussed. Finally, it will introduce the research aims.

2.2. Code-switching

2.2.1. What is code-switching?

Code-switching (CS) is a language contact phenomenon which "broadly defined, [...] is the ability on the part of bilinguals to alternate effortlessly between their two languages" (Bullock & Toribio, 2009, p. 1). Currently, different labels are used to refer the same phenomenon, as different researchers have called phrases such as **I have the** *boek* "I have the book" language alternation, code-mixing, language mixing and language switching, while others use code-switching, which can also be used to describe a switch between dialects, style, or registers (Bullock & Toribio, 2009).

Code-switching can be divided into either intersentential or intrasentential code-switching. Code-switching at sentence boundaries is called intersentential code-switching, while switching within sentence boundaries is called intra-sentential code-switching (MacSwan, 1999). An example of Dutch-English intersentential code-switching is given in (3) and an example of Dutch-English intrasentential code-switching is given in (4).

(3) *Dutch*-**English**

I was wondering if you'd like it if I make samosa's with NYE. *Denk een heet bladerdeeg hapje gevuld met zoete aardappel,wat groente en zalm.* **Also if this would fly with our hosts?**

"I was wondering if you'd like it if I make samosa's with NYE. Think of a hot pastry snack filled with sweet potato, some vegetables, and salmon. Also if this would fly with our hosts?"

(T. Engering, personal communication, December 27th, 2021)

(4) *Dutch*-**English**
We bought *oliebollen* **for the New Years' party**
"We bought Dutch doughnuts for the New Years' party"
(R.M. van der Wijk, personal communication, December 31st, 2021)

As you can see in (3), the code-switch occurs at sentence boundaries; a complete sentence is formed in English, then a code-switch occurs when a complete sentence is formed in Dutch, followed by another code-switch when another English sentence is formed. In (4) on the other hand, the code-switch is within the sentence boundaries, as a single sentence contains both English and Dutch.

In addition to the distinction between intersentential and intrasentential code-switching, code-switching may not always be used in the same way or take the same form; this is due to individual characteristics of the participants or to community norms that may get established in a particular community (Parafita Couto et al., 2021). Moreover, the motivations for code-switching can be varied, such as filling lexical gaps, expressing identity as belonging to a certain community, adhering to social norms, or adding emphasis (Parafita Couto et al., 2021; Bullock & Toribio, 2009).

Intrasentential code-switching requires a high level of proficiency in both languages, as code-switching requires the production of a clause that adheres to the language systems of both languages. When producing an intrasentential code-switch, the two grammars must be acceptably mixed into one utterance, meaning that "the [code-switched] utterances generally adhere to grammatical constraints imposed by the syntactic structures of both languages such that they conform to the surface structure of each language" (Bullock & Toribio, 2009, p. 242).

Bilinguals can vary in their proficiency, language use, order of acquisition and age of acquisition. A bilingual with a low proficiency in one or both languages can code-switch in a

different way than someone with a high proficiency in both languages. Studies were conducted on the preferences for intrasentential and intersentential code-switching for bilinguals at different levels of fluency. This was done by conducting fieldwork and collecting casual conversations that included code-switches, among others.

Lipski (2005) suggests that fluent Spanish-English bilinguals most often use intrasentential code-switching, while low-fluency Spanish-English bilinguals typically mostly use intersentential code-switching.

Poplack (1980), who studied a Puerto Rican Spanish-English community by recording speech data in interview and natural settings, concluded that less-fluent bilinguals used more intersentential code-switches. She suggests that speakers who produced intrasentential code-switches generally have a higher proficiency than those who only produce intersentential code-switches.

Additionally, Berk-Seligson (1986) studied Spanish-Hebrew bilinguals through tape-recordings of informal conversations in a local community recreation centre and found that fluent bilinguals used intrasentential code-switches more. Though she notes that this observation is unrelated to bilingual proficiency, as she found no correlation between the type of code-switching and the degree of bilingualism.

2.2.2. Types of code-switching

Aside from intersentential and intrasentential code-switching, Deuchar (2012) proposes new labels for intraclausal and interclausal code-switching. Intraclausal code-switching is a code-switch within a clause; this is intrasentential code-switching. An example is given in (5), with square brackets showing the clause boundaries:

(5) *Welsh*-**English**
[*Mae nwh (y)n* ***exfoliate****-io chdi gyntal*] [*ac yn sbwnjo chi drosodd gyntal*]
'they exfoliate you first, and sponge you over first'

(Deuchar, 2012, p. 3)

Interclausal code-switching, on the other hand, is code-switching within clause boundaries, exemplified in (6), with square brackets showing the clause boundaries:

(6) *Spanish*-**English**
[**él siempre me da cumplido-s así**] [*so I said to him, "talk to me in two more years"*]
"He always gives me compliments like this so I said to him, 'talk to me in two more years'"
(Deuchar, 2012, p. 4)

Deuchar also states that some switches can be classified as both intraclausal and interclausal at the same time, as in example (7) with square brackets showing the clause boundaries:

(7) *Welsh*-**English**
[**I wonder** [*pryd o'n i yma*] **then**]
"I wonder when I was here then"
(Deuchar, 2012, p. 4)

Deuchar argues for this distinction between intraclausal and interclausal due to the ambiguity of the term intrasentential. This ambiguity can be made clear through one of the most famous examples of code-switching by Poplack (1980) in (8) with square brackets showing the clause boundaries, as in Deuchar (2012, p. 4):

(8) *Spanish*-**English**
[Sometimes I'll start a sentence in Spanish] [y termino en Español].
'Sometimes I'll start a sentence in Spanish and end in Spanish'.
(Poplack, 1980, p. 518)

Deuchar (2012) points out that this can be classified as both intrasentential code-switching, because the switch occurs within the sentence, while other researchers classify (8) as intersentential code-switching because the clause *and end in Spanish* is a form of a minimal sentence; as such, it can be argued that the terms interclausal and intraclausal code-switching are less ambiguous, though throughout this thesis only intrasentential and intersentential code-switching will be used for simplicity.

Some studies also identify a third type of code-switching, that of extra-sentential code-switching (Cantone, 2007). This also could be argued to be interclausal code-switching by Deuchar's (2012) definition, though tags do not have to be a full sentence, in which case the term intraclausal code-switching does not apply. This involves a sentence in one language with an added tag or interjection from the other language, such as the example of English-Italian extra-sentential code-switching given in (9):

(9) *Italian*-**English**
I was happy about that, *capisci?*
"I was happy about that, do you understand?"
(Cantone, 2007, p. 58)

It is important to differentiate code-switching from other language contact phenomena, such as borrowing or loan words, and loan translation or calques, in order to clarify the specific object of study. This will be discussed next.

2.2.3. Differentiating code-switching from other language contact phenomena

The term borrowing has been used to describe many different forms, from the transfer of structural features, such as phonemes and suffixes, to the transfer of whole structures from one language to another. For this thesis, the term borrowing is taken to mean words that are transferred from one language to another.

Borrowing, or loan words, involves a word from one language being assimilated through the morphological and phonological integration of a single lexical unit, and therefore formally accepted, into the other language (Bullock & Toribio, 2009). An example of this is the English word *browsing* being adopted into Dutch *browsen*; these loan words are used by monolinguals and bilinguals. Unassimilated loan words, sometimes considered to be code-switches, but also called nonce borrowings (Poplack, 1980), only occur in bilingual speech. This is when the bilingual transfers a lexical item from one language to another language of which the item is not an established part (Bullock & Toribio, 2009), which is why some researchers, such as Myers-Scotton (1993), argue that borrowing and code-switching are on the same continuum of language transfer (Treffers-Daller, 2009). It can therefore be difficult to distinguish code-switching from borrowings, as a lexical item that is currently in the process of being assimilated by the other language could be present in both monolingual and bilingual speech.

Calques are defined by Backus and Dorleijn (2009) as "words or phrases that are reproduced as literal translations from one language into another" (p. 75). Calques adapt the item to the new language while retaining a structure similar to the original language. This is exemplified in the Turkish-Dutch calque in (10):

(10) *piano oynamak*
piano play;
"to play piano"
(Backus & Dorleijn, 2009, p. 77)

In Standard Turkish "to play piano" would be *piano çalmak* ("piano to sound") and in Standard Dutch it would be *piano spelen* ("piano to play"). In (10) the word *oynamak* "to play" is used instead of *çalmak* "to sound"; this follows the Dutch structure of "piano to play"

while still using the appropriate Turkish word *oynamak* “to play”. This is different from code-switching, where two languages co-exist without any adaptation of one language into the other. However, as mentioned before, code-switching does have to resolve possible conflicting grammatical constraints that are imposed by both languages.

The focus of this thesis is specifically on intra-sentential determiner-noun code-switching. These are code-switches between the determiner and the noun, such as in (11), where the determiner is in Spanish while the noun is in English. The word order in the determiner phrase in Dutch and in English will be explained now.

(11) *Spanish*-**English**
Edgar wanted *estos* **shoes**
“Edgar wanted these shoes”
(Parafita Couto & Stadthagen-González, 2019, p. 353)

2.2.2.1 Word order in the determiner phrase in Dutch

The basic word order for determiner phrases in Dutch is a determiner followed by a noun, such as in *het boek* “the book”. Adjectives are pre-nominal, positioned between the determiner and noun, such as in *het leuke boek* “the nice book”.

Dutch distinguishes between definite (*de* / *het)* and indefinite (*een)* determiners, as exemplified in (12). Dutch also marks grammatical gender, but only on definite articles. Dutch has two grammatical genders for nouns: common and neuter, as seen in (12).

(12) a.	*de muur*	c.	*een muur*
	“the [common] wall”		a wall
b.	*het huis*	d.	*een huis*
	the [neuter] house		a house

The grammatical gender of the determiner is based on the gender of the noun and grammatical gender agreement between the determiner and the noun is mandatory.

Standard Dutch used to have a grammatical gender distinction within common gender between masculine, feminine and masculine/feminine. This distinction has been lost in modern Dutch; functionally there is no difference in use between masculine common, feminine common or masculine/feminine common as all are treated as a common gender in Standard Dutch (Vanden Wyngaerd, 2021), as exemplified in (13); the distinction between common and neuter, however, is maintained.

(13) a. *de brouwerij*
"the [feminine common] brewery"
b. *de oom*
"the [masculine common] uncle"
c. *de fiets*
"the [masculine/feminine common] bicycle"

Words referring to entities whose natural gender is masculine also have a masculine common grammatical gender, as well as words ending in *-aar*, *-aard*, *-er*, *-erd*, *-eur*, *-or* and *-us* (Van Berkum, 1996). Conversely, words referring to entities whose natural gender is feminine also have a feminine common grammatical gender, words for abstract concepts and words ending in *-a*, *-e*, *-egel*, *-egge*, *-es*, *-in* and *-ster*, as well as suffixes that are borrowed from Latin and Greek (e.g. *-ade*, *-ica*, *-ode*, *-theek*) have a feminine grammatical gender in Dutch (Van Berkum, 1996). Based on a computerized lexical database of Dutch with over 130.000 word entries based on 42 million words of sampled text, Van Berkum (1996) found that roughly 67% of Dutch nouns are common, and 32% is of Dutch nouns are neuter.

2.2.2.2 Word order in the determiner phrase in English

Like Standard Dutch, a determiner phrase consists of a determiner followed by a noun, such as in *the book*, as well as a pre-nominal adjective, for example *the nice book*. Similarly,

English distinguishes between definite determiners (*the,* e.g. the book) and indefinite determiners (*a,* e.g. a book). However, unlike Dutch, modern English no longer has a system of grammatical gender and is therefore genderless; there is still gender distinction in pronouns (masculine pronouns, e.g. *he/him/himself,* feminine pronouns, e.g. *she/her/herself,* and neu**t**er pronouns, *it/its/itself*), but this is solely for semantic purposes, for example to mark a speaker's sexual or gender identity, rather than marking grammatical gender (Vanden Wyngaerd, 2021).

The next section will discuss methodologies used to investigate code-switching.

2.2.4. Methodologies used in code-switching research

There are several different methodologies that can be used in code-switching research, depending on the focus of the study. Most studies either focus on code-switching production, or code-switching perception, while others focus on both production and perception, or the cost of code-switching.

Studies focussing on production of CS usually use spontaneous or naturalistic corpus data or an elicitation task. An example of an elicitation task is a director-matcher task (Gullberg et al., 2009; Bellamy et al., 2018) or a picture naming task (Fairchild & Van Hell, 2017), though elicited code-switching might not behave the same as spontaneous code-switching. However, since it is difficult to collect enough data of specific types or forms of code-switching to draw conclusions from, code-switching studies often focus on the perception of CS instead.

Studies focussing on the perception of CS usually employ grammaticality judgement tests (Parafita Couto & Stadthagen-González, 2019) or use electrophysiological recordings (Pablos et al., 2019) to measure a brain response to a code-switch to determine the well-formedness of a particular construction. Grammaticality judgment tasks come in multiple

forms, such as a binary yes/no answer to the question of well-formedness, in the form of a 5-point or 7-point Likert scale judgement task or a two-alternative forced choice task (2AFC). One important note is that code-switching is often stigmatised, and this negative attitude can affect acceptability judgment tasks in that they are perceived to be ungrammatical while still being produced by bilinguals (Stadthagen-González et al., 2018).

Likert scales usually contain 5 or 7 points and are used to assess opinions, attitudes, or behaviours. Multiple points on a scale allow for a more detailed insight into opinions, rather than a binary option, as you can measure the difference in acceptability. However, participants often avoid selecting the extreme ends of a scale, and the scale may not be used in the same way by every participant throughout the experiment; it is uncertain whether a participant treats the distance between two points at the extremes of a scale the same as two points in the middle of the scale (Stadthagen-González et al., 2018). An alternative to the Likert Scale is the Magnitude Estimation, in which the participants are asked to calculate the ratio between the acceptability of a test sentence and a standard sentence (Bard et al., 1996, as cited in Stadthagen-González et al., 2018); however, this is a complex task and does not offer many advantages over the Likert scale ratings to offset the complexity (Stadthagen-González et al., 2018).

Another method to gather acceptability judgments is with a two-alternative forced choice task and then analysing the data by applying Thurstone's Law of Comparative Judgment, as described in Stadthagen-González et al. (2018). The two-alternative forced choice task presents the participant with pairs of stimuli in which they must choose which item is more acceptable, using pairwise comparisons that cover all possible combinations of the test conditions. Comparative judgments are considered easier and more reliable than ratings, and paired comparisons avoid possible shifts of the scale as the experiment progresses (Stadthagen-González et al., 2018). In spite of the fact that this method has only

recently been used for code-switching research specifically, it offers a substantial benefit in contrast to other grammaticality judgment tasks, such as the Likert Scale or Magnitude Estimation. It does not task participants to compare a code-switched test sentence to its grammatical monolingual ideal, but rather to another code-switched test sentence. This eliminates the possible influence of stigma and negative attitudes towards code-switching.

The fundamental idea of Thurstone's Law of Comparative Judgment (Thurstone, 1927) is that "the proportion of times a stimulus is judged as having more of a given attribute [...] than another is related to the number of units separating the two sensations in a psychological scale that represents that quality" (Stadthagen-González et al., 2018, p. 72). The result is an interval scale in which the starting point, at 0, is arbitrary but the distance between values is meaningful; this means that Thurstone's analysis shows a ranking of the choices and how different these rankings are.

In order to get the Thurstone's Measure for each condition, Thurstone's Analysis is carried out as follows, as described in Stadthagen-González et al. (2018, pp. 85-6):

Step 1: Determine, for each comparison (A vs B, B vs C, etc.), the number of times each option was chosen when contrasted with each of the other options and arrange them into a matrix table.

Step 2: From those values, calculate the proportion of times each option was a winner or loser against all other options by dividing them by the total number of data points for each comparison.

Step 3: Transform each entry in the matrix to a Z score by using the "Inverse of the standard normal cumulative distribution" function in Excel

Step 4: Multiply each of those Z scores by the square root of 2.

Step 5: Take the average of each row.

Step 6: Apply a linear transformation to those scores so that all numbers are positive, by adding the smallest score to all of the scores, so that the lowest score becomes a point of comparison at 0.

Step 7: Those values are the Thurstone scores for each of the options. By ranking them in descending order, you can find their relative position in an interval scale in which the distance between the ranks is meaningful.

Two-alternative forced choice tasks and Thurstone's Measure leads to more detailed and granular acceptability judgment data which is more useful in research than a Likert scale acceptability rating (Parafita Couto & Stadthagen-González, (2019)

2.2.5. Previous studies on Dutch-English bilingualism

Despite the relatively large population of Dutch-English bilinguals, only few studies have been conducted on the structural aspects of Dutch-English code-switching.

Clyne (1977) investigated grammatical gender in Dutch-English code-switching. He analysed a corpus of elicited production data of English-Dutch bilinguals in Australia and found that the most frequently used grammatical gender assignment strategy is the default agreement strategy, with common gender as the default gender. He suggests that this is due to the phonetic similarity between the Dutch determiner *de* [də] "the" and the English determiner *the* [ðə]. Grammatical gender assignment strategies in code-switching is further elaborated on in section 2.2.6.

A study by Clyne (1987) tested code-switching constraints and the notion of a matrix language while investigating the assumptions that underlie the constraints by investigating corpora from German-English and Dutch-English bilinguals, in which the Dutch-English bilinguals were post-war immigrants to Australia and their children. He found both support for and evidence against code-switching constraints and the notion of a matrix language.

Clyne also found it difficult to distinguish the matrix language from the embedded language in Dutch-English spoken code-switching due to the phonic and lexical transference between the two languages. He suggests that a wide range of language pairs must be studied before attempting to develop a universal model.

Broersma et al. (2009) on the other hand investigated triggered code-switching in Dutch-English bilinguals with cognates as the trigger word; words were considered trigger words if they overlapped in both form and meaning across both languages, such as "ga" *(to) go*. Their participants from New Zealand and Australia had Dutch as their native language and English as their second language, and interviews with the participants showed that they code-switched often. They found that words following trigger words, words overlapping both in form and meaning in both languages, were more likely to be code-switched than words preceding a trigger word.

2.2.6. Gender assignment in code-switching

Grammatical gender can be a property of nouns in languages that encode gender and grammatical gender agreements postulates agreement between the determiner and noun. For example, Spanish has feminine and masculine gender, so for Spanish-English determiner-noun code-switches the Spanish grammatical gender for an English noun must be assigned. Vanden Wyngaerd (2021) summarises the literature on gender assignment in Spanish-English code-switching by stating that gender assignment often follows one of two strategies: the analogical gender strategy or the default strategy. In the analogical gender strategy, the noun is assigned the gender of the translation equivalent of the noun, while in the default strategy, the same gender is always assigned to the noun, regardless of the translation equivalent. Examples of these strategies are shown in (14) for English-Spanish code-switching (Vanden Wyngaerd, 2021).

(14) *Spanish*-**English**

a. *la* **house**

“the [feminine] house”

Spanish translation equivalent: la [feminine] casa

b. *el* **house**

“the [masculine] house”

Spanish default gender: [masculine]

(Vanden Wyngaerd, 2021, p. 89)

Most studies investigating gender assignment strategy in code-switching have investigated Spanish-English code-switching. Valdés Kroff (2016) investigated the Spanish-English Bangor Miami Corpus with code-switching data from balanced Spanish-English bilinguals from Miami, Florida, The United States. He found that masculine is the default gender for the Spanish determiner when followed by an English noun. In contrast, feminine gender marking was very rare and is often used with feminine translation equivalents, and an English determiner followed by a Spanish noun was also rare. Several studies have concluded that in the speech of Spanish-English bilinguals, *el book* is preferred over *the libro*, meaning that masculine Spanish determiners with English nouns are favoured over English determiners with Spanish nouns (Liceras et al., 2005; Liceras et al., 2008; Valdés Kroff, 2016; Parafita Couto & Gullberg, 2019, Parafita Couto & Stadthagen-González, 2019). Therefore, the gender assignment strategy preferred in Spanish-English code-switching is the default strategy for Spanish-English speakers in Miami, with the masculine gender as the default gender. Bellamy and Parafita Couto (2021) discuss studies researching various Spanish-English communities, such as in Belize (Balam, 2016), Pennsylvania and Puerto Rico (Królikowska et al. 2019), that have found that a masculine default gender applies to the vast majority of Spanish-English determiner-noun code-switches. Interestingly, Królikowska et al. (2019) found that in Granada and El Paso, Texas both the default agreement strategy and the translation equivalent strategy were used with roughly equal frequency. Królikowska

et al. also noticed that, in communities where code-switching is more frequent, the default gender is commonly used.

Liceras et al. (2008) found that English-Spanish and French-Spanish bilinguals who acquired Spanish as their second language also preferred masculine as the default gender marking on Spanish determiners. Contrastingly, in the case of Spanish-English bilinguals who acquired Spanish as their first language, the analogical gender strategy overrules the default strategy. Instead, these bilinguals assign the gender of the Spanish translation equivalent to the English noun.

Moreover, Eichler, Hager and Müller (2012) investigated determiner-noun code-switches in young bilingual children acquiring either French, Spanish or Italian and German, or were French-Italian bilinguals, and looked at whether the determiner reflected the gender of the switched noun or the noun's translation equivalent in the other language. They found that both the unbalanced bilinguals and balanced bilinguals preferred the default strategy for gender marking over the translation equivalent strategy, using a masculine gender in almost all cases.

Eichler, Hager and Müller's (2012) result was reproduced by Balam, Lakshmanan and Parafita Couto (2021) for Spanish-English bilingual children in the Miami Spanish-English community. They found that the Spanish-English bilingual children used the masculine default gender assignment strategy when assigning gender to English nouns, even when the Spanish translation equivalent was feminine, in line with Valdés Kroff's (2016) findings about the adult Spanish-English bilinguals from Miami.

A similar result was found by Bellamy, Parafita Couto and Stadthagen-González (2018), who investigated gender assignment in Purepecha-Spanish bilinguals through a director-matcher production task and a forced-choice acceptability judgment task. The participants were all early sequential Purepecha-Spanish bilinguals who acquired both

languages in early childhood, but varied in their order of language acquisition: nine participants acquired Purepecha before Spanish, two participants acquired both Purepecha and Spanish at the same time and one participant acquired Spanish before Purepecha. Their results showed that in the director-matcher task, participants used the default assignment strategy with a masculine default gender. However, the acceptability judgment task showed that participants preferred masculine agreement with Purepecha nouns ending in *-i* or *-u* whose translation equivalent in Spanish was feminine, and preferred feminine agreement with Purepecha nouns ending in *-a*, whose translation equivalent in Spanish is masculine. Though it is important to note that in both cases, the actual grammatical gender of the translation equivalent did not play a role. They therefore suggest that the choice of the gender assignment strategy appears to be influenced by the task type and the order of acquisition.

Bellamy and Parafita Couto (2021), in an overview of gender assignment strategy research, conclude that bilinguals who learned the gendered language, Spanish in the case of Spanish-English bilinguals and Dutch in the case of Dutch-English bilinguals, prefer the translation equivalent gender assignment strategy. At the same time, Spanish-English bilinguals who code-switch regularly appear to prefer the default gender assignment strategy with masculine as the default gender (Królikowska et al. 2019).

Greidanus Romaneli et al. (2021) investigated grammatical gender assignment in code-switching between two gendered languages, namely Dutch (common and neuter genders) and Portuguese (masculine and feminine genders), by analysing natural speech, elicited code-switches and a two-alternative forced choice acceptability judgment task. They found a preference for the default gender assignment strategy in Dutch-Portuguese code-switching, with common *de* being the default definite determiner in a Dutch-Portuguese codeswitch with a Dutch determiner followed by a Portuguese noun, and masculine *o* being

the default definite determiner in a Portuguese-Dutch codeswitch with a Portuguese determiner followed by a Dutch noun.

In conclusion, research on these strategies has suggested that speakers who acquired the gendered language first tend to prefer the analogical gender assignment strategy, whereas simultaneous bilinguals and speakers who learned the gendered language as their second language prefer the default agreement strategy, though it is not necessarily the case that all bilinguals who acquired the gendered language first use the same strategy. Additionally, it is important to note that the preferred strategy can change based on community norms and the frequency of codeswitches, as bilinguals who code-switch regularly tend to prefer the default agreement strategy regardless of order of acquisition. To summarise, the gender assignment strategy used in grammatical gender marking can depend on the type of bilingual, as well as other factors, such as the frequency of code-switching in the community.

2.2.7. Code-switching conflict sites

As code-switching requires the mixing of two grammars into one sentence, there are possibilities for the grammars to conflict at certain morphosyntactic junctures. For example, in the noun phrase there can be a conflict in the word order of the noun and the adjective in Papiamento-Dutch code-switching as Papiamento requires post-nominal adjectives, as in (15a), while in Dutch the adjective is always pre-nominal, as in (15b).

(15) *Papiamento*-**Dutch**

a. *biña kòrá*
   wine red
   “red wine”

b. **rode wijn**
   “red wine”

(Pablos et al., 2019, p. 715)

There can also be a conflict where one language requires gender assignment, and the other does not, for example with the language pair French-English where French has grammatical gender and English does not. This is shown in (16), where French marks masculine grammatical gender on the French determiner, which is followed by an English noun:

(16) *French*-**English**
le **necklace**
"the [masculine] necklace"
(Vanden Wyngaerd, 2021, p. 125)

In this French-English determiner-noun code-switch, the bilingual must pick the grammatical gender of the determiner based on an English noun which does not mark for gender, which creates a conflict.

At the surface level, English and Dutch do not appear to have a conflict site within the determiner phrase in intra-sentential code-switching, as the word order is the same for both languages. However, as explained in section 2.2.2.1, Dutch determiners mark the grammatical gender of the noun; code-switching between a Dutch determiner and an English noun therefore creates a conflict in gender assignment, just as in (16). The Dutch-English bilingual will have to either use a default grammatical gender, through the default agreement strategy as in (14b), or use the analogical gender assignment strategy, as in (14a) and use the grammatical gender of the Dutch translation equivalent of the English noun, as explained in section 2.2.6. As mentioned before, Clyne (1977) found a preference for the default agreement strategy with common as the default gender.

These conflict sites, such as the noun phrase for Dutch-English code-switches, can be resolved in several ways. Two models, the Matrix Language Frame Model, and the Minimalist Program, make conflicting predictions of how these determiner-noun conflicts are

resolved. Though it is important to note that the MLF and MP do not make predictions about the gender of the determiner specifically, only about the choice for the language of the determiner. These two models will be discussed next.

2.3. Models of Code-Switching:

Two opposing theoretical models that make different predictions about the possible resolution of conflicts in code-switching have been proposed: the Matrix Language Frame (MLF) model and the Minimalist Program (MP). The MP is not a model for code-switching specifically as proponents of the model view code-switching as another instantiation of the language faculty, but proponents of the model have attempted to explain code-switching data using principles proposed by the Minimalist Program,.

2.3.1. Matrix Language Frame

The Matrix Language Frame is a model proposed by Myers-Scotton (1993) on the structural constraints on intrasentential code-switching. The basic assumption of this framework is that the two languages in code-switching fulfil two contrasting roles: one language is the Matrix Language (ML), which provides the grammatical frame of the sentence, and the other is the Embedded Language (EL), which provides the content elements in the sentence.

There are three main premises about the ML and EL proposed in the MLF. Firstly, the ML is dominant over the EL in the utterance, providing the morphosyntactic frame for both the ML and the EL. Secondly, both the ML and EL are activated in the speaker's brain, rather than suppressing one language and activating the other (Myers-Scotton, 2006). Thirdly, the ML and EL differ in the types of morphemes they provide as the ML provides system morphemes and the EL provides content morphemes.

Furthermore, the MLF is based on two assumptions regarding morphemes that help to determine the ML for an intrasentential code-switch: the Morpheme Order Principle (MOP) and the system morpheme principle (SMP). The MOP states that the surface morpheme order should be that of the matrix language and the SMP states that "all system morphemes which have grammatical relations external to their head constituent [...] will come from the ML" (Myers-Scotton, 1993, p. 83). An example of how the MOP would be applied comes from Deuchar (2006) on English-Welsh code-switching as seen in (17), with Welsh in italics:

(17) *Welsh*-**English**
oedd gynnon ni ystafell yn Plas yn Dref, ystafell **brilliant**
'We had a room in Plas yn Dref, a brilliant room'
(Deuchar, 2006, p. 1994)

The verb *oedd* is at the start of the sentence which agrees with the Welsh word order of verb-subject-object, so the MOP would state that the ML would be Welsh. The SMP also states that the ML would be Welsh, as the verb and subject pronoun come from Welsh.

The MLF model was augmented by the 4-M model of morpheme classification (Myers-Scotton and Jake 2000; Myers-Scotton 2002a) in order to provide a linguistic theory of language contact specifically for bilingual processing and production, with bilingual speech defined as surface level morphemes from two or more language varieties in the same clause.

The 4-M model distinguishes between content morphemes and system morphemes, with three added subclasses of system morphemes: early system morphemes, bridge late system morphemes and outside late system morphemes. Early system morphemes are elements that add specificity or transitivity to the content morpheme, while late system morphemes usually have no semantic content and are simply structural units (Myers-Scotton

& Jake, 2017). Bridge late system morphemes joins two units, through sentential complementizers such as *that* (Myers-Scotton & Jake, 2017). Outside late system morphemes, on the other hand, create more transparent relationships between elements in a clause; they disambiguate relationships by clarifying and specifying the relationship between sentence elements, for example in a relationship between a nominal and a predicate (Myers-Scotton & Jake, 2017).

The 4-M model also added the Uniform Structure Principle (UPS), which states that within the bilingual clause that is framed by the ML, EL structures only appear in EL islands. EL-islands are chunks of EL that form an exception to the aforementioned SMP and MOP.

Specifically applying the assumptions of the MLF to determiner-noun code-switches, Jake et al. (2002) formulated the Bilingual Noun Phrase Hypothesis within the Matrix Language Frame Model (MLF), stating that determiners in mixed nominal constructions should come from the matrix language of the clause. For example, in the sentence *the* **loodgieter** *is coming* "the plumber is coming", the verb is in English; this means that the matrix language is English, and the determiner should also be English.

2.3.2. Minimalist Program

MacSwan (1999) used the Minimalist Program (MP) to explain code-switching data; MacSwan's MP is a minimalist approach to intrasentential code-switching based on Chomsky's (1995) generativist approach to minimalist syntax. The MP assumes that there is a universal underlying word order and that only the requirements of mixed grammar constraints code-switching, and that therefore all code-switches can be explained without code-switching specific constraints (MacSwan, 1999). Moro Quintanilla (2014) investigated Spanish-English code-switches produced in informal speech by English-Spanish bilinguals in

Gibraltar, and argues that “codeswitching involves the same principles formulated within the minimalist theory of monolingual linguistic competence” (p. 224).

Some supporters of the MP, such as Liceras et al. (2005) propose the Grammatical Features Spell-out Hypothesis (GFHS); this hypothesis states that “in the process of activating the features of the two grammars, [the bilingual], who will rely on the two lexicons, will make [code-switching] choices which will favour the functional categories containing the largest array of uninterpretable features” (Liceras et al., 2005, p. 227). Examples of these uninterpretable features are gender and number. The MP will therefore predict that 18(a) will be used more often than 18(b), as Spanish determiners carry two uninterpretable phi features, namely gender and number, and English determiners do not carry either of these features, so Spanish determiners followed by an English noun is preferred over English determiners followed by a Spanish noun.

(18) *Spanish*-**Dutch**

a. *los* **books**
“the.masculine books”

b. **the** *libros*
“the book.plural”

(Liceras et al., 2005, p. 230)

2.3.3. Comparing MLF and MP

Many studies have been conducted in order to evaluate the predictions of the MLF, the MP or both. The studies that were carried out included a variety of language pairs, such as Spanish-English (Parafita Couto & Stadthagen-González, 2019; Parafita Couto & Gullberg, 2019), Papiamento-Dutch (Pablos et al, 2019; Parafita Couto & Gullberg, 2019), and Welsh-English (Deuchar, 2006; Parafita Couto et al., 2015; Parafita Couto & Gullberg, 2019); as well as

different conflict sites, such as the determiner phrase (Deuchar, 2006; Blokzijl, Deuchar & Parafita Couto, 2017) or adjectives in the noun phrase (Parafita Couto et al., 2015); in addition to various data types, such as production data (Deuchar, 2006) and comprehension data (Parafita Couto et al., 2017), acquired through various methodologies, for example grammaticality judgments (Parafita Couto & Stadthagen-González, 2019), corpus analyses (Parafita Couto and Gullberg, 2019) and induced code-switches (Fairchild & Van Hell, 2017).

Table 2 displays an overview of several studies that evaluated the predictions of the MLF and MP for determiner-noun code-switches, including the language pair, conflict site, methodology used, population investigated, and whether they found support for the MLF (MLF+), or MP (MP+), or neither (MLF- / MP-) or both (MLF+ / MP+). In the case of determiner-noun code-switches, the MLF predicts that the language of the determiner comes from the matrix language, whereas the MP predicts that the language of the determiner comes from the language with the most uninterpretable phi-features. If a study has multiple findings regarding support, all findings will be listed. Some studies found both evidence against and evidence for a model. It should be noted that this overview is only a sample of the ever-growing body of research of model prediction testing within code-switching research.

Table 2. Overview of studies investigating determiner-noun code-switches

Source	Language pair	Conflict site	Methodology	Population	Results
Parafita Couto & Stadthagen-González, 2019	Spanish-English	Determiner-noun	Acceptability judgment	Adults (18 – 57)	MLF+/MP+ MLF+/MP-
Parafita Couto et al., 2017	Welsh-English	Determiner-noun	Electro-physiology	Adults (Mean: 26.2)	MLF+/MP+ MLF+/MP-
Parafita Couto & Gullberg, 2019	Spanish-English Welsh-English Papiamento-Dutch	Determiner-noun and determiner-adjective-noun	Corpus analysis	Adults and children S-E: (11 – 78) W-E: (10 – 80) P-D: (18 – 61)	MLF+/MP+ MLF+/MP-
Pablos et al., 2019	Papiamento-Dutch	Determiner-noun	Electro-physiology	Adults (Mean: 23.6)	MLF-/MP-
Fairchild & Van Hell, 2017	Spanish-English	Determiner-noun	Externally induced code-switches	Adults (Mean: 20.76)	MLF-/MP-
Blokzijl et al, 2017	Spanish-English	Determiner-noun	Corpus analysis	Adults and children	MLF+/MP-
Deuchar, 2006	Welsh-English	Determiner-noun	Corpus analysis	Adults (20 – ~50)	MLF+/MP-

As can be seen, a variety of language pairs, conflict sites, methodologies, and populations have been investigated. Some studies found evidence for the predictions of the MLF and the MP, others found no evidence for predictions of either model.

Evidence from studies investigating determiner-noun code-switches and adjective-noun code-switches will be discussed in more detail next.

2.3.4. Evidence from studies investigating determiner-noun code-switches

Evidence in favour of the MLF comes from Deuchar's (2006) study on Welsh-English code-switching within the determiner phrase, which investigated the Matrix Language Principle,

the Asymmetry Principle, and the Uniform Structure Principle. Deuchar investigated data collected from informal conversations by Welsh-English bilinguals from north-west Wales; she identified the morpheme order and the source of the morpheme order to identify the Matrix Language in every bilingual clause. She found that the language of the determiner followed the matrix language for the majority of the code-switched clauses, regardless of the Welsh gender feature that is assumed by the Minimalist Program, and therefore concluded that the found results supported the MLF's assumptions and principles.

Liceras et al. (2005), on the other hand, investigated English-Spanish code-switches in bilingual children and predicted that the determiners in a determiner-noun code-switch would always be Spanish, due to the fact that Spanish has an uninterpretable gender feature on the determiner whereas English does not. Liceras et al. performed a quantitative analysis on code-switches in the CHILDES database and indeed found a preference of Spanish determiners with English nouns.

Blokzijl, Deuchar and Parafita Couto (2017) also investigated the language of the determiner in determiner-noun code-switches for Spanish-English bilinguals from Miami and Spanish-English creole from Nicaragua by analysing two bilingual corpora: the Miami Corpus with 84 Spanish-English bilingual speakers totalling 35 hours of natural speech, and the Nicaragua Corpus with 42 bilingual speakers for a total of 16 hours of recordings. They, however, took the ML of the sentence into account, something which Liceras et al. (2005) did not do. In this case, the MLF predicts that the language of the determiner follows the ML, so the determiner would be Spanish if the ML is Spanish, and English if the ML is English. Indeed, they found results similar to Deuchar's (2003) study that in 98% of the code-switched sentences the language of the determiner was the same as the ML. Furthermore, there was still a preference for Spanish determiners with an English noun: 89.5% of the mixed determiner phrases had Spanish determiners followed by an English noun.

A corpus study was done by Parafita Couto and Gullberg (2019) on three different language pairs; Spanish-English, Welsh-English and Papiamento-Dutch, and two conflict sites; determiner-noun and adjective-noun. Parafita Couto and Gullberg accounted for the Matrix Language, similar to Blokzijl et al. (2017), and compared the data with the predictions of the MLF and the predictions of the MP. The MLF predicts that the language of the determiner comes from the ML and the adjective-noun word order also follows the word order from the ML, whereas the MP predicts that the determiner comes from the language with the most uninterpretable phi features. In these specific language pairs, that would be Spanish, Welsh, and Dutch, respectively. They found that the MP assumption that the determiner in a determiner-noun code-switch comes from the language with the gender feature held up for Welsh-English and Spanish-English determiner-noun code-switches, but not for Papiamento-Dutch determiner-noun code-switches. Papiamento-Dutch determiner-noun code-switches with a Papiamento determiner without gender marking and a Dutch noun, following the Papiamento ML, were more frequent than a Dutch determiner with gender marking and a Papiamento noun. They also found that the language of the determiner almost always followed the ML in all three language pairs. Additionally, when investigating noun-adjective word order, placing the code-switched adjective before or after the noun, the trend appeared to support the prediction that the position of the adjective is determined by the language of the adjective. This is a prediction made by Cantone and MacSwan (2009), instead of the MLF's prediction that the ML would determine the position of the adjective. However, this trend can be explained by the fact that the determiner-adjective-noun code-switches were contained into EL-islands, where the Embedded Language was the language of the adjective and noun, not the ML. In sum, the MLF was found to be better suited to explain the data as a whole than the MP, which only held up for word order and not for the gender marking on the determiner.

Finally, Parafita Couto and Stadthagen-González (2019) conducted a study on the language of the determiner in Spanish-English determiner-noun code-switches, testing the predictions of the MP and MLF through acceptability judgments on a Likert scale and a two-alternative forced-choice acceptability task on code-switching patterns. The code-switching patterns were derived from the predictions by the MLF and MP on determiners in code-switching. As the MLF predicts that the language of the determiner follows the ML of the sentence, Spanish determiners are expected to be used when the ML is Spanish and English determiners are expected to be used when the ML is English. Conversely, the MP predicts that Spanish determiners will always be preferred over English determiners. Parafita Couto and Stadthagen-González found that the code-switching pattern where the language of the determiner was Spanish, the same as the ML, which marked gender, followed by an English noun was the most acceptable. This pattern is predicted to be acceptable by both the MLF and MP. This pattern was followed closely by the code-switching pattern where the determiner was English, the ML was English, which does not mark gender, followed by a Spanish noun; a code-switching pattern the MLF would predict, but the MP would not predict due to the lack of gender marking in English. In conclusion, they suggest that the grammaticality of code-switching can only be understood by combining insights from both the MLF and MP.

One issue that has not yet been considered is the position of the determiner-noun code-switch is in relation to the verb. In previous studies, such as Parafita Couto and Stadthagen-González (2019), the code-switch was within the direct object and the direct object always occurred directly adjacent to the verb. This may have led to the determiner of the direct object cliticizing to the verb; the determiner became part of the verb that preceded it, which could influence the acceptability of the determiner-noun code-switch as well as the preferred language of the determiner (M.C. Parafita Couto, personal communication / internship report, February 8th, 2022). For example, in the English-Spanish code-switched

sentence (Spanish in italics) “Edgar wanted *estos* shoes”, it is possible the Spanish determiner *estos* cliticised to the English verb “wanted” and form a phonological structure “wanted *estos*” which made the English-Spanish determiner-noun code-switch more acceptable. Inserting an indirect object between the verb and the determiner-noun code-switch or moving the determiner-noun code-switch to the start of the sentence prevents the determiner from cliticizing to the verb.

2.3.5. Evidence from studies investigating adjective-noun code-switches

While adjective-noun code-switches are not the target conflict site of this study, research on adjective-noun code-switches has been included to contribute to a more complete picture of research comparing the MLF and the MP, as conflicting results, similar to the results for determiner-noun code-switches, have been found in studies investigating adjective-noun code-switches

Parafita Couto et al. (2015) investigated how Welsh-English bilinguals deal with the conflict site of adjective-noun code-switches, as Welsh requires the adjective to follow the noun, whereas English requires the adjective to precede the noun, and whether the predictions of the MLF and MP would fit best for the data. They created three datasets: the naturalistic data set, from spontaneous corpus data; the semi-experimental data set, created from data from a director-matcher task; and the experimental data set compromised of data collected through an acceptability judgment task. The MLF would predict that the position of the adjective would be in accordance with the ML: if the ML is English, the adjective should be pre-nominal, and if the ML is Welsh, the adjective should be post-nominal. The MP on the other hand, suggests that the position of the adjective corresponds with the language of the adjective: if the adjective is Welsh, the adjective is placed post-nominally, and if the adjective is English, the adjective is placed pre-nominally. They found that the most frequent

combination of an adjective-noun code-switch was an English noun followed by a Welsh adjective, with Welsh as the ML. This means that both the MLF and MP would apply. Nonetheless, they also found English adjectives following a Welsh noun with Welsh as the ML, in contrast to the prediction of the MP, which would state that the English adjective would be before the Welsh noun. In general, while the MLF was a better fit for the data than the MP, there was still support for the MP present. In comparison, Vanden Wyngaerd (2017) investigated French-Dutch adjective-noun code-switches through acceptability judgment tasks and found that the sentences predicted by the MP were judged to be more grammatical than sentences predicted by the MLF, thus providing support for the MP.

A follow-up study by Parafita Couto et al. (2017) using electrophysiology with Welsh-English bilinguals found more support for the MLF than the MP, though with some ambiguity in the control conditions. An additional study with electrophysiology by Pablos et al. (2019) on Papiamento-Dutch adjective-noun code-switching found no support for either the MLF or MP. Another study on Welsh-English bilinguals on adjective-noun code-switches, by Vaughan-Evans et al. (2020), found support for the MP when focussing on the onset of the noun, and found support for the MLF when focussing on the onset of the adjectives.

The aforementioned study by Parafita Couto and Gullberg (2019) on Spanish-English, Welsh-English, and Papiamento-Dutch also investigated adjective-noun code-switches and evaluated the predictions of the MLF and the MP regarding word order. The MLF predicts that the ML sets the word order, which would be Welsh, Spanish and Papiamento respectively in this study, as these languages prefer post-nominal adjectives while Dutch and English prefer pre-nominal adjectives. The MP, on the other hand, would predict that, if the adjective is in Dutch or English, the adjective would be in the pre-nominal position; if the adjective is in Welsh, Spanish or Papiamento, the adjectives would be in the post-nominal

position. They found support for the predictions from both the MLF and the MP. Determiners in Welsh, Spanish and Papiamento are followed by adjective-noun clusters in English and Dutch, with the adjectives in the prenominal position that English and Dutch prefer; this supports the prediction of the MP that the language of the adjective sets the word order, while the MLF would have expected a match between the language of the determiner and the word order for adjective-noun phrases of that language. However, this mis-match could be explained by the concept of EL-islands if you consider the adjective-noun phrase to be an embedded language island, which would support the MLF. They also noted that the majority of the code-switches occurred between the determiner and the adjective-noun cluster, rather than between the adjective and the noun itself; in the few examples of adjective-noun code-switches they found, the position of the adjective always matched the ML word order, in accordance with the predictions of the MLF.

Similar to the aforementioned study by Parafita Couto and Stadthagen-González (2019) on acceptability judgments of Spanish-English determiner-noun code-switches, Stadthagen-González et al. (2019) tested the acceptability of Spanish-English adjective-noun code-switches with a 5-point Likert scale and a two-alternative forced-choice acceptability task. Just as Parafita Couto and Stadthagen-González (2019), Stadthagen-González et al. (2019) came to conclude that neither the MLF nor the MP can fully account for the acceptability of English-Spanish adjective-noun code-switches. They also suggest that a combination of the two frameworks might lead to more insights, as their data suggests that the adjective position is partially dependent on the verb that is in the complementizer phrase above it; they speculate that the Matrix Language influences the entire complementizer phrase, rather than just the determiner phrase.

2.4. The present study

Conflicting evidence from various studies comparing various language pairs, conflict sites and methodologies shows that there has not yet been irrefutable support for or against either the MLF or MP, as findings are either inconclusive or consistent with both accounts (Parafita Couto et al., 2021). One language pair that has not yet been investigated in this context is Dutch-English.

In addition to that, bilinguals have to resolve grammatical gender assignment on the determiner in Dutch-English determiner-noun code-switches. This conflict has been studied extensively for Spanish-English gender assignment, but not yet for Dutch-English gender assignment.

This thesis therefore aims to fill this gap in the current literature and contribute to the growing body of code-switching research by investigating whether Dutch-English code-switching supports the predictions of the MLF or MP and how grammatical gender assignment, through the default agreement strategy or analogical gender assignment strategy, is resolved in Dutch determiners followed by an English noun.

The research question for this thesis is therefore two-pronged:

RQ1: In a determiner-noun switch, is there a preference for the language of the determiner?

1.1. Is the pattern of the language of the determiner applied the same way for Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals?

1.2. Is the preference for the language of the determiner the same for a pre-verbal determiner-noun code-switch as for a post-verbal determiner-noun code-switch?

1.2.1. Is this preference the same for Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals?

1.3. If there is a preference, does this support the predictions of the MLF, following the ML, or the MP, using Dutch determiners because of Dutch gender coding?

Hypotheses:

For research question 1.1, the null hypothesis is that the pattern of the language of the determiner is applied the same way for Dutch-dominant bilinguals when compared to English-dominant bilinguals and balanced Dutch-English bilinguals, as there is currently no evidence indicating there would be a difference between the groups.

For research question 1.2, the hypothesis is that the preference for the language of the determiner for a pre-verbal determiner-noun code-switch is not the same as for a post-verbal determiner-noun code-switch. Assuming the code-switch happens within the direct object while placing the direct object directly adjacent to the verb in grammaticality judgment tasks, as has been done in previous research such as Stadthagen-González et al. (2019) and Parafita Couto and Stadthagen-González (2019), may have caused the determiner of the direct object to be cliticised to the verb; the determiner became part of the verb that preceded it, which could influence the acceptability of the determiner-noun code-switch as well as the preferred language of the determiner (M.C. Parafita Couto, personal communication / internship report, February 8th, 2022). The null hypothesis for research question 1.2.1. is that the preference for the language of the determiner is the same for Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals, as there is currently no evidence indicating there would be a difference between the groups.

The hypothesis for research question 1.3 is that the preferences follow the predictions of the Matrix Language Frame, as there is currently more evidence for the predictions of the MLF than for the predictions of the MP, as shown in Table 2.

RQ2: If a Dutch determiner is followed by an English noun, what is the gender of the determiner?

2.1. What strategy, the analogical gender assignment strategy, or the default agreement strategy, is used to assign the gender to the Dutch determiner (neuter or common)? Is there a clear preference visible for one strategy over the other?

2.1.1. Is it the analogical gender assignment strategy, where the gender of the Dutch translation equivalent of the English noun is being applied to the Dutch determiner?

2.1.2. If the default strategy is used, what is the default gender, common 'de' or neuter 'het'?

2.2. Is the pattern of the gender of the determiner applied the same way for Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals?

Hypotheses:

For research question 2.1, the hypothesis is that the default agreement strategy will be used to assign gender to the Dutch determiner in a determiner-noun code-switch, as previous research on this topic by Clyne (1977) has found that the default agreement strategy is most frequently used for Dutch bilinguals, with common *de* as the default gender (Dutch-English bilinguals: Clyne, 1977; Dutch-Portuguese bilinguals: Greidanus Romaneli et al. 2021).

Previous research has shown that the gender agreement strategy used can differ depending on order of acquisition, as bilinguals who acquired the gendered language first preferred the analogical criterion agreement strategy, in contrast to bilinguals who acquired the gendered language second preferring the default agreement strategy (Liceras et al., 2008; Bellamy and Parafita Couto, 2021). The hypothesis for research question 2.2 is therefore that

the preference for gender agreement strategy is not the same all Dutch-English bilinguals, but that Dutch-dominant bilinguals will prefer the translation equivalent strategy and that balanced Dutch-English bilinguals and English-dominant bilinguals will prefer the default agreement strategy.

3. Methodology

3.1. Participants

A total of 68 Dutch-English bilinguals took part in this survey. All participants stated that they were comfortable using both English and Dutch in a casual environment.

Most participants were born in the Netherlands (N = 49), some participants were born in the United States and Canada (N = 13), and some were born in another country (Belgium (N = 2), Germany (N = 1), Indonesia (N = 1), Macedonia (N = 1), China (N = 1). Most participants are currently residing in the Netherlands (N = 40), or an English-speaking country (N = 25), such as the United States (N = 14), Australia (N = 6), Canada (N = 2), United Kingdom (N = 2) and New Zealand (N = 1).

The highest level of education for 24 participants was a bachelor's degree at university level, 16 participants had achieved a master's degree, and 10 participants had achieved a PhD or MD. Three participants achieved a vocational degree (age: 35 – 54), and the highest level of education for three participants was high school (age: 24 – 31) . Five participants had attended at least some college, three at least some university of applied sciences, two participants at least some university, and two participants had attended at least some graduate school.

Participants were recruited through social media and personal connections, as well as through Amazon Mechanical Turk (See Appendix E for recruitment text). Amazon Mechanical Turk is an online crowdsourcing marketplace that can be used to collect

behavioural data over the internet and is a good source for gathering acceptability judgments (Gibson, Piantadosi, & Fedorenko, 2011). The participants were paid a small fee of $2.50 for completing the survey and filling in their worker-specific confirmation code. Only workers with an acceptance rate of 95% or above and at least 100 tasks completed were allowed to fill in the survey, following Stadthagen-González et al. (2019), who were following the guidelines proposed by Peer et al. (2014). In total, 107 participants completed the task on Amazon Mechanical Turk. However, only 15 responses were retained for analysis, due to insufficient indication of proficiency in Dutch or due to being flagged as a bot by the survey program.

Thus, 15 participants were recruited through Amazon Mechanical Turk and 53 participants were recruited through personal correspondence and social media, for a total of 68 participants. Table 3 shows the participant characteristics.

Table 3. Participant characteristics

	All participants (N = 68)
Number of female/male/non-binary participants	31 / 36 / 1
Mean age in years (SD; range)	34;6 (13.08; 20 – 77)
Age of acquisition of English (SD; range)*	7 (4.02; 0 – 16)
Self-assessed English proficiency (out of 24)	22.49 (SD: 2.44)
Age of acquisition of Dutch (SD; range)*	3 (5.50; 0 – 20)
Self-assessed Dutch proficiency (out of 24)	21.32 (SD: 4.35)
People should avoid mixing English and Dutch (SD; range 0-6)	2.22 (SD: 2.16)
In everyday conversation, I mix English and Dutch (SD; range 0-6)	3.68 (SD: 2.10)

Dutch global language score (BLP) (out of 218)	79.68 (SD: 41.13) (5.90 – 144.41)
English global Language score (BLP) (out of 218)	75.56 (SD: 39.70) (10.90 – 145.32)
Dominance score (range -218 to 218)	-4.12 (SD: 78.99) (-133.06 – 138.96)

Note. The question in the Bilingual Language Profile questionnaire was worded as "At what age did you start learning English?" / "At what age did you start learning English?" and the highest possible answer was 20 years old or older; this might have skewed the average age of acquisition slightly.

3.2. Materials

3.2.1. Task 1: 2AFC grammaticality judgments

Following Parafita Couto and Stadthagen-González (2019)'s approach to acceptability judgments for determiner noun code-switches in order to test the predictions of the MLF and MP, I constructed 12 base sentences that included a subject, a verb, a determiner, and a noun, with each base sentence modified into code-switched forms according to the following patterns:

Pattern	Condition	Structure (pre-verbal)	Example (*Dutch*-**English**) Base sentence: "The bird sings a song"
A	MLF - / MP +	D_{Du} + N_{En} + V_{En}	*De* **bird sings a song**
B	MLF + / MP +	D_{Du} + N_{En} + V_{Du}	*De* **bird** *zingt* **a song**
C	MLF + / MP -	D_{En} + N_{Du} + V_{En}	**The** *vogel* **sings** *een lied*
D	MLF - / MP -	D_{En} + N_{Du} + V_{Du}	**The** *vogel zingt een lied*
Pattern	Condition	Structure (post-verbal)	Example (*Dutch*-**English**) Base sentence: "Amber grabs the box"
A	MLF - / MP +	V_{En} + D_{Du} + N_{En}	**Amber grabs** *de* **box**
B	MLF + / MP +	V_{Du} + D_{Du} + N_{En}	**Amber** *pakt de* **box**
C	MLF + / MP -	V_{En} + D_{En} + N_{Du}	**Amber grabs the** *doos*
D	MLF - / MP -	V_{Du} + D_{En} + N_{Du}	**Amber** *pakt* **the** *doos*

Six base sentences had the determiner-noun code-switch before the verb (pre-verbal) and six base sentences had the code-switch after the verb (post-verbal). All 12 target nouns and their corresponding base sentences are listed in Appendix A. This generated 48 code-switched critical sentences that were evaluated by participants using the 2AFC technique.

Proper names in the sentences were chosen so that they were commonplace in both Dutch and English (e.g. Robin, Daphne, Amber), with six sentences using proper names, and six sentences starting with a determiner-noun code-switch. Only nouns that were not cognates or homographs but instead were translation equivalents were selected as target nouns for the tasks. Identical cognates were defined as words that have the exact same written form in both Dutch and English and have a very similar meaning in both languages, such as in (19):

(19) *Dutch*-**English**:
Identical cognate: gang
Dutch sentence: *Hij liep door de gang*
English meaning: "He was walking through the hallway"
English sentence: **The group was robbed by a gang of bandits**
Dutch meaning: *De groep werd beroofd door een bende bandieten*

Non-identical cognates, as exemplified in (20), were defined as having very similar but not identical forms in both Dutch and English with very similar meaning in both languages.

(20) *Dutch*-**English**:
Non-identical cognate: *kat* - **cat**
Dutch sentence*: Hij aaide de* kat
English meaning: "He petted the cat"

Homographs, as in (21), were defined as words that have the exact same written form in both Dutch and English but different and unrelated meanings in both languages.

(21) *Dutch*-**English**:
Homograph: *troon* - **throne**
Dutch sentence: *Het Nederlandse Koninkrijk heeft geen officiële troon*
English meaning: **The Dutch Kingdom has no official throne**

Translation equivalents were defined as a pair of Dutch and English words that were translations of each other but whose written forms were not at all or only minimally similar, as in (22):

(22) *Dutch*-**English**:
Translation equivalents: *kikker* - **frog**
Dutch sentence: *Elke avond hoorden ze een kikker kwaken*
English meaning: **Every night they heard a frog croak.**

Additionally, three nouns referring to living creatures were used, as the grammatical gender of a noun can be influenced by the biological or natural gender of the meaning of the noun; in the Northern part of the Netherlands, animal nouns are viewed as masculine, even if the noun is originally feminine.

3.2.2. Task 2: 2AFC grammatical gender assignment

All 22 base sentences had a Dutch-English pre-verbal determiner-noun code-switch with a Dutch determiner followed by an English noun. Two different versions of the base sentence were created, one for the Dutch determiner "de" and a second version with the Dutch determiner "het":

1. Dutch determiner "de" followed by an English noun in a Dutch Matrix language sentence, e.g. *de **bicycle** staat in de schuur*
2. Dutch determiner "het" followed by an English noun in a Dutch Matrix Language sentence, e.g. *het **bicycle** staat in de schuur* 'The bicycle is in the shed'

Out of the 22 sentences, ten used an English noun with a Dutch translation equivalent that required the neuter *het* and twelve sentences used an English noun with a Dutch translation equivalent that required common *de*. Four out of the 22 base sentences referred to living creatures; one sentence used an English noun with a Dutch translation equivalent that

required the neuter *het* and the other three sentences used an English noun with a Dutch translation equivalent that required common *de*.

Even though Dutch no longer functionally distinguishes between masculine common gender, feminine common gender, or masculine/feminine common gender, the distinction was taken into account while creating the task sentences. There were four sentences that contained an English noun with a Dutch translation equivalent that required masculine common *de*, there were four sentences that required feminine common *de* in the Dutch translation equivalent of the English noun, and there were four sentences that required masculine/feminine common *de* in the Dutch translation equivalent of the English noun. All 22 target nouns and their corresponding base sentences are listed in Appendix A.

As before, only nouns that were translation equivalents, as in (22), rather than cognates or homographs (see (19), (20) and (21)), were selected as target nouns for the task.

3.2.3. Quality control sentences

Four quality control sentences with intersentential code-switches were included. Each sentence had an error that could be easily detected if the sentences were read carefully. The error was uncontroversial in the sense that a native speaker would not produce it, regardless of their dialect. The quality control sentences do contain cognates and/or homographs, but this is not an issue as they are not the target nouns. The quality control sentences are presented in Appendix A.

3.2.4. Background questionnaire

The background questionnaire was adapted from the Bilingual Language Profile made by Birdsong et al. (2012) and scored using their formulas to calculate a global language score. There are four modules: Language History (with six questions: each worth between 0 and 20

points), Language Use (with five questions: each worth between 0 and 10 points), Language Proficiency (with four questions: each worth between 0 and 6 points) and Language Attitudes (with four questions: each worth between 0 and 6 points). Each item is worth the numerical value given in the response, with three exceptions: the first two items are scored in the reverse: where a "20" response is worth 0, a "19" is worth 1, and so on, and phrasal responses "Since birth" and "For as long as I can remember" are worth 20 points and "Not yet" is worth 0 points; this is to take age of acquisition into account for language history, where acquiring a language at a younger age influences your language dominance. Every module is multiplied by a factor (language history: 0.545; language use: 1.09; language proficiency: 2.27; language attitude: 2.27), adding to a total possible score of 218 per language.

The participant was offered the choice to fill in the survey in English or Dutch. The English version was made by Birdsong et al (2012), while the Dutch version was made specifically for this thesis; both versions are included in Appendix D..

Some additional questions were added to the survey in order to adapt the survey to code-switching research and gain insight into the code-switching attitudes of the participants. The questions that were added to the Bilingual Language Profile were:

1. "Please fill in all languages you are comfortable using (speaking / listening / reading / writing):" (open question)
2. People should avoid mixing English and Dutch (Scale from 1 to 6, where 1 = disagree, 6 = agree)
3. In everyday conversation, I mix English and Dutch (Scale from 1 to 6, where 1 = disagree, 6 = agree)

The phrasing of the first open question was changed from "Please fill in the languages you are comfortable using" to "Please fill in all languages you are comfortable using (speaking /

listening / reading / writing):" after initial respondents' feedback to clarify the requirement to list all known languages and to add specification to usage of a language.

3.3. Procedure

The survey was administered online using Qualtrics. The participants were first presented with a consent form (Appendix B). After they had consented to the fact that their data would be used for the experiment, they were presented with instructions for the task (Appendix C). The instructions mixed Dutch and English, both within the same sentence and between sentence boundaries, to show that code-switching is acceptable; the instructions explained that participants had to pick the one sentence that 'felt the best' to them. They were asked to make a choice even if both sentences sounded 'right' or both sounded 'wrong'. They were then presented with sentence pairs, as described in the Materials section, contrasting each version of a given base sentence with all its other variations. The order of presentation was individually randomized for each participant. The participants were given the background questionnaire after the test sentences; they could pick whether they filled in the questionnaire in English or in Dutch. 40 participants filled in the background questionnaire in Dutch (Appendix D) and 28 participants filled in the questionnaire in English (Appendix D). After submitting their response, they were thanked for their participation.

3.4. Analysis

The first part of the analysis focuses on how the participant group was split into three groups (Dutch-dominant group, English-dominant group, and balanced Dutch-English group), based on the participant's language dominance score. The second part focuses on how Thurstone's measure was calculated and what sentences were excluded in analysis. The last part of the

analysis focuses on how the analysis of the grammatical gender of Dutch determiners was carried out.

3.4.1. Three group split

The participants were split into three groups, the Dutch-dominant group, the balanced group, and the English-dominant group, depending on their dominance score.

Participants could score between 0 and 218 points in their language dominance for one language. The language dominance score for Dutch, as calculated by the Bilingual Language Profile, was subtracted from the English language dominance score in order to obtain the bilingual language dominance score. This created a dominance score that ranges from -218 to +218. A score near zero indicates balanced bilingualism and more positive or more negative scores reflect respective language dominance, with 218 meaning full English language dominance and no Dutch proficiency, and -218 being full Dutch language dominance and no English proficiency. The distribution of the dominance score across all participants is displayed in Figure 1.

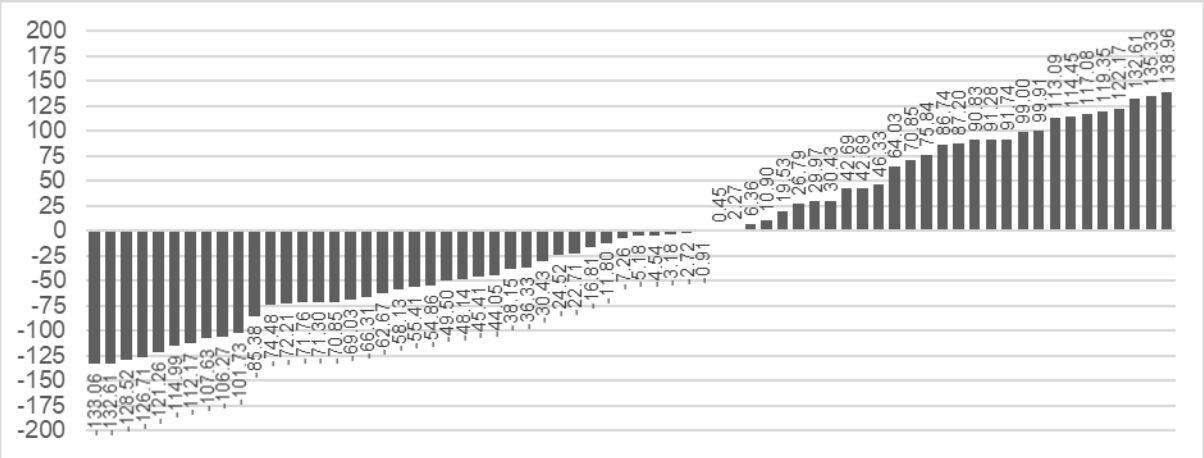

Figure 1. Distribution of dominance score for all participants

As can be seen above, there was a wide variety of bilingual dominance scores, with dominance for Dutch and English varying per participant; some participants had a slightly higher global language score for one language than the other and some balanced bilinguals

had a dominance score nearing zero. By creating two groups, these distinctions are lost as balanced bilinguals (scores between -10 – +10) and bilinguals who are not extremely dominant in one language (scores between +10 – +100 and -10 – -100) are put together with bilinguals who are dominant in one language (scores between 100 – 218 and -100 – -218).

To create a more detailed insight in code-switching preferences of bilinguals, the participants were split into three groups: the English-dominant group (bilinguals with a dominance score above 100, N = 8), the Dutch-dominant group (bilinguals with a dominance score below -100, N = 10) and a balanced group (with all other dominance scores, between -99.99 and 99.99, N = 50). The distribution of the dominance score within groups is displayed in Figure 2 for the Dutch-dominant group, Figure 3 for the English-dominant group, and Figure 4 for the balanced group. Participant characteristics per group are described in Table 4. The division into groups was necessary for analysis through Thurstone's Measure, but ideally bilingual dominance score would be considered as a continuous variable.

All participants in the Dutch-dominant group were born in the Netherlands and were residing in the Netherlands at the time of the study. In the English-dominant group, one participant was born in the Netherlands and resided in the Netherlands at the time of the study, another participant was born in the Netherlands and was residing in Australia at the time of the study, and all other participants in the English-dominant study were born in the United States (N = 5) or Canada (N = 1) and were still residing there at the time of the study.

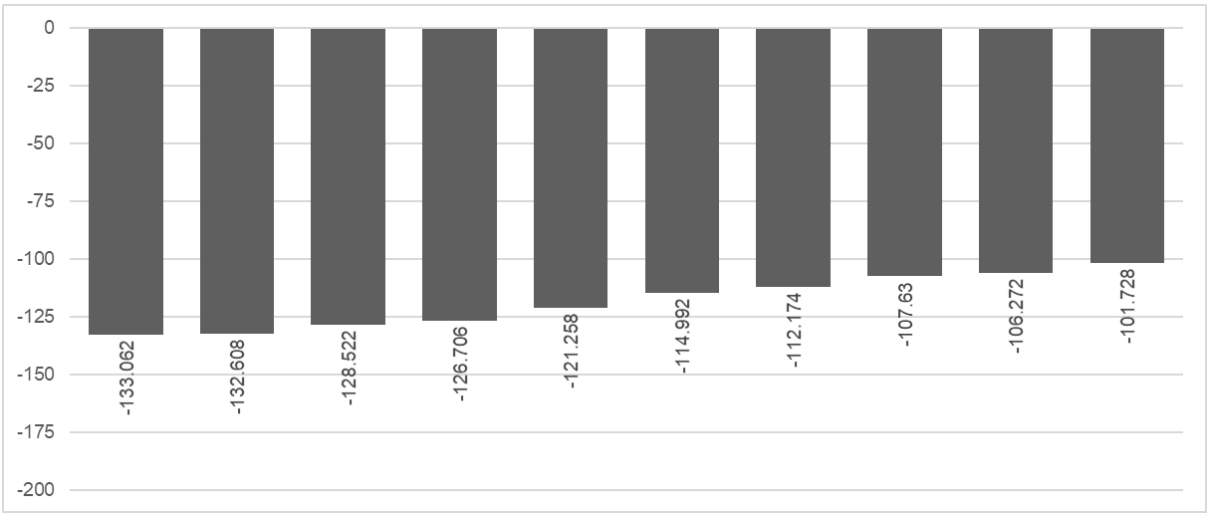

Figure 2. Distribution of dominance score for the Dutch-dominant group (N= 10)

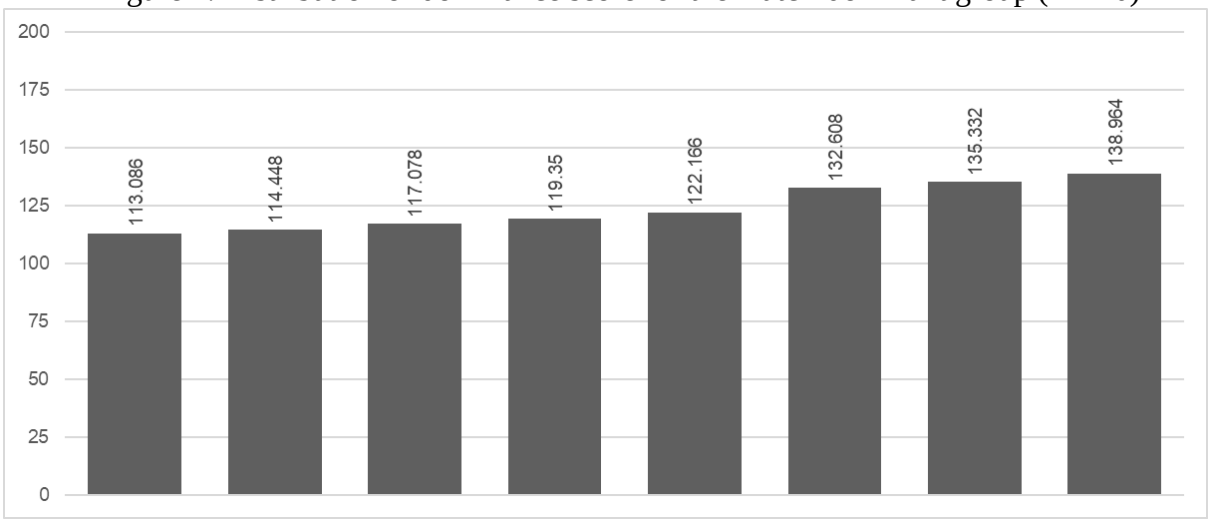

Figure 3. Distribution of dominance score for the English-dominant group (N = 8)

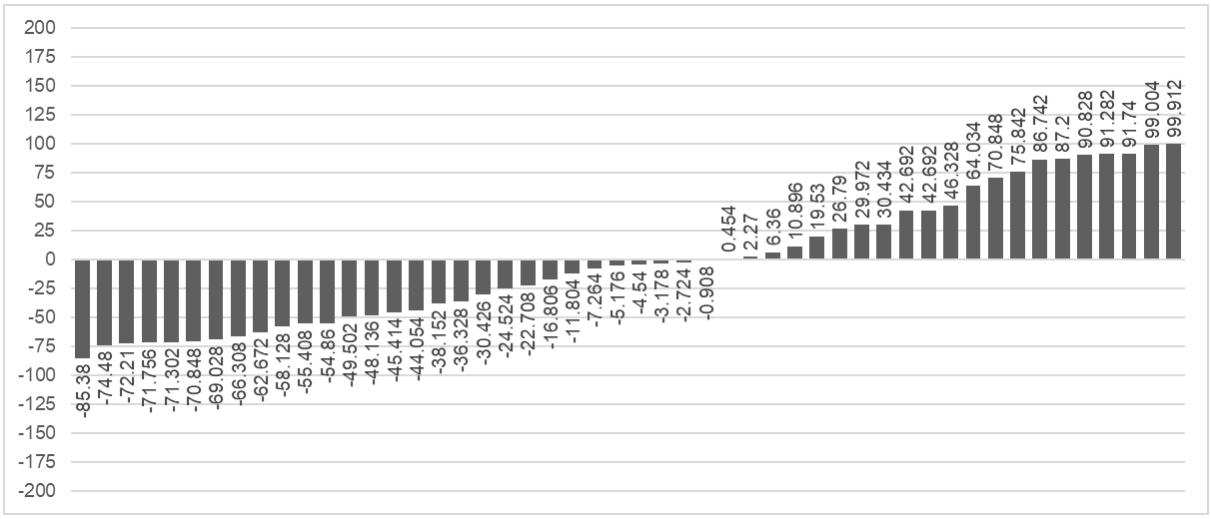

Figure 4. Distribution of dominance score for the balanced Dutch-English group (N = 50)

Note. This figure displays the range of the dominance scores that are considered to be "balanced" for the purposes of grouping participants

Table 4. Participant characteristics

	Dutch-dominant group (N = 10)	English-dominant group (N = 8)	Balanced D-E group (N = 50)
Number of female/male/ non-binary participants	6 / 4 / 0	2 / 6 / 0	23 / 26 / 1
Mean age in years (SD; range)	43.30 (12.70; 23 - 62)	44.62 (18.46; 24 - 77)	31.30 (10.62; 20 – 73)
Age of acquisition of English (SD; range)*	8.50 (3.27; 4 - 12)	2.88 (4.94; 0 – 14)	7.72 (3.60; 0 - 16)
Self-assessed English proficiency (out of 24)	22.60 (SD: 3.13)	21.25 (SD: 3.24)	22.66 (SD; 2.13)
Age of acquisition of Dutch (SD; range)*	0 (0; 0 – 0)	10 (9.26; 0 – 20)	2 (4.30; 0 – 20)
Self-assessed Dutch proficiency (out of 24)	23.00 (SD: 1.76)	17.88 (SD: 6.10)	22.60 (SD: 2.13)
People should avoid mixing English and Dutch (SD; range 0-6)	1.80 (SD: 2.20)	3.50 (SD: 1.93)	2.10 (SD: 2.16)
In everyday conversation, I mix English and Dutch (SD; range 0-6)	4.10 (SD: 1.97)	3.00 (SD: 2.67)	3.70 (SD: 2.04)
Dutch global language score (BLP) (out of 218)	138.17 (SD: 8.00) (118.07 – 144.41)	14.73 (SD: 6.03) (5.90 – 22.70)	78.37 (SD: 30.12) (9.08 – 120.80)
English global Language score (BLP) (out of 218)	19.68 (SD: 6.57) (10.90 – 29.51)	138.86 (SD: 5.74) (130.34 – 145.32)	76.60 (SD: 29.16) (33.14 – 130.79)
Dominance score (range -218 to 218)	-118.50 (SD: 11.49) (-101.73 – -133.06)	124.13 (SD: 10.07) (113.09 – 138.96)	-1.76 (SD: 55.97) (-85.38 – 99.91)

Note. The question in the Bilingual Language Profile questionnaire was worded as "At what age did you start learning English?" / "At what age did you start learning English?" and the highest possible answer was 20 years old or older; this might have skewed the average age of acquisition slightly.

3.4.2. Thurstone's measure

Participants' responses were analysed using Thurstone's Law of Comparative Judgment, as explained in section 2.2.4 and in Stadthagen-González et al. (2018). Stadthagen-González analysed the participants' responses to two-alternative forced-choice tasks through Thurstone's law of comparative judgments to create a ranking of preference between conditions; this can be used as a measure for relative comparison between conditions. These measures can be interpreted as values on an interval scale that represent the relative acceptability of the sentence. It is important to note that for analysis of the first research

question judgments of both pre-verbal and post-verbal were included, as it is possible to make a general ranking of preference across both types of code-switching. In addition to that, a general ranking of preference for pre-verbal codeswitches and a general ranking of preference for post-verbal code-switches were created; a limitation of this study is that it cannot compare the two rankings of pre-verbal and post-verbal switches directly, because they were not compared directly in the survey. That is, the difference in preference between pre-verbal and post-verbal code-switches is not quantifiable without direct comparison between the two.

All calculations for Thurstone's measure, as well as other raw data and analyses will be made available after grading of this thesis; the calculation of Thurstone's measure for Task 1 across all participants is presented in Appendix F for illustration.

3.4.3. Grammatical gender of Dutch determiner

For the second task, frequencies of the choices for common *de* and neuter *het* were calculated. First, all responses were coded as "1" if the choice was "common *de*", and as "2" if the choice was "neuter *het*". Next, the participants were then split into the three groups of Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals. After this, the responses were split into two categories: "Common *de* translation equivalent" and "Neuter *het* translation equivalent". Finally, the frequency of each choice, common *de* or neuter *het*, was added up for each group and each category separately.

3.4.4. Survey issues

There were some errors during survey creation:

1. The English base sentence "the witness testifies in the trial", included in Appendix A (p. 94), was changed in condition three from the intended form "the *getuige* testifies

in the trial" to "the *getuige* testifies in de *rechtzaak*" in the comparison between condition one and three.

2. The English base sentence "the community votes in favor of the plan", included in Appendix A (p. 93), was changed in condition three from the intended form "the *gemeenschap* votes in favor of the plan" to "the *gemeenschap* votes *voor het plan*" in the comparison between condition one and three.

    These two changes introduced a secondary code-switch between the verb and the object, which could have impacted the perceived grammaticality of the sentence and therefore influenced results.

3. The English base sentence "the bullet hit Casper", included in Appendix A (p. 93), had the comparison between condition three and four replaced by a second comparison of condition two and four, which meant that the comparison between condition three and four was excluded from the survey.

As the amount of pairwise comparisons was not equal for all conditions due to these mistakes, all four conditions (MLF - / MP +; MLF + / MP +; MLF + / MP -; MLF - / MP -) of these three base sentences were excluded from analysis. This meant that in the post-verbal analysis, only two sentences were compared, with each comparison occurring twice, compared to the six sentences with each comparison occurring eight times for the pre-verbal code-switches.

4. Results

4.1. Research Question 1:

4.1.1. Language of the determiner

The first part of the first research question investigated whether there is a preference for the language of the determiner in a determiner-noun switch.

Table 5 shows the ranking of the Thurstone's Measure from all participants and across all code-switches, including pre-verbal and post-verbal code-switches.

Table 5. Thurstone's measure for determiner-noun code-switches (task 1)

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	V_{En} + D_{En} + N_{Du} or D_{En} + N_{Du} + V_{En}	1	1.74
D	MLF - / MP -	V_{Du} + D_{En} + N_{Du} or D_{En} + N_{Du} + V_{Du}	2	1.60
B	MLF + / MP +	V_{Du} + D_{Du} + N_{En} or D_{Du} + N_{En} + V_{Du}	3	0.62
A	MLF - / MP +	V_{En} + D_{Du} + N_{En} or D_{Du} + N_{En} + V_{En}	4	0

Table 5 shows that Pattern C was preferred the most, which has an English determiner with a Dutch noun with an English matrix language, followed by Pattern D, which also has an English determiner with a Dutch noun but with a Dutch matrix language. It is therefore likely that there is a preference for an English determiner with a Dutch noun in a Dutch-English determiner-noun switch, with a slight preference for sentences where the language of the determiner matches the language of the verb, or matrix language. This matches the predictions of the MLF.

4.1.2. Bilingual profiles

In order to answer the question of whether the preference for the language of the determiner is the same for both the Dutch-dominant group and the English-dominant group, Thurstone's

measures for both groups are presented in Table 6 for the Dutch-dominant group and Table 7 for the English-dominant group. To allow comparison with balanced bilinguals, Thurstone's measure for the balanced bilinguals is presented in Table 8.

Table 6. Results for the Dutch-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{En}$	1	2.04
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{Du}$	2	1.97
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{Du}$	3	0.58
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{En}$	4	0

Table 7. Results for the English-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{Du}$	1	0.26
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{En}$	2	0.21
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{Du}$	3	0.16
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{En}$	4	0

Table 8. Results for the balanced group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{En}$	1	1.96
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{Du}$	2	1.79
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{Du}$	3	0.70
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{En}$	4	0

As can be seen above, the ranking of Thurstone's measure is similar for the Dutch-dominant bilinguals and the balanced bilinguals. The balanced group has the same preference as the Dutch-dominant bilinguals, which is Pattern C, whereas the English-dominant group prefers Pattern B, followed by a preference for pattern C.

According to these results, there is a preference for Pattern C by the Dutch-dominant bilinguals and balanced bilinguals, which has an English determiner followed by a Dutch noun and an English matrix language. The English-dominant bilinguals, however, prefer pattern B, which is a Dutch determiner followed by an English noun and a Dutch matrix language. An explanation for this preference could be that the participants from the English-dominant group lives outside of the Netherlands, who primarily use Dutch as a matrix language when they code-switch.

4.1.3. Pre-verbal and post-verbal switches

In order to answer the question whether the preference for the language of the determiner is the same when comparing pre-verbal and post-verbal code-switches, Thurstone's measures for all three groups together are presented in Table 9 for the pre-verbal code-switches and Table 10 for the post-verbal code-switches.

Table 9. Results for pre-verbal code-switches across all three groups

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
D	MLF - / MP -	$D_{En} + N_{Du} + V_{Du}$	1	1.61
C	MLF + / MP -	$D_{En} + N_{Du} + V_{En}$	2	1.59
B	MLF + / MP +	$D_{Du} + N_{En} + V_{Du}$	3	0.18
A	MLF - / MP +	$D_{Du} + N_{En} + V_{En}$	4	0

As can be seen in Table 9, there is a preference for Pattern D when looking only at pre-verbal code-switched sentences across all three groups. Pattern D has an English

determiner followed by a Dutch noun, with the main verb in Dutch. In second place is Pattern C, which has the same combination of an English determiner with a Dutch noun, but the main verb in Pattern C is English. Therefore, there is a general preference of an English determiner followed by a Dutch noun for pre-verbal code-switches.

Table 10. Results for post-verbal code-switches across all three groups

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	V_{En} + D_{En} + N_{Du}	1	2.28
B	MLF + / MP +	V_{Du} + D_{Du} + N_{En}	2	2.02
D	MLF - / MP -	V_{Du} + D_{En} + N_{Du}	3	1.66
A	MLF - / MP +	V_{En} + D_{Du} + N_{En}	4	0

As can be seen in Table 10, there is a preference for Pattern C, with Pattern B in second place, when looking only at post-verbal code-switched sentences across all three groups. Results therefore suggest that when looking at post-verbal code-switches, the language of the determiner is following the language of the inflected verb, similar to the results by Parafita Couto and Stadthagen-González (2019) for Spanish-English post-verbal code-switches.

4.1.4. Bilingual profiles

In order to answer the question whether the preference for the language of the determiner is the same for Dutch-dominant bilinguals, English-dominant bilinguals and balanced Dutch-English bilinguals when comparing pre-verbal and post-verbal code-switches, Thurstone's measures for pre-verbal code-switches are presented in Table 11 for the Dutch-dominant group, in Table 12 for the English-dominant group, and in Table 13 for the balanced Dutch-English group. Thurstone's measures for post-verbal code-switches for Dutch-dominant

bilinguals are presented in Table 14, for English-dominant bilinguals in Table 15 and for balanced Dutch-English bilinguals in Table 16.

Pre-verbal code-switches

Table 11. Results for pre-verbal code-switches for the Dutch-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$D_{En} + N_{Du} + V_{En}$	1	2.10
D	MLF - / MP -	$D_{En} + N_{Du} + V_{Du}$	2	2.04
B	MLF + / MP +	$D_{Du} + N_{En} + V_{Du}$	3	0.29
A	MLF - / MP +	$D_{Du} + N_{En} + V_{En}$	4	0

Table 12. Results for pre-verbal code-switches for the English-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$D_{En} + N_{Du} + V_{En}$	1	0.22
D	MLF - / MP -	$D_{En} + N_{Du} + V_{Du}$	2	0.04
A	MLF - / MP +	$D_{Du} + N_{En} + V_{En}$	3	0.006
B	MLF + / MP +	$D_{Du} + N_{En} + V_{Du}$	4	0

Table 13. Results for pre-verbal code-switches for the balanced group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
D	MLF - / MP -	$D_{En} + N_{Du} + V_{Du}$	1	1.82
C	MLF + / MP -	$D_{En} + N_{Du} + V_{En}$	2	1.75
B	MLF + / MP +	$D_{Du} + N_{En} + V_{Du}$	3	0.20
A	MLF - / MP +	$D_{Du} + N_{En} + V_{En}$	4	0

As can be seen above, Pattern C is preferred by the Dutch-dominant and English-dominant group for pre-verbal code-switches, while the balanced Dutch-English bilinguals preferred pattern D for pre-verbal code-switches. Both pattern C and D have an English determiner followed by a Dutch noun, but in Pattern C the language of the determiner follows the

language of the main verb, while there is no match in language between the determiner and the main verb in Pattern D.

Post-verbal code-switches

Table 14. Results for post-verbal code-switches for the Dutch-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$	1	2.15
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$	2	2.05
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$	3	1.73
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$	4	0

Table 15. Results for post-verbal code-switches for the English-dominant group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$	1	1.07
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$	2	0.54
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$	3	0.22
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$	4	0

Table 16. Results for post-verbal code-switches for the balanced group

Pattern	Condition	Structure	Ranking	Thurstone's Measure:
C	MLF + / MP -	$V_{En} + D_{En} + N_{Du}$	1	2.61
B	MLF + / MP +	$V_{Du} + D_{Du} + N_{En}$	2	2.19
D	MLF - / MP -	$V_{Du} + D_{En} + N_{Du}$	3	1.55
A	MLF - / MP +	$V_{En} + D_{Du} + N_{En}$	4	0

As can be seen above, Pattern C is preferred by the Dutch-dominant and Dutch-English balanced bilinguals for pre-verbal code-switches, while the English-dominant bilinguals preferred pattern B for pre-verbal code-switches.

When comparing pre-verbal and post-verbal code-switches within the Dutch-dominant group, the preference for the language of the determiner stays the same: the Dutch-dominant bilinguals prefer Pattern C, which is an English determiner followed by a Dutch noun, for both pre-verbal code-switches, and post-verbal code-switches. This is not the case for English-dominant bilinguals, as they prefer Pattern C for pre-verbal code-switches and Pattern B for post-verbal code-switches. It is important to note that for both Dutch-dominant and English-dominant bilinguals there is a preference for those code-switches where there is agreement between the language of the determiner and the language of the main verb. Similar to the Dutch-dominant group, the balanced Dutch-English bilinguals prefer English determiners followed by a Dutch noun as in Pattern D for pre-verbal code-switches and prefer English determiners followed by a Dutch noun as in Pattern C for post-verbal code-switches. However, in Pattern D the determiner is not adjacent to the verb and there is no match between the language of the determiner and the language of the main verb, while there is a match between the language of the determiner and the language of the main verb for Pattern C.

To summarise, in the case of post-verbal code-switches, where the determiner is adjacent to the verb, code-switches where the language of the determiner matches the language of the adjacent verb are preferred. In pre-verbal code-switches, where the determiner is separated from the verb by the noun, the language of the determiner does not have to match the language of the verb. In both pre-verbal and post-verbal code-switches, a general preference for Pattern C, an English determiner followed by a Dutch noun, is shown.

4.1.5. Summary of results: MLF or MP

There does appear to be a general preference for Pattern C ($V_{En} + D_{En} + N_{Du}$ or

$D_{En} + N_{Du} + V_{En}$), English determiners with Dutch nouns with an English matrix language. Pattern C supports the predictions of the MLF with the language of the determiner following the Matrix Language, and not the predictions of the MP, with an English determiner that does not encode gender.

When not taking the position of the code-switch into account, both the Dutch-dominant bilinguals and the balanced Dutch-English bilinguals prefer pattern C ($V_{En} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{En}$) which supports the predictions of the MLF and not the predictions of the MP. The English-dominant bilinguals prefer Pattern B ($V_{Du} + D_{Du} + N_{En}$ or $D_{Du} + N_{En} + V_{Du}$), which is a Dutch determiner followed by an English noun with a Dutch matrix language, which supports the predictions of both the MLF and of the MP.

However, when taking the position of the code-switch into account, there is a difference in preference, both when comparing pre-verbal and post-verbal code-switches across all participants as well as between the three groups. With pre-verbal code-switches, Pattern D ($D_{Du} + N_{En} + V_{En}$) is preferred when all groups are combined; this supports the prediction of the MP, as a Dutch determiner would be preferred due to grammatical gender encoding. However, when looking at post-verbal code-switches, Pattern C ($V_{En} + D_{En} + N_{Du}$) is preferred instead, which supports the prediction of the MLF.

This indicates that there is a potential effect of adjacency between the verb and the determiner, because the pattern where the language of the determiner matches the language of the adjacent verb is preferred for post-verbal code-switches, both when looking across all groups and when looking at the bilingual groups separately.

Comparing Dutch-dominant bilinguals, English-dominant bilinguals, and balanced Dutch-English bilinguals shows a difference in preference. Dutch-dominant bilinguals prefer Pattern C ($V_{En} + D_{En} + N_{Du}$ or $D_{En} + N_{Du} + V_{En}$) for both pre-verbal and post-verbal code-switches, which supports the predictions of the MLF. English-dominant bilinguals prefer Pattern C (D_{En}

+ N_{Du} + V_{En}) for pre-verbal code-switches, which supports the prediction of the MLF, and Pattern B (V_{Du} + D_{Du} + N_{En}) for post-verbal code-switches, which supports the predictions of both the MLF and the MP. Balanced Dutch-English bilinguals, on the other hand, prefer pattern D (D_{Du} + N_{En} + V_{En}) in pre-verbal code-switches, which does not support the predictions of the MLF or MP, and Pattern C (V_{En} + D_{En} + N_{Du}) in post-verbal code-switches, which does support the predictions of the MLF.

An overview of the results for the preferences for code-switching patterns per participant group and position of the code-switch is given in Table 17.

Table 17. Summary of results: most preferred code-switching pattern per group and position of code-switch, and which model the pattern provides evidence for

	Position of the code-switch		
Participant group	Both*	Pre-verbal position	Post-verbal position
All participants	C (MLF + / MP -)	D (MLF - / MP -)	C (MLF + / MP -)
Dutch-dominant bilinguals	C (MLF + / MP -)	C (MLF + / MP -)	C (MLF + / MP -)
English-dominant bilinguals	B (MLF + / MP +)	C (MLF + / MP -)	B (MLF + / MP +)
Balanced Dutch-English bilinguals	C (MLF + / MP -)	D (MLF - / MP -)	C (MLF + / MP -)

*__Note__. Analysis included both pre-verbal code-switches, and post-verbal code-switches

As can be seen in Table 17, there is a preference for code-switches with Pattern D (V_{En} + D_{En} + N_{Du}) in the pre-verbal position when looking at all three groups together and when looking at balanced Dutch-English bilingual only, which does not support the predictions of the MLF nor the MP.

Table 17 also shows that there is only a difference in preference when specifically taking the position of the code-switch into account; the preferences for post-verbal code-

switches (column 3) are the same as the preferences for both pre-verbal and post-verbal code-switches together (column 1), which differs from the preferences for pre-verbal code-switches specifically (column 2).

In sum, there is evidence for both the MLF and MP, though more evidence is present for the MLF, with the language of the determiner following the matrix language, than for the MP.

4.2. Research Question 2:

4.2.1. Gender of Dutch determiner

Participants had to choose whether they thought the Dutch determiner common *de* or neuter *het* followed by an English target noun 'felt the best' to them. Out of the 22 different target nouns, 12 were common and 10 were neuter in Dutch. Across 22 different words and 68 participants for a total of 1496 comparisons, participants preferred "de" over "het" 84.69% of the time (N = 1267), with "het" being chosen over "de" only 15.31% of the time (N = 229). This means that, on average, the grammatical gender of a Dutch determiner with an English noun will be common. There is a clear preference of the common grammatical gender over the neuter grammatical gender.

4.2.2. Gender assignment strategy

Table 18 shows the results for the second task, where participants had to choose between a Dutch determiner with the common gender (*de*) followed by an English noun or a Dutch determiner with the neuter gender (*het*) followed by an English noun. The purpose of this task was to determine whether Dutch-English bilinguals used the default agreement strategy or the analogical gender agreement strategy to resolve the gender assignment conflict in Dutch-English determiner-noun code-switch.

Table 18. Results for task 2 (N = 1496)

Translation equivalent of noun is common (N = 816)				Translation equivalent of noun is neuter (N = 680)			
Common *de* (default or analogical)	%	Neuter *het* (default)	%	Common *de* (default)	%	Neuter *het* (default or analogical)	%
731	89.58	85	10.42	536	78.82	144	21.18

As can be seen in Table 18, the common gender, the Dutch determiner *de*, is preferred when followed by an English noun, regardless of whether the translation equivalent of the English noun is common or neuter in Dutch. This means that the default agreement strategy is used to assign the gender to the Dutch determiner, with the default gender being common *de*.

4.2.3. Bilingual profiles

Gender assignment strategy can differ based on language dominance; Table 19, Table 20 and Table 21 show the frequencies of common *de* and neuter *het* for the Dutch-dominant group, for the English-dominant group, and for the balanced Dutch-English group, respectively.

Table 19. Results for task 2 per group

	Dutch-dominant group (N = 220)	
	Common *de* translation equivalent (N = 120)	Neuter *het* translation equivalent (N = 100)
Common *de*	120	87
%	100	87
Neuter *het*	0	13
%	0	13

Table 20. Results for task 2 per group

	English-dominant group (N = 176)	
	Common *de* translation equivalent (N = 96)	Neuter *het* translation equivalent (N = 80)
Common *de*	69	54
%	71.88	67.5
Neuter *het*	27	26
%	28.13	32.5

Table 21. Results for task 2 per group

	Balanced D-E group (N = 1100)	
	Common *de* translation equivalent (N = 600)	Neuter *het* translation equivalent (N = 500)
Common *de*	542	395
%	90.33	79
Neuter *het*	58	105
%	9.67	21

As can be seen above, all three groups prefer common *de* when followed by an English noun, regardless of the Dutch translation equivalent.

4.2.4. Summary

It can be concluded that if a Dutch determiner is followed by an English noun, the Dutch determiner is most likely common *de*, as participants chose common *de* over neuter *het* 89.6% of the time when the Dutch translation equivalent required common *de*, and chose common *de* over neuter *het* 78.8% of the time when the Dutch translation equivalent required neuter *het*. This means that participants use the default agreement gender assignment strategy most of the time, with common *de* being the default gender.

This gender assignment strategy appears to be used by all three bilingual groups, as the Dutch-dominant group preferred common *de* over neuter *het* 100% of the time when the Dutch translation equivalent required common *de,* and chose common *de* over neuter *het* 87% of the time when the Dutch translation equivalent required neuter *het*. The English-dominant group chose common *de* over neuter *het* 71.88% of the time when the Dutch translation equivalent required common *de,* and chose common *de* over neuter *het* 67.5% of the time when the Dutch translation equivalent required neuter *het*. The balanced Dutch-English bilingual group chose common *de* over neuter *het* 90.33% of the time when the Dutch translation equivalent required common *de,* and chose common *de* over neuter *het* 79% of the time when the Dutch translation equivalent required neuter *het*. This is in line with the findings of Clyne (1977), who found that common *de* was most frequently used in Dutch-English determiner-noun code-switches, and in line with Greidanus Romaneli's (2021) findings that common *de* is the default definite determiner in a Dutch-Portuguese codeswitch with a Dutch determiner followed by a Portuguese noun. Therefore, it can be concluded that the gender assignment strategy, which is the default agreement strategy in this case, does not differ based on the dominance of Dutch, the gendered language, over English, the non-gendered language.

5. Discussion

5.1. Research question 1

The first research question investigated was whether there is a preference for the language of the determiner in a determiner-noun switch. The results of this study suggest a clear preference for an English determiner followed by a Dutch noun in a sentence with an English matrix language. This is in line with previous research on Spanish-English code-switches, where English-Spanish bilinguals prefer to match the language of the determiner with the matrix language (Parafita Couto & Gullberg, 2019; Parafita Couto & Stadthagen-González, 2019).

It is interesting to note that in post-nominal Spanish-English code-switches there is a preference for Spanish, the gendered language, if there is a mismatch between the determiner and the matrix language, though this could be due to the fact that Spanish as a matrix language is more common in Spanish-English communities (Parafita Couto & Stadthagen-González, 2019).

This study, on the other hand, found a preference for the language of the determiner to be the non-gendered language if there is a mismatch between the determiner and the matrix language. An explanation for this result may be that the Dutch determiner common *de* [də] "the" is phonetically very similar to the English determiner *the* [ðə], which might mean that Dutch-English bilinguals do not differentiate between the two and use them interchangeably. This is in addition to the fact that common *de* is the most frequently occurring grammatical gender in Dutch (Van Berkum, 1996).

Though Blokzijl et al. (2017) and Parafita Couto and Gullberg (2019) have suggested that code-switches tend to be towards the majority language, such as Dutch in the Netherlands, very little was found in the literature on the question of whether the preferences for the language of the determiner in determiner-noun code-switches differed depending on

language dominance. Further investigation shows that the preference for the language of the determiner is the same for the Dutch-dominant bilingual group and the balanced Dutch-English bilingual group, with a clear preference for an English determiner followed by a Dutch noun. The English-dominant bilingual group, on the other hand, shows a preference for a Dutch determiner followed by an English noun, with the Dutch determiner matching the Dutch matrix language. In contrast to findings regarding grammatical gender assignment strategies, language dominance did not appear to play a role in selecting the language of the determiner. Nevertheless, the preference for an English determiner followed by a Dutch noun by balanced Dutch-English bilinguals an Dutch-dominant bilinguals may be related to Blokzijl et al.'s (2017) and Parafita Couto and Gullberg's (2019) suggestion that there is a preference for code-switching towards the majority language, which is Dutch for these bilinguals; this also applies for the English-dominant bilingual group, as they show a preference for code-switching into English, their majority language, by preferring a Dutch determiner followed by an English noun. However, these results need to be interpreted with caution due to the small sample size in the English-dominant bilingual group (N = 8) compared to the Dutch-dominant group (N = 10) and the balanced bilingual group (N = 50), in addition to the fact that the majority of participants (N = 6) that were in the group of English-dominant bilinguals came from Amazon Mechanical Turk, which can be a source of less reliable participants and lower quality data (Peer et al., 2014).

Additionally, results suggest that the preference for the language of the determiner is not the same for a pre-verbal determiner-noun code-switch as for a post-verbal determiner-noun code-switch. Indeed, the results indicate that there is a preference for a Dutch determiner followed by an English noun with the main verb in English for pre-verbal code-switches, and a preference for an English determiner followed by a Dutch noun with the main verb in English for post-verbal code-switches; this preference indicates an effect of adjacency

from the verb on the language of the determiner, as there is a preference for a match between the language of the determiner and the verb in post-verbal code-switches. Further investigation into the differences between pre-verbal and post-verbal code-switches for different bilingual groups show that Dutch-dominant bilinguals and balanced Dutch-English bilinguals prefer an English determiner followed by a Dutch noun pre-verbal and post-verbal code-switches, while English-dominant bilinguals prefer an English determiner followed by a Dutch noun for pre-verbal code-switches and a Dutch determiner followed by an English noun for post-verbal code-switches. The results therefore indicate that the type of bilingual, or language dominance, does influence these preferences. As mentioned before, these code-switches are towards the majority language for these types of bilinguals, with Dutch-English balanced bilinguals and Dutch-dominant bilinguals, who mostly reside in the Netherlands, switching into Dutch, while English-dominant bilinguals switch into English, like the suggestion by Blokzijl et al. (2017) and Parafita Couto and Gullberg (2019).

In all but one case the language of the determiner matched the language of the main verb, the exception was where balanced Dutch-English bilinguals preferred Pattern D for pre-verbal code-switches, meaning an English determiner followed by a Dutch noun followed by a Dutch verb. These findings support previous research in the suggestion that the language of the determiner will follow the language of the main verb when they are adjacent, as is the case in post-verbal code-switches (Blokzijl et al., 2017; Parafita Couto & Stadthagen-González, 2018; Parafita Couto & Gullberg, 2019).

It is important to note, however, that there is a disparity in comparisons present in the analysis, with the post-verbal code-switches having six sentences with eight comparisons each and the pre-verbal code-switches having only two sentences with only two comparisons due to an incomplete set of comparisons. Having less comparisons for pre-verbal code-switches might have impacted the results when investigating the general preference for the

determiner across pre-verbal and post-verbal code-switches, with the preferences for post-verbal code-switches contributing more to the ranking than pre-verbal code-switches.

In general, therefore, it seems that there is a preference for an English determiner followed by a Dutch noun and there is more support for the MLF than for the MP: in most cases, the preferred language of the determiner followed the matrix language. However, there is also some support for the MP, as some bilinguals preferred Dutch determiners over English determiners, though the language of the determiner still matched the matrix language. Additionally, the preferred code-switches were all switches into the majority language. A future study could investigate this further by investigating preferences in a tight-knit community with either Dutch or English as the majority language.

Thus, the results support Parafita Couto and Stadthagen-González's (2019) suggestion that a theory where insights from both the MP and MLF frameworks are combined would help explain code-switching constraints more than either of the frameworks would separately.

5.2. Research question 2

The second research question investigated grammatical gender assignment in Dutch-English determiner-noun code-switches with a Dutch determiner followed by an English noun.

Only one study (Clyne, 1977) investigated grammatical gender assignment at the determiner-noun conflict site for Dutch-English bilinguals, though others have looked at other language pairs, such as Greidanus Romaneli (2021) for Dutch-Portuguese bilinguals. In line with the results by Clyne (1977), the results of the present study indicate that the grammatical gender of the Dutch determiner in an English-Dutch determiner-noun code-switch is common *de*. This is likely due to the phonetic similarity between the Dutch determiner *de* [də] "the" and the English determiner *the* [ðə], in addition the fact that that

common *de* is the most frequently occurring grammatical gender in Dutch (Van Berkum, 1996).

Further investigation shows that the preference for the grammatical gender of the determiner is the same for the Dutch-dominant bilingual group and the English-dominant bilingual group, as well as the balanced Dutch-English bilingual group, with a clear preference for common *de* over neuter *het*, regardless of the grammatical gender of the Dutch translation equivalent of the English noun. Correspondingly, the gender assignment strategy used and preferred by all Dutch-English bilinguals is therefore the default agreement strategy, with common *de* as the default gender, regardless of language dominance. This is in contrast to the findings by Bellamy et al. (2018) for Purepecha-Spanish code-switching and the conclusions by Bellamy and Parafita Couto (2021), who concluded that when the analogical strategy is used, it is often used by bilinguals who acquired the gendered language first. This could be explained by the fact that the Dutch grammatical gender system is opaque and has an uneven distribution of gender: two-thirds of the Dutch nouns are common gender and only one-third of the Dutch nouns are neuter gender. Using common *de* as a default determiner has a higher chance of matching with the Dutch translation equivalent of the English noun than using neuter *het*.

Another explanation could be that bilinguals who code-switch regularly tend to prefer the default gender assignment strategy, regardless of the order of acquisition (Bellamy & Parafita Couto, 2021), though the frequency of code-switching by the participant was not investigated in this thesis.

6. Conclusion

The purpose of this thesis was to provide insights into the rules governing decisions made by Dutch-English bilinguals and to contribute to the growing body of code-switching research by comparing the predictions of the MLF and MP in regard to Dutch-English code-switching, as well as investigating how grammatical gender assignment is resolved in Dutch determiners followed by an English noun.

The results show support for predictions by both the MLF and MP. Dutch-English bilinguals have a general preference for an English determiner followed by a Dutch noun with English as the matrix language, though this can differ depending on the position of the code-switch. This study has also found that Dutch-English bilinguals employ the default agreement strategy with common *de* as default option in order to resolve Dutch grammatical gender marking in a Dutch determiner-English noun code-switch. Both the Dutch-dominant bilinguals and the English-dominant bilinguals, as well as balanced Dutch-English bilinguals, share the preference for an English determiner with a Dutch noun, as well as the preference for the default agreement strategy.

Several limitations of this study need to be examined. Firstly, several sentences with pre-verbal code-switches had to be excluded from analysis due to an incomplete set of comparisons, meaning that the pre-verbal code-switches had less comparisons in total than the post-verbal code-switches, which could influence Thurstone's ranking.

Secondly, pre-verbal and post-verbal code-switches were not compared directly with each other in this study due to time and methodological constraints; the current survey included 104 comparisons and took the participants on average 27 minutes to fill in completely. Longer surveys generally have a higher drop-off rate, with completion rate severely diminishing the longer the survey is. Including direct comparisons between pre-verbal and post-verbal code-switches would have increased the survey length significantly

while severely decreasing completion rate; including comparison between pre-verbal and post-verbal codeswitches was not considered to be worth the drop-off in responses.

As Thurstone's measure only allows for comparison of the relative order within the same scale, the two scales for pre-verbal code-switches and post-verbal code-switches presented in this study cannot be compared directly because they do not have the same baseline due to the fact they were not compared directly with each other in this study. This means that no conclusions can be drawn regarding how much more or less a certain code-switched pattern is preferred when comparing pre-verbal and post-verbal code-switches. As the data was not tested for statistical significance, no conclusions can be drawn about whether the difference between pre-verbal and post-verbal ranking is statistically significant, only what code-switching pattern is preferred for pre-verbal code-switches and what code-switching pattern is preferred for post-verbal code-switches.

Recent discussions regarding categorizations of bilingualism have argued for the categorization of bilingualism as a continuous variable or even a factor mixture model, rather than a categorical variable, as categorical groups of bilinguals may be heterogenous and often use arbitrary cut-offs (Kremin & Byers-Heinlein, 2021). A significant drawback of using Thurstone's measure is that it does not allow for a continuous variable, such as language dominance, to be used in analysis. This means that, in this study, language dominance had to be categorised as a categorical variable, which led to one heterogenous big group and two smaller groups, as well as a loss of granularity in comparison. Additionally, Kremin and Byers-Heinlein (2021) note that "conducting group analyses when the variable of interest is actually continuous reduces statistical power and increases the chance of a Type I error" (p. 1564). For example, one participant from the Dutch-English balanced bilingual group had a dominance score of 99.12, where the cut-off for English-dominant bilinguals was a dominance score of 100. This cut-off point seems arbitrary because there are no pre-defined

categories of types of bilingualism. This meant that this participant had more in common with participants in the English-dominant group than with other participants in their group, but due to the cut-off point of 100, the participant was categorised as balanced bilingual instead, which might not reflect the reality for that bilingual.

Thirdly, the participants were split into the Dutch-dominant group, the English-dominant group, or the balanced Dutch-English group, on the basis of their dominance score; this was calculated by subtracting their Dutch global language score from their English global language score, resulting in a dominance score range of -218 to +218. All participants with a dominance score above +100 were put in the English-dominant group and all participants with a dominance score below -100 were put in the Dutch-dominant group, while all other participants, with a dominance score between -99 and +99, were put in the balanced Dutch-English group. The Dutch-dominant group and the English-dominant group were fairly homogenous, while the balanced Dutch-English group had significant individual differences in place of birth and dominance score. Language dominance should be treated as a continuous variable rather than a categorical variable (Kremin & Byers-Heinlein (2021); this was not easy to do given the design of this study; using Thurstone's Measure was necessary use in order to get more robust results from acceptability judgment tasks. By the same token, only a small sample of the Dutch-English bilingual population was used, meaning that the found preferences do not necessarily hold up for the Dutch-English bilingual community or subcommunities in The Netherlands as previous research has shown that bilinguals with the same language pair from different communities have different code-switching preferences, such as Balam et al. (2020), who found that Spanish-English speakers from Northern Belize, New Mexico, and Puerto Rico had different preferences in compound verb code-switching.

Initial plans for this study were to investigate different Dutch-English bilingual communities and compare code-switching preferences for Dutch-English bilinguals from the

Netherlands with Dutch-English bilinguals from Australia specifically, due to presence of the Dutch post-war immigrants to Australia. However, initial attempts at categorisation of Dutch-English bilinguals from the Netherlands was done by categorising participants on where they were born and where they were residing when taking the survey; this categorisation did not take their language dominance into account and therefore would have excluded Dutch-English bilinguals who were not born in the Netherlands or residing at the Netherlands at the time. Therefore, place of birth and place of residence was not taken into consideration while categorising, focussing on language dominance instead. Additionally, it proved more difficult than anticipated to reach the Dutch-English community in Australia and recruit enough participants from Australia; instead, other English-speaking countries, such as The United States of America, The United Kingdom and Canada were included as well.

Additionally, this study did not account for the phonological and lexical similarity between Dutch *de* and English *the*, which could influence the acceptability of the code-switches as well as being a possible trigger for the default agreement strategy. Another study could focus on neuter Dutch words requiring *het* to avoid the phonological similarity with *the*.

Code-switching can be stigmatised and therefore can be considered ungrammatical when compared to unilingual sentences (Stadthagen-González et al., 2018), and it is important to note that this is one of the issues of using acceptability judgment tasks for code-switching (Gullberg et al., 2009; Stadthagen-González et al., 2018). Therefore, an English-Dutch determiner-noun code-switch could be interpreted as not being a code-switch at all but rather a Dutch noun phrase due to the phonological similarity between the Dutch determiner *de* [də] “the” and the English determiner *the* [ðə], as suggested by Clyne (1977). This Dutch noun phrase could be preferred to a determiner-noun code-switch, which could explain the preference for the English determiner *the* followed by a Dutch noun. However, this similarity

is unavoidable with highly cognate languages such as Dutch and English; creating a visual difference between *de* and *the* by using the written form to evaluate code-switching preferences might mitigate this phonological similarity.

A follow-up study could compare pre-verbal and post-verbal code-switches directly with each other (pre-verbal: ***De*** *queen visits Hannah* "The queen visits Hannah" vs post-verbal: *Hannah visits* ***de*** *queen* "Hannah visits the queen") and see if bilinguals prefer pre-verbal or post-verbal determiner-noun code-switches. As results suggest that the position of the code-switch does impact the preference for the language of the determiner in Dutch-English code-switches, follow-up studies for other language pairs are required to see if this holds up for those pairs too.

Future research might further explore the rules governing Dutch-English code-switches and investigate whether the MLF and MP can explain code-switching constraints between two languages that are typologically just as similar as Dutch and English. In the same fashion, further research is necessary with regards to grammatical gender assignment strategies in Dutch-English code-switching, as this thesis found results that support previous findings on Spanish-English grammatical gender assignment.

In sum, this thesis attempted to add to the body of research on Dutch-English code-switches, as this study replicated the finding by Clyne (1977); the most frequently used grammatical gender assignment strategy is the default agreement strategy, with common gender as the default gender. Clyne (1987) also investigated code-switching constraints and the concept of a matrix language for Dutch-English bilinguals and suggested further investigation was necessary, as he found both support for and evidence against the notion of a matrix language. This study found comparable results to Clyne (1987), with support for both the MLF and MP; English-dominant bilinguals preferred Dutch determiners, as predicted by the MP, while Dutch-dominant bilinguals and balanced Dutch-English bilinguals preferred

English determiners, though all groups preferred matching the language of the determiner to the matrix language, as predicted by the MLF.

As research into Dutch-English code-switching has been limited so far, more research is still necessary to fill the Dutch-English gap in the existing code-switching literature.

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Appendices

Raw data and analysis will be made available after grading of this thesis.

Appendix A - Experimental sentences

Task 1 – target nouns and monolingual base sentences

Target nouns

Dutch	English	Gender (common)
griep	flu	masculine or feminine
grap	joke	masculine or feminine
doos	box	masculine or feminine
berg	mountain	masculine
emmer	bucket	masculine
kogel	bullet	masculine
waarheid	truth	feminine
gemeenschap	community	Feminine
getuige	witness	masculine or feminine
vogel	bird	masculine
koningin	queen	feminine

Monolingual base sentences

Sentences with pre-verbal code-switches:

English	**Dutch**
The flu infects the lungs	De griep infecteert de longen
The bullet hit Casper	De kogel raakt Casper
The witness testifies in the trial	De getuige getuigt in de rechtzaak
The community votes in favor of the plan	De gemeenschap stemt voor het plan
The bird sings a song	De vogel zingt een lied

Sentences with post-verbal code-switches:

English	**Dutch**
Robin tells the joke to Ben	Robin vertelt de grap aan Ben
Amber grabs the box	Amber pakt de doos
Fred climbs the mountain	Fred beklimt de berg
Daphne fills the bucket with water	Daphe vult de emmer met water
Jonathan tells the truth	Jonathan vertelt de waarheid
Hannah visits the queen	Hannah bezoekt de koningin

Task 2 – target nouns and monolingual base sentences

Target nouns

Dutch	English	Gender
moeras	swamp	Neuter
touw	rope	Neuter
hout	wood	Neuter
gedicht	poem	Neuter
gebouw	building	Neuter
lichaam	body	Neuter
geheim	secret	Neuter
gazon	lawn	Neuter
bestuur	board	Neuter
fiets	bicycle	Common (masculine/feminine)
jas	coat	Common (masculine/feminine)
jurk	dress	Common (masculine/feminine)
vloek	curse	Common (masculine)
twijfel	doubt	Common (masculine)
tuin	garden	Common (masculine)
onderneming	company	Common (feminine)
boerderij	farm	Common (feminine)
ontdekking	discovery	Common (feminine)
paard	horse	Neuter
schildpad	turtle	Common (masculine/feminine)
haai	shark	Common (masculine)
kip	chicken	Common (feminine)

Monolingual base sentences

English	Dutch
The swamp teems with mosquitos	Het moeras wemelt van de muggen
The rope in his backpack is useful	Het touw in zijn rugzak komt goed van pas
The wood for the fire is outside	Het hout voor het vuur ligt buiten
The poem is recited by the author	Het gedicht wordt voorgedragen door de auteur
The building collapses	Het gebouw stort in
The body is buried in the garden	Het lichaam ligt begraven in de tuin
The secret is safe with me	Het geheim is veilig bij mij
The lawn needs mowing	Het gazon moet gemaaid worden
The board has made a decision	Het bestuur heeft een beslissing genomen
The bicycle is in the shed	De fiets staat in de schuur
The coat is on the coat rack	De jas hangt aan de kapstok
The dress suits her very well	De jurk staat haar heel goed
The curse will always follow him	De vloek zal hem altijd blijven volgen
The doubt is visible on his face	De twijfel staat op zijn gezicht geschreven
The garden looks nice	De tuin ligt er mooi bij
The company opens next month	De onderneming gaat volgende maand open
The farm has a lot of animals	De boerderij heeft veel dieren
The discovery shocks the world of technology	De ontdekking schokt de wereld van technologie
The horse walks through the pasture	Het paard loopt door de wei
The turtle eats fish	De schildpad eet vis
The shark swims in the sea	De haai zwemt in de zee
The chicken lays an egg	De kip legt een ei

Task 1 – Code-switched sentences

Pre-verbal code-switches

Sentence 1:

English	the	flu	infects	the lungs
1	de	flu	infects	the lungs
2	de	flu	infecteert	the lungs
3	the	griep	infects	de longen
4	the	griep	infecteert	de longen
Dutch	de	griep	infecteert	de longen

Sentence 2:

English	the	bullet	hit	Casper
1	de	bullet	hit	Casper
2	de	bullet	raakt	Casper
3	the	kogel	hit	Casper
4	the	kogel	raakt	Casper
Dutch	de	kogel	raakt	Casper

* Due to a mistake in survey creation, the comparison between condition 3 and 4 was replaced by a second comparison of condition 2 and 4; due to this, the comparison between condition 3 and 4 was excluded. This led to the exclusion of all comparisons of this sentence in the calculation of the Thurstone's measure.

Sentence 3:

English	the	community	votes	in favor of the plan
1	de	community	votes	in favor of the plan
2	de	community	stemt	voor het plan
3	the	gemeenschap	votes	in favor of the plan
4	the	gemeenschap	stemt	voor het plan
Dutch	de	gemeenschap	stemt	voor het plan

* Due to a mistake in survey creation, the sentence for condition three changed from "the *gemeenschap* votes in favor of the plan" to "the *gemeenschap* votes *voor het plan*" in the comparison between condition 1 and 3. This change introduced a secondary code-switch between the verb and the object, which could have influenced results. This led to the exclusion of all comparisons of this sentence in the calculation of the Thurstone's measure.

Sentence 4:

English	the	witness	testifies	in the trial
	1 de	witness	testifies	in the trial
				in de
	2 de	witness	getuigt	rechtzaak
	3 the	getuige	testifies	in the trial
				in de
	4 the	getuige	getuigt	rechtzaak
				in de
Dutch	de	getuige	getuigt	rechtzaak

* Due to a mistake in survey creation, the sentence for condition three changed from "the *getuige* testifies in the trial" to "the *getuige* testifies *in de rechtzaak*" in the comparison between condition 1 and 3. This change introduced a secondary code-switch between the verb and the object, which could have influenced results. This led to the exclusion of all comparisons of this sentence in the calculation of the Thurstone's measure.

Sentence 5:

English	the	bird	sings	a song
	1 de	bird	sings	a song
	2 de	bird	zingt	a song
	3 the	vogel	sings	een lied
	4 the	vogel	zingt	een lied
Dutch	de	vogel	zingt	een lied

Post-verbal code-switches

Sentence 1:

English		Robin	tells	the	joke	to Ben
	1	Robin	tells	de	joke	to Ben
	2	Robin	vertelt	de	joke	aan Ben
	3	Robin	tells	the	grap	to Ben
	4	Robin	vertelt	the	grap	aan Ben
Dutch		Robin	vertelt	de	grap	aan Ben

Sentence 2:

English		Amber	grabs	the	box
	1	Amber	grabs	de	box
	2	Amber	pakt	de	box
	3	Amber	grabs	the	doos
	4	Amber	pakt	the	doos
Dutch		Amber	pakt	de	doos

Sentence 3:

English		Fred	climbs	the	mountain
	1	Fred	climbs	de	mountain
	2	Fred	beklimt	de	mountain
	3	Fred	climbs	the	berg
	4	Fred	beklimt	the	berg
Dutch		Fred	beklimt	de	berg

Sentence 4:

English		Daphne	fills	the	bucket	with	water
	1	Daphne	fills	de	bucket	with	water
	2	Daphne	vult	de	bucket	met	water
	3	Daphne	fills	the	emmer	with	water
	4	Daphne	vult	the	emmer	met	water
Dutch		Daphne	vult	de	emmer	met	water

Sentence 5:

English		Jonathan	tells	the	truth
	1	Jonathan	tells	de	truth
	2	Jonathan	vertelt	de	truth
	3	Jonathan	tells	the	waarheid
	4	Jonathan	vertelt	the	waarheid
Dutch		Jonathan	vertelt	de	waarheid

Sentence 6:

English		Hannah	visits	the	queen
	1	Hannah	visits	de	queen
	2	Hannah	bezoekt	de	queen
	3	Hannah	visits	the	koningin
	4	Hannah	bezoekt	the	koningin
Dutch		Hannah	bezoekt	de	koningin

Task 2 – Code-switched sentences

All code-switches were in pre-verbal position, to ensure that the adjacency of the verb would not influence the gender of the determiner.

1	a	de	swamp	wemelt van de muggen
	b	het	swamp	wemelt van de muggen
2	a	de	rope	in zijn rugzak komt goed van pas
	b	het	rope	in zijn rugzak komt goed van pas
3	a	de	wood	voor het vuur ligt buiten
	b	het	wood	voor het vuur ligt buiten
4	a	de	poem	wordt voorgedragen door de auteur
	b	het	poem	wordt voorgedragen door de auteur
5	a	de	building	stort in
	b	het	building	stort in
6	a	de	body	ligt begraven in de tuin
	b	het	body	ligt begraven in de tuin
7	a	de	secret	is veilig bij mij
	b	het	secret	is veilig bij mij
8	a	de	lawn	moet gemaaid worden
	b	het	lawn	moet gemaaid worden
9	a	de	board	heeft een beslissing genomen
	b	het	board	heeft een beslissing genomen
10	a	de	bicycle	staat in de schuur
	b	het	bicycle	staat in de schuur
11	a	de	coat	hangt aan de kapstok
	b	het	coat	hangt aan de kapstok
12	a	de	dress	staat haar heel goed
	b	het	dress	staat haar heel goed
13	a	de	curse	zal hem altijd blijven volgen
	b	het	curse	zal hem altijd blijven volgen
14	a	de	doubt	staat op zijn gezicht geschreven
	b	het	doubt	staat op zijn gezicht geschreven
15	a	de	garden	ligt er mooi bij
	b	het	garden	ligt er mooi bij
16	a	de	company	gaat volgende maand open
	b	het	company	gaat volgende maand open
17	a	de	farm	heeft veel dieren
	b	het	farm	heeft veel dieren
18	a	de	discovery	schokt de wereld van technologie
	b	het	discovery	schokt de wereld van technologie

Quality control sentences:

1						Grammatical
	English base sentence:	Tim	build	the	house	No
	Condition 1	Tim	build	het	house	No
	Condition 2	Tim	bouwt	het	house	Yes
	Condition 3	Tim	build	the	huis	No
	Condition 4	Tim	bouwt	the	huis	Yes
	Dutch base sentence:	Tim	bouwt	het	huis	Ye
2						
	English base sentence:	Tom	fix	the	roof	No
	Condition 1	Tom	fix	het	roof	No
	Condition 2	Tom	repareert	het	roof	Yes
	Condition 3	Tom	fix	the	dak	No
	Condition 4	Tom	repareert	the	dak	Yes
	Dutch base sentence:	Tom	repareert	het	dak	Yes
3						
	English base sentence:	Michelle	buys	the	bag	Yes
	Condition 1	Michelle	buys	de	bag	Yes
	Condition 2	Michelle	koops	de	bag	No
	Condition 3	Michelle	buys	the	tas	Yes
	Condition 4	Michelle	koops	the	tas	No
	Dutch base sentence:	Michelle	koops	de	tas	No
4						
	English base sentence:	Jennifer	raises	the	flag	Yes
	Condition 1	Jennifer	raises	de	flag	Yes
	Condition 2	Jennifer	heist	de	flag	No
	Condition 3	Jennifer	raises	the	vlag	Yes
	Condition 4	Jennifer	heist	the	vlag	No
	Dutch base sentence:	Jennifer	heist	de	vlag	No

All four quality control sentences were included in the survey but only comparisons between condition 1-2, 1-4, 2-3 and 3-4 were included in the survey. Comparison between condition 1-3 would lead to only having ungrammatical choices in the case of sentences 1 and 2, and only grammatical choices in the cases of sentences 3 and 4; the reverse is true for comparison between condition 2-4. The only difference between condition 1-3 and 2-4 is the language of the determiner, rather than a grammatical issue.

Appendix B - Consent form

English version

Hi there!

As part of the MA Linguistics, I have to conduct a research study and write a thesis. This study is part of my thesis. For this study, it is necessary to use your personal data. To use this data during the study, I need your consent.

What data are being used?
I will need to save both your experimental data and personal data. Experimental data includes your answers for the tasks presented. Personal data includes your age, gender, highest completed level of education, place of birth and residence, language history, language proficiency, language use and language attitude.

What happens if I change my mind?
If you change your mind, you can send an e-mail to t.a.van.der.heide@vuw.leidenuniv.nl with a short message indicating that you want your data to be removed. Your entry will be permanently deleted from the collected data. Any other information that can be traced back to you will also be permanently deleted.

What will be done with my data after the research project has ended?
Your data will be stripped of information that can identify you, one month after the research is concluded.

Please tick the box that is applicable
Klik op het vakje dat van toepassing is

- o I do not consent to any use of the information collected about me Ik geef geen toestemming om mijn verzamelde gegevens te gebruiken (1)
- o I consent to the use of the information collected about me for this research project Ik geef mijn toestemming om mijn verzamelde gegevens te gebruiken voor dit specifieke onderzoek (2)

Dutch version

Hoi!

Als onderdeel van mijn MA Taalwetenschap, moet ik zelfstandig onderzoek uitvoeren en een scriptie schrijven. Dit onderzoek maakt onderdeel uit van mijn scriptie. Voor dit onderzoek is het noodzakelijk om je persoonlijke gegevens op te slaan en te gebruiken. Hiervoor heb ik je toestemming nodig.

Welke gegevens zullen gebruikt worden?
Zowel je experimentele gegevens als persoonlijke gegevens worden opgeslagen. Antwoorden die je hebt gegeven op de opdrachten vallen onder experimentele data. De verzamelde persoonlijke gegevens zijn: leeftijd, geslacht, opleiding, geboorteplaats en woonplaats, taalachtergrond, taalvaardigheid, taalgebruik en je mening over taal.

Wat als ik van gedachten verander?
Als je van gedachten verandert bent na het invullen van dit onderzoek, kun je een email sturen naar t.a.van.der.heide@vuw.leidenuniv.nl met een kort berichtje met je wens om de gegevens te verwijderen. Je reactie op het onderzoek zal dan worden verwijderd. Alle gegevens die mogelijk naar jou te herleiden zijn, worden ook verwijderd.

Wat wordt er met mijn gegevens gedaan nadat het onderzoek is geeindigd?
Alle persoonlijke gegevens die naar jou persoonlijk te herleiden zijn, worden één maand na het beeindigen van het onderzoek verwijderd.

Please tick the box that is applicable
Klik op het vakje dat van toepassing is

- o I do not consent to any use of the information collected about me Ik geef geen toestemming om mijn verzamelde gegevens te gebruiken (1)
- o I consent to the use of the information collected about me for this research project Ik geef mijn toestemming om mijn verzamelde gegevens te gebruiken voor dit specifieke onderzoek (2)

Appendix C - Instructions

In dit deel word je gevraagd zinnen te beoordelen. You'll notice dat alle zinnen zowel Engels als Nederlands bevatten. We zijn geïnteresseerd in jouw mening about the interaction between these two languages.

In this study we are interested in finding out hoe tweetaligen afwisselen tussen Nederlands en Engels in een tweetalige conversatie. Dit noemen we "code-switching". Code-switching is a form of linguistic expression like any other and, therefore, it is subject to rules and restrictions like any other. De regels en
restricties die we hier bedoelen hebben niets te maken met "correct taalgebruik" zoals aangeleerd wordt op school, but rather with the linguistic structures that speakers have in their minds.

In the survey, you might find that neither of the sentences are perfect nor totally awful and some sentences may sound odd because it doesn't seem like something anyone would ever say or care about. Still, kies er een. Bij het beoordelen van de zinnen, the question then is: which of the sentences is the best? Even if you don't know why anyone would actually say the sentence!

Whenever you are ready, ga door naar de volgende pagina.

Appendix D - Background questionnaire

English version

Age

_____

Gender

- o Male
- o Female
- o Non-binary
- o Prefer not to say

Place of birth (city/state followed by country)

_____

Current place of residence (city/state followed by country)

_____

Highest level of formal education:

- o Less than high school
- o College (B.A. / B.S.)
- o PhD/MD/JD
- o High School
- o Some graduate school
- o Some college
- o Some graduate school
- o Masters
- o Other

Language history
In this section, we would like you to answer some factual questions about your language history.

Please fill in **all** languages you are comfortable using (speaking/listening/reading/writing):

_____

_____

At what age did you start learning English?
(Options: “Since birth”, “1” to “20+”)

At what age did you start learning Dutch?
(Options: “Since birth”, “1” to “20+”)

At what age did you start to feel comfortable using English?
(Options: “As early as I can remember”, “1” to “20+”, “Not yet”)

At what age did you start to feel comfortable using Dutch?
(Options: “As early as I can remember”, “1” to “20+”, “Not yet”)

How many years of classes (grammar, history, math, etc.) have you had in English (primary school through university)?
(Options: “0” to “20+”)

How many years of classes (grammar, history, math, etc.) have you had in Dutch (primary school through university)?
(Options: “0” to “20+”)

How many years have you spent in a country/region where English is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

How many years have you spent in a country/region where Dutch is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

How many years have you spent in a family where English is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

How many years have you spent in a family where Dutch is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

How many years have you spent in a work environment where English is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

How many years have you spent in a work environment where Dutch is/was spoken (as the dominant language)?
(Options: “0” to “20+”)

Language use

In this section, we would like you to answer some questions about your language use by filling in numbers in boxes. Total use for all languages in a given question should equal 100%.

In an average week, what percentage of the time do you use the following languages with friends?

English : _____

Dutch : _____

Other : _____

Total : _____

In an average week, what percentage of the time do you use the following languages with family?

English : _____

Dutch : _____

Other : _____

Total : _____

In an average week, what percentage of the time do you use the following languages at school/work?

English : _____

Dutch : _____

Other : _____

Total : _____

When you talk to yourself, how often do you talk to yourself in the following languages?

English : _____

Dutch : _____

Other : _____

Total : _____

When you count, how often do you count in the following languages?

English : _____

Dutch : _____

Other : _____

Total : _____

Language proficiency
In this section, we would like you to rate your language proficiency by giving marks from 0 to 6.

How well do you speak English?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you speak Dutch?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you understand English?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you understand Dutch?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you read English?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you read Dutch?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

How well do you write English?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)
How well do you write Dutch?
(Options: “0 (=Not well at all)” to “6 (=Very well)”)

Language attitudes

In this section, we would like you to respond to statements about language attitudes by giving marks from 0-6

I feel like myself when I speak English
(Options: “0 (=Disagree)” to “6 (=Agree)”)

I feel like myself when I speak Dutch
(Options: “0 (=Disagree)” to “6 (=Agree)”)

I identify with an English-speaking culture
(Options: “0 (=Disagree)” to “6 (=Agree)”)

I identify with a Dutch-speaking culture
(Options: “0 (=Disagree)” to “6 (=Agree)”)

It is important to me to use (or eventually use) English like a native speaker
(Options: “0 (=Disagree)” to “6 (=Agree)”)

It is important to me to use (or eventually use) Dutch like a native speaker
(Options: “0 (=Disagree)” to “6 (=Agree)”)

I want others to think I am a native speaker of English.
(Options: “0 (=Disagree)” to “6 (=Agree)”)

I want others to think I am a native speaker of Dutch.
(Options: “0 (=Disagree)” to “6 (=Agree)”)

In everyday conversation, I prefer speaking English
(Options: “0 (=Disagree)” to “6 (=Agree)”)

In everyday conversation, I prefer speaking Dutch
(Options: “0 (=Disagree)” to “6 (=Agree)”)

People should avoid mixing English and Dutch
(Options: “0 (=Disagree)” to “6 (=Agree)”)

In everyday conversation, I mix English and Dutch
(Options: “0 (=Disagree)” to “6 (=Agree)”)

Dutch version

Leeftijd

_____

Geslacht

o Man
o Vrouw
o Non-binair
o Vertel ik liever niet

Geboorteplaats (stad/staat gevolgd door land)

_____

Huidige woonplaats (stad/staat gevolgd door land)

_____

Hoogst genoten opleiding

- o Minder dan middelbare school
- o Middelbare school
- o MBO
- o Some HBO
- o HBO (B.A. / B.S.)
- o Some university
- o University (B.A./B.S.)
- o Masters (M.A./M.S.)
- o PhD/MD/JD
- o Anders

Taal achtergrond

In dit onderdeel willen we graag meer te weten komen over je taalachtergrond.

_____

_____

Op welke leeftijd ben je begonnen met het leren van Nederlands?
(Options: “Vanaf mijn geboorte”, “1” to “20+”)

Op welke leeftijd ben je begonnen met het leren van Engels?
(Options: “Vanaf mijn geboorte”, “1” to “20+”)

Op welke leeftijd begon je op je gemak te voelen met het gebruiken van Nederlands?
(Options: “Zo lang als ik me kan herinneren”, “1” to “20+”, “Nog niet”)

Op welke leeftijd begon je op je gemak te voelen met het gebruiken van Engels?
(Options: “Zo lang als ik me kan herinneren”, “1” to “20+”, “Nog niet”)

Hoeveel jaar heb je les gehad (bijvoorbeeld grammatica, geschiedenis, wiskunde, etc.) in het Nederlands (basisschool tot en met universiteit)?
(Options: “0” to “20+”)

Hoeveel jaar heb je les gehad (bijvoorbeeld grammatica, geschiedenis, wiskunde, etc.) in het Engels (basisschool tot en met universiteit)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een land/regio waar Nederlands is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een land/regio waar Engels is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een familie waar Nederlands is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een familie waar Engels is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een werkomgeving waar Nederlands is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Hoeveel jaar heb je doorgebracht in een werkomgeving waar Engels is/werd gesproken (als de dominante taal)?
(Options: “0” to “20+”)

Taalgebruik
In dit onderdeel willen we graag meer te weten komen over je taalgebruik. De totale som voor alle talen moet voor elke vraag 100% zijn.

In een gemiddelde week, hoeveel procent van de tijd gebruik je de volgende talen met je vrienden?

Engels : _____

Nederlands : _____

Anders : _____

Total : _____

In een gemiddelde week, hoeveel procent van de tijd gebruik je de volgende talen met je familie?

Engels : _____

Nederlands : _____

Anders : _____

Total : _____

In een gemiddelde week, hoeveel procent van de tijd gebruik je de volgende talen op school/werk?

Engels : _____

Nederlands : _____

Anders : _____

Total : _____

Wanneer je tegen jezelf praat, hoeveel procent van de tijd praat je tegen jezelf in de volgende talen?

Engels : _____

Nederlands : _____

Anders : _____

Total : _____

Als je aan het tellen bent, hoeveel procent van de tijd tel je in de volgende talen?

Engels : _____

Nederlands : _____

Anders : _____

Total : _____

Taalvaardigheid

In dit onderdeel willen we graag meer te weten komen over je taalvaardigheid door je te vragen om jezelf een cijfer te geven van 0 tot en met 6.

Hoe goed spreek je Nederlands?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed spreek je Engels?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Nederlands verstaan?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Engels verstaan?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Nederlands lezen?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Engels lezen?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Nederlands schrijven?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Hoe goed kun je Engels schrijven?
(Options: “0 (=Helemaal niet goed)” to “6 (=Heel erg goed)”)

Meningen over taal

In dit onderdeel willen we graag meer te weten komen over jouw mening over en/of houding tegenover talen, door je te vragen om cijfers tussen 0 en 6 te geven.

Ik voel me als mezelf als ik Nederlands spreek
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik voel me als mezelf als ik Engels spreek
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik voel me deel van een Nederlandstalige cultuur
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik voel me deel van een Engelstalige cultuur
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Het is belangrijk voor mij dat ik Nederlands gebruik (of ga gebruiken) zoals een moedertaalspreker
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Het is belangrijk voor mij dat ik Engels gebruik (of ga gebruiken) zoals een moedertaalspreker
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik wil dat anderen denken dat Nederlands mijn moedertaal is
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik wil dat anderen denken dat Engels mijn moedertaal is
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik geef de voorkeur aan het Nederlands in het dagelijkse taalgebruik
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik geef de voorkeur aan het Engels in het dagelijkse taalgebruik
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Mensen zouden Engels en Nederlands niet met elkaar moeten mengen
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Ik meng Nederlands en Engels in het dagelijkse taalgebruik
(Options: “0 (=Oneens)” to “6 (=Eens)”)

Appendix E - Recruitment text

English version

SPREEK JIJ NEDERLANDS EN ENGELS? DO YOU SPEAK ENGLISH AND DUTCH?
(ENGLISH VERSION --- DUTCH BELOW)

Dear all!
As part of the MA Linguistics, I have to write a thesis and conduct a research study!
Would you like to help me graduate by participating in my thesis research?

I am looking for speakers of Dutch & English willing to fill in my survey about language mixing. It does not matter whether your native language is Dutch, English or whether you were raised bilingually Dutch/English, as long as you're comfortable with both Dutch and English.

Participation is voluntary and anonymous; it should take no longer than 30 minutes and would be greatly appreciated! Feel free to share the link!

Thank you so much!

Dutch version

Lieve allemaal,

Als onderdeel van mijn MA Taalwetenschap, moet ik een scriptie schrijven en zelfstandig onderzoek uitvoeren. Help jij mij aan mijn Master diploma door mee te doen aan mijn scriptieonderzoek?

Ik ben op zoek naar mensen die zowel Nederlands als Engels spreken en bereid zijn om mijn enquête over language mixing in te vullen. Het maakt niet uit of je moedertaal Nederlands of Engels is, of als je meertalig bent opgevoed, zo lang je zowel Nederlands als Engels zonder problemen kan gebruiken.

Deelname is vrijwillig en anoniem en het meedoen neemt niet langer dan 30 minuten in beslag, maar wordt wel enorm gewaardeerd! Delen mag!

Heel erg bedankt!

Appendix F – Calculation of Thurstone's measure

Step 1: Determine, for each comparison (A vs B, B vs C, etc.), the number of times each option was chosen when contrasted with each of the other options and arrange them into a matrix

		Winner	Winner	Winner	Winner
		A = 1	B = 2	C = 3	D = 4
Loser	A = 1	\	212	123	165
Loser	B = 2	332	\	161	196
Loser	C = 3	421	383	\	275
Loser	D = 4	379	348	269	\

Step 2: From those values, calculate the proportion of times each option was a winner or loser against all other options by dividing them by the total number of data points for each comparison.

		Winner	Winner	Winner	Winner
		A = 1	B = 2	C = 3	D = 4
Loser	A = 1	\	0.3897	0.2261	0.3033
Loser	B = 2	0.6103	\	0.2960	0.3603
Loser	C = 3	0.6967	0.7040	\	0.5055
Loser	D = 4	0.6967	0.6397	0.4945	\

Step 3: Transform each entry in the matrix to a Z score

		Winner	Winner	Winner	Winner
		A = 1	B = 2	C = 3	D = 4
Loser	A = 1	\	-0.2801	-0.7517	-0.5149
Loser	B = 2	0.2801	\	-0.5361	-0.3577
Loser	C = 3	0.5149	0.5361	\	0.0138
Loser	D = 4	0.5149	0.3577	-0.0138	\

Step 4: Multiply each of those Z scores by the square root of 2

		Winner	Winner	Winner	Winner
		A = 1	B = 2	C = 3	D = 4
Loser	A = 1	\	-0.3961	-1.0631	-0.7282
Loser	B = 2	0.3961	\	-0.7581	-0.5058
Loser	C = 3	0.7282	0.7581	\	0.0195
Loser	D = 4	0.7282	0.5058	-0.0195	\

Step 5: Take the average of each row in the matrix

		Winner A = 1	Winner B = 2	Winner C = 3	Winner D = 4
Loser	A = 1	\	-0.5602	-1.5035	-1.0298
Loser	B = 2	0.5602	\	-1.0721	-0.7153
Loser	C = 3	1.0298	1.0721	\	0.0276
Loser	D = 4	1.0298	0.7153	-0.0276	\

Step 6: We now apply a linear transformation to those scores so that all are positive numbers.
We do this by finding the smallest score and adding it to each of the scores.
This shifts the origin for all values,
in effect making the lowest score the point of comparison for all other scores

	Average
A = 1	0.0000
B = 2	0.6221
C = 3	1.7410
D = 4	1.6037

Step 7: Those values are the Thurstone scores for each of our options.
We now just need to rank them in descending order to find their relative position in an interval scale, that is, on in which the distance (though not the ratio) between its values is meaningful.
The values thus obtained can then be tested using
standard statistical methods such as standard errors and ANOVA.

		Average	Ranking:
A = 1	MLF-/MP +	0.0000	4
B = 2	MLF+/MP+	0.6221	3
C = 3	MLF+/MP-	1.7410	1
D = 4	MLF-/MP-	1.6037	2