

Effect of Language Contact on Speech and Gesture
The case of Turkish-Dutch bilinguals in the Netherlands

Zeynep Azar

© Zeynep Azar 2020
ISBN 978-94-92910-11-0

The research reported in this dissertation was funded by the Center for Language Studies, Radboud University Nijmegen.

The educational component of the doctoral training was provided by the International Max Planck Research School (IMPRS) for Language Sciences. The graduate school is a joint initiative between the Max Planck Institute for Psycholinguistics and two partner institutes at Radboud University – the Centre for Language Studies, and the Donders Institute for Brain, Cognition and Behaviour. The IMPRS curriculum, which is funded by the Max Planck Society for the Advancement of Science, ensures that each member receives interdisciplinary training in the language sciences and develops a well-rounded skill set in preparation for fulfilling careers in academia and beyond.

Cover design: Zeynep Azar
Illustration: Steve Sondag

Printed and bound by Ipskamp Drukkers

Effect of language contact on speech and gesture: The case of Turkish-Dutch bilinguals in the Netherlands

Proefschrift

ter verkrijging van de graad van doctor
aan de Radboud Universiteit Nijmegen
op gezag van de rector magnificus prof. dr. J.H.J.M. van Krieken,
volgens besluit van het college van decanen
in het openbaar te verdedigen op maandag 28
september 2020 om 12.30 uur precies

door

Elif Zeynep Azar
geboren op 13 november 1988
te Gürsu (Turkije)

Promotoren:

Prof. dr. A. Özyürek

Prof. dr. A. M. Backus (Tilburg University)

Manuscriptcommissie:

Prof. dr. P. C. Muysken

Prof. dr. M. Gullberg (Lund Universitet, Zweden)

Prof. dr. A. C. Küntay (Koç Üniversitesi, Turkije)

Prof. dr. P. M. Perniss (Universität zu Köln, Duitsland)

Prof. dr. J. C. Treffers-Daller (University of Reading, Verenigd Koninkrijk)

Effect of language contact on speech and gesture:
The case of Turkish-Dutch bilinguals in the Netherlands

Doctoral Thesis

to obtain the degree of doctor
from Radboud University Nijmegen
on the authority of the Rector Magnificus prof. dr. J.H.J.M. van Krieken,
according to the decision of the Council of Deans
to be defended in public on Monday, September 28,
2020 at 12.30 hours

by

Elif Zeynep Azar
Born on November 13, 1988
in Gürsu, Turkey

Supervisors:

Prof. dr. A. Özyürek

Prof. dr. A. M. Backus (Tilburg University)

Doctoral Thesis Committee:

Prof. dr. P. C. Muysken

Prof. dr. M. Gullberg (Lund University, Sweden)

Prof. dr. A. C. Küntay (Koç University, Turkey)

Prof. dr. P. M. Perniss (University of Cologne, Germany)

Prof. dr. J. C. Treffers-Daller (University of Reading, United Kingdom)

Dedicated to my grandfather, Servet Dođan

You were always so proud telling everyone I would be a doctor, and you would add “not the kind who prescribes pills, but the kind who thinks deeply”. I wish you could see the day I did get my degree!

Dedem Servet Dođan’a ithafen

Herkese benim torunum doktor olacak diye gururla anlatırdın ve “ilaç yazan cinsten deđil, çok derin şeyler düşünen cinsten” diye de eklerdin. Keşke gerçekten doktor olduğumu görebilseydin.

Table of Contents

Chapter 1	General Introduction	1
Chapter 2	Turkish Dutch Bilinguals Maintain Language-Specific Reference Tracking Strategies in Elicited Narratives	41
Chapter 3	General and Language Specific Factors Influence Reference Tracking in Speech And Gesture in Discourse	89
Chapter 4	Language Contact Does Not Drive Gesture Transfer	129
Chapter 5	Reference Tracking Strategies in Gesture Remain Language-Specific in Language Contact	165
Chapter 6	Summary of The Findings and General Discussion.....	205
References		235
Appendices		263
Nederlandse Samenvatting		295
Acknowledgements		305
Publications		309
Curriculum Vitae		311
MPI Series in Psycholinguistics		313

Chapter 1

General Introduction

General Introduction

This thesis investigates the influence of language contact on the linguistic patterns used by second-generation Turkish heritage speakers in the Netherlands in the domain of discourse production. The Turkish community in the Netherlands exhibits high attainment of Turkish, and most second-generation speakers of Turkish continue to use Turkish in various domains next to the majority language Dutch (e.g., Extra & Yağmur, 2010).

Previous research on language contact has focused on possible contact-induced changes in speech patterns only. As a novel contribution to language contact studies, here effects of language contact are investigated not only on speech, but also on co-speech gestures that are used to organize information at the discourse level. Hence, this thesis adopts a multimodal approach to bilingualism, studying not only speech but also patterns of gestures accompanying speech. Recent research has shown that gestures that speakers use while speaking are integrated with what is expressed in speech at many levels of linguistic organization, and that gestures show variation across languages. Whether and how language specific gestures are influenced by language contact, on the other hand, is not known.

Multimodal discourse data are collected from the bilingual heritage speakers both in Turkish and Dutch and compared to the patterns in the non-bilingual, monolingual¹ variety in each language. Thus, this thesis also offers a crosslinguistic comparison of monolingual Turkish and Dutch patterns in the domain of multimodal discourse production.

¹Throughout the thesis, ‘monolingual’ is used as an operational term to refer to participants who were raised monolingually and spoke only one of the languages that we study, Turkish or Dutch. All participants in this study have reported to have knowledge of English to some extent, although none of the participants grew up with English as an early first language.

1. Introduction to Key Concepts and Literature

1.1. What is language contact?

Language contact as examined in this thesis refers to situations when two different languages come into contact through both speech communities and individual speakers, with intentions to communicate with each other on a daily basis and in a shared geographical space (Gómez Rendón, 2008). Speakers from all over the world may come into contact with other languages via TV, internet and printed media without sharing the same geographical space with the speakers of those languages. These cases of language contact are outside the domain of this thesis.

In a language contact context, there are usually a majority and a minority language, e.g., English is the majority language in the United States while Spanish is a minority language with a large number of speakers with diverse heritage. *Minority language* is also often called *heritage language* and *bilingual speakers* are called *heritage speakers* (these terms will be used interchangeably in this thesis). Heritage speakers typically refer to second generation immigrants, the children of the first-generation immigrants (Benmamoun, Montrul & Polinsky, 2013). They are raised in homes where a heritage/ minority language is spoken, and they are to some degree bilingual in the heritage language and the societally-dominant/ majority language (Valdés, 2000). Usually, heritage speakers are more proficient and dominant in the majority language (Benmamoun et al., 2013) and less proficient in the minority language.

In the case of Turkish-Dutch contact, which is the topic of this thesis, Turkish is the minority/ heritage language and Dutch is the majority language. The Turkish speech community is smaller than the Dutch speech community (speakers of Dutch as their L1), and Dutch is the dominant language in the society, being the primary language for education and work.

Studying language contact can be informative with regard to how languages adapt to different socio-linguistic situations; which aspects of language are subject to influence and which aspects are not, and whether and how new varieties emerge through innovative use of language. When languages come into contact at the societal level, some changes in the patterns and frequency of use may be observed. Some knowledge of a second language at the level of the individual speaker, and a certain degree of bilingualism at the level of society is necessary for the emergence of contact-induced change, and innovative forms to emerge in the speech community (Gómez Rendón, 2008).

Thomason (2001) defines contact-induced change as “any linguistic change that would have been less likely to occur outside a particular contact-situation” (p. 62). Contact-induced changes, however, do not necessarily emerge any time different speech communities come together. Several social and linguistic factors may determine the emergence, and degree of contact-induced change. Those social factors can be the education level of the heritage speakers, prestige of the heritage language in relation to the majority language, language identity, group identity, whether social networks in the heritage speech community are densely connected or not (Michael, 2014). For example, densely connected networks tend to be more resistant to innovations compared to sparsely connected networks. Some linguistic factors that might predict contact-induced change, on the other hand, are cross-linguistic differences between the two languages and markedness of linguistic patterns in the minority language (Thomason, 2001). Marked patterns, for example, induce ease of perception and ease of production (Thomason, 2007), which in turn makes those patterns resistant to change. The level of proficiency might also play a role in whether bilingual patterns differ from the non-bilingual variety and to what extent, speakers with higher proficiency in the heritage language maintaining the patterns in the non-bilingual variety to a greater extent (Montrul, 2004). The influence of contact on language patterns of bilinguals has been studied to a great

extent. These studies have provided evidence for code-switching (Backus, 1996; Demirçay, 2017; Muysken, 2000; Thomason, 2001; Poplack & Levey, 2010) as well as lexical borrowings from the majority language to the minority language (Backus, 2005; Myers-Scotton, 2002; Poplack & Sankoff 1984). Some changes in the phonetics and phonology (Godson, 2004) as well as morphology such as decreased command of definiteness agreement (Bolonyai, 2007), case marking (Polinsky, 2006, 2008) and errors in aspectual morphology (Montrul 2002, 2009; Polinsky 2006) have also been observed.

Syntactic knowledge, particularly the knowledge of phrase structure and word order, on the other hand, appear to be more resistant to influences of language contact (Montrul, 2004, 2010; Sánchez, 2004). However, some differences between heritage speakers and monolingual varieties have been attested at the syntax-pragmatic interface such as the use of pronouns which is also a topic of this thesis. The use of overt pronouns in discourse in pro-drop languages like Spanish and Turkish is argued to be governed by this interface. That is, in such languages, overt pronouns are used for referents that are marked for focus or contrast and they are dropped if no pragmatic marking is intended. Heritage speakers of a pro-drop language and a non-pro-drop language, for example Spanish-English bilingual speakers in the United States, have been found to generalize the use of overt pronouns in heritage language Spanish to non-marked contexts, similar to the use of pronouns in English (Montrul, 2004). Use of higher frequency of overt pronouns, or overt pronouns in pragmatically unmarked contexts in pro-drop heritage languages has been attested for Hungarian (de Groot 2005), Hindi (Mahajan 2009), Tamil and Polish (Polinsky 1997), Spanish (Silva-Corvalán 1994; Montrul 2004), and Arabic (Albirini et al. 2011). Heritage speakers were dominant in the majority language in most of these cases.

This thesis aims to provide new data for language contact cases by studying contact between Dutch and Turkish, two languages that differ from each other in the

domain of discourse production and third person reference tracking. It provides data from heritage speakers who are highly educated and proficient in each language. The aim is to enhance our understanding of the role of factors such as cross-linguistic differences between the languages in a context where heritage speakers usually have high maintenance of the heritage language (Backus, 2013). It also aspires to bring a multimodal approach to the language contact literature by studying not only speech but also gesture patterns of heritage speakers who are part of two different speech communities that might be using different verbal and gestural patterns in discourse. The next section explains in more detail the goals of the thesis.

1.2. Approach and the empirical domain of the thesis

This thesis aims to provide insights into the bi-directional influence of language contact, that is the influence of each language on the other, by studying both Turkish (minority language) and Dutch (majority language) in the domain of discourse production. Studies of language contact have so far focused mainly on the influence of contact on the minority language because the minority language is usually too weakly mastered to expect an influence from the minority to the majority language. Additionally, the majority language is expected to be learned without much difficulty as it is the dominant language in the society (Daller et al., 2011; Montrul & Ionin, 2010), not leaving much room for influence from the minority language. In the case of Turkish as heritage language in the Netherlands, there is high language attainment by most of the speakers due to strong national language identity and close ties to speakers in Turkey (Backus, 2013; Extra & Yağmur, 2010). Hence, this thesis investigates possible bi-directional influence, that is the influence of each language on the other.

Furthermore, the thesis offers an in-depth study on the monolingual baselines of Turkish spoken in Turkey and Dutch spoken in the Netherlands by speakers who do not know the other language. It collects comparable data from both bilingual and non-bilingual speakers instead of “assuming” the baseline patterns. To be able to

compare data from all groups, discourse data were elicited in a controlled setting following the recent research traditions in this domain (Indefrey, Şahin & Gullberg, 2017; Montrul, 2004, 2008, 2010; van Suchtelen, 2016; Polinsky, 2006; van Osch & Sleeman, 2016).

The work presented here is innovative in adopting a multimodal approach to language production in a language contact situation for the first time, expanding the scope of language contact research to co-speech gestures. There is growing evidence that gesture and speech form a single, integrated system (McNeill, 1992; Kendon, 2004; see Özyürek, 2017 for a review). It has been repeatedly shown that gestures convey lexical, syntactic and pragmatic information that is relevant to what is encoded in speech (Alferink, 2015; Brown & Gullberg, 2008; Kendon, 2004; Kita & Özyürek, 2003; Krahmer & Swerts, 2007; Özçalışkan, 2016) and importantly, gestures may vary in rate and form across different languages (see Kita, 2009; Nicoladis, 2007 for review). Moreover, language input is multimodal (Clark & Estigarribia, 2011) and from early on, bilingual children are exposed to the gestural repertoire of the two languages they grow up speaking. Considering the tight relations between speech and gesture, studying gestures is highly relevant for a study of bilingualism (Gullberg, 2012) as they can offer new possibilities for examining how languages coexist and interact beyond what we can observe through analyses of speech alone (Brown & Gullberg, 2008; Gullberg, 2009).

The empirical domain of this thesis is reference tracking, in particular the production of 3rd person subject referring expressions in achieving coherence in discourse, and how speakers might achieve this multimodally. In order to produce coherent discourse, speakers track the novelty versus continuity of the entities they mention by choosing between richer versus reduced forms of referring expressions (Ariel, 1990; Arnold, 2010; Givón, 1976). Speakers usually introduce referents with a richer referring expression (RE), e.g., ‘a child’ and tend to maintain reference to the same entity with a reduced form, e.g., ‘she’ later in the discourse. Speakers vary

the richness of the referring expressions they use taking the accessibility of referents into account.

There are several factors that may determine the degree of accessibility of discourse referents (e.g., such as joint attention between the interlocutors, potential competitors for the same reference in the discourse context, animacy and gender, Allen, Hughes & Skarabela, 2015). Here, however, we take discourse status of referents, that is whether the referent has been mentioned in the immediately preceding discourse or not as the accessibility factor. When referents are introduced into discourse, they are new and they do not have activated and accessible representations in the memories of speakers and the addressees. Therefore, they need to be expressed with richer forms of referring expressions for a successful communication (Arnold, 2010). When referents are maintained, however, reduced forms as pronouns and in some cases null pronouns (i.e., argument drop) may be sufficient to track referents because those referents have already accessible representations. Varying the richness of referring expressions in relation to accessibility and discourse status (i.e., whether referents are (re)introduced or maintained) has been shown to be a language-general strategy across typologically different languages, both signed and spoken (Aksu-Koç & Nicolopoulou, 2015; Arnold, 2010; Contamori & Dussias, 2016; Debreslioska & Gullberg, 2019; Frederiksen & Mayberry, 2018; Hickmann & Hendriks, 1999; Hendriks, Koster & Hoeks, 2014; Perniss & Özyürek, 2015) (see Figure 1 below for a schematic representation of relations between accessibility and linguistic marking).

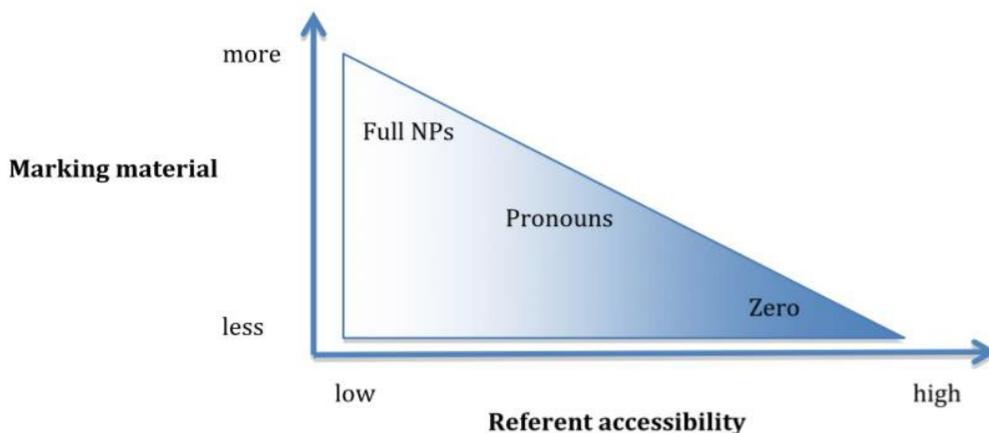


Figure 1. Schematic representation of relations between type of RE and accessibility of referents in discourse. Figure from Perniss and Özyürek (2015).

Next to language-general strategies of reference tracking, languages show cross-linguistic differences with regard to the reduced RE form they prefer. For example, they may differ in whether null pronoun is the most common form to mark reference maintenance or not (i.e., pro-drop vs. non-pro-drop) and whether the choice between the overt pronoun and the null pronoun is pragmatically motivated, as it is often the case in pro-drop languages such as Spanish and Turkish. In pro-drop Turkish, for example, referents are maintained mostly with null pronouns, as in (1b)². However, in some cases as in (1d), the subject referent can be marked pragmatically for contrast (contrast to the subject referents in 1b) and it is expressed with an overt pronoun, *o* ‘she/he’. On the other hand, in the Dutch example (2), the subject referent is mostly maintained with overt pronouns (rather than with null pronouns) regardless

² When speech examples are given, subject referents are underlined and marked with subscript letters in the English translations to clarify the co-referentiality of subjects across clauses. Dropped arguments that are glossed with \emptyset in the original example are given in parentheses in translations.

of whether it occurs in a pragmatically marked context or not (abbreviations that are used in speech examples throughout the thesis are listed in *Appendix A* at the end of the thesis).

(1)

a. *İş arkadaş -lar- im-dan bir-i tatil-de İstanbul'a git-miş.*
 colleague-PL-POSS-GEN one-ACC holiday-LOC Istanbul-DAT go-PAST.EV.3SG
 'A colleague of mine went to Istanbul on holiday.' introduced/ NP

b. *Ø şehir-in her şey-i-ni çok beğen-miş.*
 city-GEN every thing-ACC-ACC much like- PAST.EV.3SG
 '(He) liked everything of the city (all aspects of the city) very much.' maintained/
 null pronoun

c. *Fakat eş -i tatilden pek memnun kalmamış.*
 But spouse-ACC holiday-GEN much like-NEG-PAST.EV.3SG
 'But (his) spouse was not very satisfied with the holiday.' introduced/ NP

d. *O, şehri fazla yorucu bulmuş.*
 She city-ACC much tiring find- PAST.EV.3SG
 'She found the city very tiring.' maintained/ overt pronoun

(2)

a. *Het meisje met 't roze T-shirt wil een pot-je openmak-en.*
 The girl-DIM with the pink T-shirt want-PRS.3SG a jar-DIM open-INF
 'The girl with the pink T-shirt_i wants to open a jar.' re-introduced/ NP

b. *Maar die krijg-t ze niet los.*
 But that get- PRS.3SG she not loose
 'But she_i cannot get it loose.' maintained/ overt pronoun

c. *Degene die staa-t probeer-t ook.*
 The.one that stand- PRS.3SG try- PRS.3SG also
 'The one who is standing_t also tries.' re-introduced/ NP

d. *En zij_t krijg-t 't uiteindelijk los.*
 And she get- PRS.3SG the finally loose
 'And she_i finally gets it loose (opens the jar).' maintained/ overt pronoun

Reference tracking is an interesting domain to study in bilingualism in language contact because it is one of the core properties of language and we practice it many times a day whenever we refer to the events that are happening around us. Additionally, there are cross-linguistic differences in how reference tracking is achieved across languages as explained above, which makes it an intriguing topic with regard to the influence of language contact on bilingual speakers' language production. Cross-linguistic differences between Turkish as a pro-drop language and Dutch as a non-pro-drop language allow opportunities to see whether and how language contact might induce changes in both languages. This thesis takes into account the discourse status of referents (i.e., whether referents are re-introduced or maintained) and the pragmatic contexts surrounding their use (i.e., whether referents are marked for similarity, contrast or topic shift) as factors that might influence the choice of referring expressions in bilinguals, comparing them to monolingual baselines.

This thesis also studies the gesture patterns that accompany different types of referring expressions in discourse. Previous research has shown tight relations between reference tracking strategies in speech and gestures with regard to discourse status and accessibility of the referents as well as with the richness of the expression (e.g., NPs vs. pronouns) (Debreslioska & Gullberg, 2019; Gullberg, 2006; Perniss & Özyürek, 2015). One of the aims of this thesis is to see whether and how speech and gesture patterns might show language specificity as well as generality in typologically different languages, and how these patterns might change in cases of language contact (see below on the relations between gestures and speech in general, and reference tracking in discourse in particular).

To summarize, the general aim of this thesis is to investigate the types of referring expressions in discourse and their correlates in gestures. We are interested in cross-linguistic differences in monolingual baselines and the possible effects of language contact on these patterns in the bilinguals in each language. Section 3. *Main*

Research Questions of the Thesis presents the specific main and sub research questions of this thesis.

2. Background

2.1. Language contact and reference tracking expressions in speech

As mentioned above, the production of subject referring expressions in discourse by bilingual speakers of a pro-drop language (usually the minority language) in contact with a non-pro-drop language (usually the majority language) has been studied in many languages. The predominant pattern that came out of those studies is that bilingual speakers might loosen the discourse-pragmatic constraints on overt pronouns in the pro-drop language. That is, they may use overt pronouns in pragmatically ‘redundant’ contexts, for example when a referent is not marked for similarity, contrast or topic shift (Flores-Ferrán, 2004; Gürel, 2004; Keating, VanPatten, Jegerski, 2011; Montrul, 2004, Silva-Corvalan, 1994; Tsimpli, Sorace, Heycock & Filiaci, 2004). The ability to use null pronouns, on the other hand, has been suggested to stay intact, with the exception of severe cases of attrition (Polinsky, 1995).

Such findings have been interpreted as showing that overt pronouns in a pro-drop language are vulnerable to cross-linguistic influence from a non-pro-drop language in which overt pronouns are frequently used and are not pragmatically marked in comparison to null pronouns (Gürel, 2004; Montrul, 2004; Müller & Hulk, 2000; Schmitt, 2000; Tsimpli et al., 2004). It has also been suggested that the cause of the vulnerability to cross-linguistic influence of overt pronouns in pro-drop languages is the syntax-pragmatics interface (e.g., Müller & Hulk, 2000). The most tested formulation of this proposal, the Interface Hypothesis (IH) (Sorace & Filiaci, 2006; Tsimpli & Sorace, 2006), proposes that some linguistic structures, such as the production and processing of overt pronouns in pro-drop languages, require the integration and coordination of syntactic and pragmatic information in real time.

Sorace and Serratrice (2009) argue that phenomena at the syntax and pragmatic interface are problematic for bilinguals due to various factors such as cross-linguistic influence in representations of grammatical knowledge, possible less automatized syntactic processing strategies and executive control limitations in handling two languages in real time, and the input received by bilingual speakers, both in terms of quantity and quality (whether it is produced by native, non-native speakers).

As a result, interface phenomena are more vulnerable to cross-linguistic influence than structures that require only syntactic knowledge, e.g. the use of null pronouns. This vulnerability may lead to the overgeneralization of the overt pronoun as a ‘default’ unmarked form to relieve processing overload (Chamorro, Sorace & Sturt, 2016; Sorace, 2011; Sorace & Filiaci, 2006; Sorace & Serratrice, 2009).

Note that besides the nature of the linguistic phenomena, language use in terms of its frequency, proficiency, and contexts have also been found to influence whether heritage speakers maintain monolingual patterns of use or not (Albirini, 2014; Travis, Torres Cacoullos & Kidd, 2017). These findings are compatible with usage-based approaches to language which proposes that there is a link between the frequency of use of a pattern and how strong its representation is in the memory of an individual speaker, i.e., its *degree of entrenchment* (Brooks & Tomasello, 1999; Bybee, 2006). Constructions – patterns of form and meaning pairings (Tomasello, 2007) that are frequently used have strong representations in memory, thus they are strongly entrenched. Therefore, they will stay activated and accessible for the speakers (de Bot and Clyne, 1989; Green, 2003; Paradis, 2007) and can easily be retrieved for further use (Bybee, 2010; Croft, 2000; Ellis, 2016; Langacker, 1987; MacWhinney, 2012). Constructions that are weakly entrenched, on the other hand, will have less accessible representations in memory and this may make them more vulnerable to cross-linguistic influence (Backus, 2013). Speakers will have less automatized processing routines for those constructions, which will induce a higher cognitive cost during processing and production compared to constructions with high

levels of entrenchment. According to a usage-based approach, whether linguistic patterns in minority/majority languages will change or not in language contact, will be sensitive to the frequency of the patterns in each language as well as how frequently speakers are practicing their languages.

In this thesis, findings with regard to reference tracking in discourse, i.e., syntax-pragmatics interface, will be evaluated within both IH and usage-based approaches.

2.2. Co-speech gestures and their relation to speech

While speaking, speakers use not only speech but they also gesture. Gestures are meaningful bodily movements that convey communicative information related to what is expressed in speech (McNeill, 2006). They are mostly expressed by the hands and arms but facial expressions are also considered gestural. This thesis focuses on manual gestures that occur while speaking, i.e., co-speech gestures. Gestures are tightly linked to speech (Kita & Özyürek, 2003; McNeill, 1992; So, Kita & Goldin-Meadow, 2009) and they convey semantic, syntactic, discursive and pragmatic information that is relevant to what is expressed in speech (see Özyürek, 2017 for a review). Different types of gestures and theoretical models of how speech and gesture are related to each other in production are important to summarize here as these will be relevant for our multimodal approach to discourse production across languages and bilingualism in language contact.

Co-speech gestures can be grouped into four main types in terms of form and function: iconic, metaphoric, deictic (abstract and concrete) and beat gestures (McNeill, 1992). It should be noted, however, that each gesture might have more than one function.

Iconic gestures represent images of physically present or absent concrete entities and/or actions and have “a close formal relationship to the semantic content

of speech” (McNeill, 1992:12). As an example of an iconic gesture, Figure 2³ from the dataset of the thesis illustrates a bilingual speaker (left panel) speaking Turkish and tracing a square with her gesture while referring to the room in the stimulus video (right panel).

Deictic gestures in the form of pointing by finger or whole hand may refer to physically present (i.e., concrete deictic gestures) or physically non-present entities in gesture space (i.e., abstract deictic gestures). For example, in Figure 3 a monolingual speaker of Turkish in the data set is producing an abstract deictic gesture (left panel) referring to the woman who is in front of the stove in the stimulus video (right panel). Her gesture is temporally aligning with *o kadın* ‘that woman’ in her speech. Note that her pointing gesture is an “abstract” deictic gesture pointing to an entity in gesture space which is not physically present at the moment of the narration.

The third category of gestures, *beat* gestures, are simple and rapid hand movements which align with the rhythmical peaks of speech (McNeill, 1992, 2006). In Figure 4, a monolingual speaker of Dutch moves her hands rapidly left and right while saying *papiertjes* ‘little pieces of paper’. These gestures are not meaningful themselves but follow the prosodic markings of information in speech. Finally, metaphoric gestures represent abstract concepts. For example, while speaking about past events, English speakers may point in a sequence from left to right (Casasanto & Jasmin, 2012), using gesture space metaphorically to represent a time line. Such gestures did not appear in the data set used for the thesis. Most of the gestures in the discourse elicited for the thesis were abstract deictics, iconic and beat gestures. This thesis focuses on gestures that have semantic link to what is expressed in speech, that is iconic gestures and abstract deictic gestures.

Studies have repeatedly shown that there is both a temporal and a semantic relationship between speech and gesture (i.e., for gestures that convey semantic

³In the examples, the part of speech that the gesture temporally aligns with is given in bold.

information). That is, co-speech gestures temporally align with the part of speech they represent and the representation in gesture is semantically related to the meaning expressed in speech. Even though there is consensus that gestures are related to speech, the exact relation between speech and gesture with regard to the language production is still under debate.



Figure 2. Speaker tracing a square while saying *oda* ‘room’. Full clause: *Bir odadalar* ‘They are in a **room**’.



Figure 3. The speaker is locating the woman who is standing in the stimulus video in the gesture space with an abstract deictic gesture. Full clause: *O kadın arkasını dönüyor*. ‘**That woman** is turning around’.



Figure 4. The speaker moves her hands rapidly up and down while she says *papiertje* ‘paper’. Full clause: *Die jongen pakte het papiertje*. ‘That boy picked the **paper** (sheets of paper)’.

Krauss, Dushay, Chen, & Rauscher (1995) have suggested that gestures, iconic gestures in particular, are generated from spatial representations, independent from how certain information is linguistically formulated. Later, Krauss and colleagues (Krauss, Chen, & Gottesmann, 2000) also argued that the primary function of producing iconic gestures is to facilitate lexical access in speech production by functioning as a cross-modal prime for word form retrieval. The *Sketch Model* by de Ruiter (2000), on the other hand, argues that both a gesture and the speech it accompanies have a communicative function, and both originate from one and the same communicative intention (De Ruiter & Beer, 2013). He argues that after the communicative intention is planned, speech and gesture are planned as two separate but parallel processes, and the intention might be expressed partially by speech and partially by gesture. Therefore, “gestural and the verbal part of the utterance are used to express *different* types of information originating from the *same* communicative intention (De Ruiter, 2017, p. 60). Later, *Trade-off Hypothesis* (De Ruiter, Bangerter, & Dings, 2012; Van der Sluis & Krahmer, 2007) was also put forward in line with the Sketch model, and it suggests that when the load of producing communication intent gets high, which can be for a number of reasons, gestures may share the load and speakers may start gesturing more. In a revised model, Ruiter has proposed *Asymmetric Redundancy Hypothesis* (ARH, 2017), which claims that “the information expressed in an iconic gesture originates from the same communicative intention as the verbal part of an utterance does, and is shaped so as to be maximally redundant with that communicative intention” (De Ruiter, 2017, p. 65). In this model, the function of iconic gestures is to enhance the signal by providing additional, redundant visual information rather than express *different* types of information than is conveyed in speech.

In addition to influence of spatial representations and communicative intent on gesture production, the *Interface Hypothesis*⁴ by Kita and Özyürek (2003) states that gesture production is also modulated by linguistic formulation possibilities in a language, and argue that speech influences accompanying gestures. Cross-linguistic differences on gesture production, especially on iconic gestures in the domain of motion event descriptions, have so far provided strong evidence for the *Interface Hypothesis*, showing that gestures that accompany those descriptions show variation across languages in line with the variation in the linguistic encoding of motion events (e.g., Brown and Gullberg, 2008; Kita & Özyürek, 2002; Özçalışkan, 2016) (see *Cross-linguistic differences in gestures & bilingual gestures* in this chapter for details of such research).

Apart from above-mentioned psycholinguistics accounts of speech and gesture relations, some scholars have argued that frequent and recurrent speech and gesture pairings at different levels of semantic and syntactic encodings form “multimodal constructions”. These constructions are symbolic units that comprise multiple channels of conceptualization and expression (e.g., Langacker, 2008; Zima, 2014; Kok and Cienki, 2016). This argument postulates the existence of language-specific lexical and syntactic multimodal constructions as entrenched symbolic units, which is in line with a usage-based approach to language. At the same time, it is also in line with *Interface Hypothesis* (Kita & Özyürek, 2003) as well as previously found crosslinguistic differences in speech and gesture units.

To sum up, most of these theories have assumed that speech and gesture are produced with similar communicative intent and that gestures are shaped with linguistic encoding in speech- based on recurrent differences between variation in

⁴Note that the theory with regard to discourse-pragmatic interface and the use of pronouns in speech (Sorace & Filiaci, 2006) is also called Interface Hypothesis. *Interface Hypothesis* for speech-gesture relations (Kita & Özyürek, 2003) is written in italics throughout the thesis, while the theory with regard to the use of pronouns is non-italic and it is referred to as IH after its first mention in each chapter.

crosslinguistic patterns and gestures. Note that this thesis does not aim to test any of the specific approaches outlined above. However, it takes assumptions that speech and gesture are produced with similar communicative intent and that language-specific ways of encoding information influence patterns of gestures as starting points to investigate further how language contact might influence language-specificity of speech and gesture.

2.3. Relations between speech and gesture in reference tracking in discourse
Studies that have investigated the use of abstract deictic gestures in reference tracking in discourse have shown that reference tracking is a multimodal phenomenon (Azar & Özyürek, 2015; Gullberg, 2006; Levy & McNeill, 1992; So, Kita, Goldin-Meadow, 2009; Perniss & Özyürek, 2015; Yoshioka, 2008). Speakers vary the presence or absence of their gestures in locating referents in gestures space accompanying referring expressions, also taking into account the discourse status of referents as well as the type of referring expression. Speakers are more likely to gesture with (re)introduced referents (low accessibility) than with maintained referents (high accessibility). At the same time, the presence or absence of gestures is also sensitive to the type of referring expressions used. Speakers tend to use gestures more often to accompany richer expressions, such as noun phrases, than reduced expressions such as pronouns.

Previous studies on multimodal reference tracking have mostly looked at non-pro-drop languages. The relation between different types of referring expressions in speech and the gestures accompanying them in the discourse of pro-drop languages like Turkish is not known- a gap this thesis aims to fill.

2.4. Cross-linguistic differences in gestures & bilingual gestures

As mentioned previously, cross-linguistic comparisons of iconic gestures have found cross-linguistic variation, mostly in description of motion events. Spoken languages show variation in whether manner and path components of an event are conflated into a single clause or not (Talmy, 1985, 2000). For example, speakers of English

tend to conflate manner and path components of an event into a single clause (e.g., ‘The boy ran into the house’), while speakers of Turkish tend to encode path information in the verb in the main clause and optionally express manner outside the verb in another subordinate clause e.g., *Oğlan (koşarak) eve girdi* ‘The boy (by running) entered the house’ (Kita & Özyürek, 2002; Özçalışkan, 2016). These cross-linguistic differences reflect on gesture patterns as well; while English speakers conflate manner and path components into a single gesture (e.g., moving fingers in rapid movements while moving them forward as if running), speakers of Turkish produce separate gestures for manner (‘ran’) and path (‘entered’) (Kita & Özyürek, 2003; Özçalışkan, 2016; Özçalışkan & Slobin, 1999). These findings are also in line with multimodal constructions approach. Expressions that encode manner and path would exist as separate symbolic units such as verbs co-occurring with corresponding manner and path gestures in Turkish. In English, however, both the manner and the path particle would constitute a symbolic construction unit together with one conflated manner and path gesture (Zima, 2014).

The differences found in iconic gestures across languages have led to research investigating such gestures in bilingualism. The majority of studies focused on motion event descriptions of speakers whose L1 and L2 show crosslinguistic variation in this domain (Alferink, 2015; Brown & Gullberg, 2008; Özçalışkan, 2016). Some of these studies showed that L2 learners’ co-speech gestures continued to show L1 patterns when speaking L2 (Choi & Lantolf, 2008; Stam, 2006), even if the speech was target-like in the L2 (Özçalışkan, 2016). For example, L2 speakers of English with L1 Turkish showed cross-linguistic differences between the two languages in their descriptions in speech. Their gestures, however, did not reflect the cross-linguistic differences found between monolingual Turkish and English speakers. That is, they produced more separated gestures both in Turkish and English, maintaining Turkish gesture patterns while speaking L2 English.

In addition to differences found in the type of representations in iconic gestures, previous studies also point to differences in the *frequency/rate* of gestures across languages. For example, Italian culture has been suggested to be a high gesture culture (Efron, 1941; Kendon, 1992) while (British) English has been described as low gesture culture (Graham and Argyle, 1975). Gesture rate has also been examined in bilingual production, and some studies provided evidence for transfer of gesture rate from a high-gesture language to a lower gesture language (So, 2010), while others did not find evidence for transfer (Cavicchio & Kita, 2013; see Chapter 4 in this thesis for a more detailed review of the literature on L2 gestures).

Some previous studies of bilingual gesture rate have focused on the relations between the rate of gestures and language proficiency, rather than focusing on the transfer of gesture rate. They have investigated whether bilinguals used more gestures in their weaker language (L2) than in their stronger first language (L1), perhaps as a learner's strategy (e.g., Gullberg, 1998, 2006; Pika, Nicoladis & Marentette, 2007; Sherman & Nicoladis, 2004; Yoshioka, 2008). Those studies have found that bilinguals use abstract deictic gestures indeed more often with their L2 than with their L1 (e.g., Gullberg, 1998; Marcos, 1979; Sherman & Nicoladis, 2004). As for iconic gestures, some studies found no difference across L1 and L2 with regard to gesture rate (Sherman & Nicoladis, 2004) while some found more iconic gestures in the L1 (Gullberg, 1998). In the light of these findings, it has been suggested that iconic and abstract deictic gestures might be related to speech in different ways (Gullberg, 2013; Nicoladis et al., 1999; Sherman & Nicoladis, 2004). Deictic gestures have been suggested to co-occur with grammatical or discourse organizational difficulties. Gullberg (1998), for example, suggests that speakers may use deictic gestures when they have problems with expressing tense marking, and using deictic gestures to help indicate the sequence of events by mapping them out spatially (Gullberg, 1998).

As for reference tracking gestures in bilingualism, studies with L2 learners suggest that when L2 speech is over-explicit, so are L2 gestures. That is, when L2 speakers use semantically richer forms, such as NPs, for maintained referents (for which L1 speakers would prefer reduced forms such as pronouns), they are also likely to accompany those referents with gestures (Gullberg, 2006). This suggests that patterns in speech and gesture go hand-in-hand in the domain of reference tracking in L2 contexts as well.

To summarize, most studies of bilingual gestures have investigated L2 speakers where some learning strategies or imbalance in L1 and L2 proficiency had an influence on the L2 patterns of use. Whether and how gestures change in language contact situations where bilinguals have high proficiency in each language and use them regularly, as well as how changes in gestures relate to changes in speech patterns are not known.

3. Main Research Questions of The Thesis

The main aim of this thesis is to investigate how language contact influences multimodal discourse strategies in general and more specifically reference tracking strategies of Turkish-Dutch bilinguals in the Netherlands. Given the literature we reviewed and what is known and not known already about reference tracking in both speech and gesture, across typologically different languages and in bilingual contexts, this study asks the following questions:

1. Given the typological differences between Turkish and Dutch in reference tracking strategies in speech (pro-drop versus non-pro-drop), do second-generation Turkish heritage speakers in the Netherlands follow language-specific reference tracking strategies in speech, or do they show contact-induced change? Are there bidirectional influences between the two languages? How do bilingual patterns compare to monolingual varieties in each country? (Chapter 2)

2. How do multimodal reference tracking strategies look in a pro-drop language like Turkish? Do monolingual Turkish speakers use gestures in similar or different ways found for non-pro-drop languages? (Chapters 3)

3. How does language contact influence patterns of multimodal reference tracking?

To answer this question, we first ask:

3.a. Are there are language contact-induced changes in gesture rate in general (Chapter 4)?

Given that Turkish is a Mediterranean language, we expect gesture rate to be higher in Turkish than in Dutch as Mediterranean languages are usually higher gesture languages (Kendon, 1992). If language contact influences the overall frequency of gestures, this will be informative while interpreting findings with regard to bilingual gestures that accompany referring expressions.

Next, we ask:

3.b. What happens to gestures that are produced during reference tracking in language contact situations? Do they follow the contact induced patterns in speech? (Chapter 5)

Given the questions we ask and the literature we previously reviewed, we have the following predictions for each question:

As for question 1, according to IH (Sorace & Filiaci, 2006; Tsimpli & Sorace, 2006) we would expect bilinguals in Turkish to generalize overt pronouns to pragmatically unmarked contexts in Turkish and use ‘redundant’ overt pronouns in contexts that do not signal similarity, contrast or topic shift as this is a syntax-pragmatics interface phenomenon. Following a usage-based approach, however, we would not expect differences in bilingual use of overt and null pronouns compared to the monolingual baselines with regard to either their proportional distribution or their use in pragmatic contexts, considering that the bilingual speakers in this study are proficient in both Turkish and Dutch.

As for question 2 with regard to analysis multimodal reference tracking strategies of monolingual speakers of Turkish, we expect them to be sensitive to discourse status of referents and use richer expressions such as NPs with less accessible referents, and reduced expressions with more accessible referents, e.g., null pronouns. With regard to pronouns, we expect speakers of Turkish to use overt pronouns mainly in pragmatically marked contexts, in line with previous research on pro-drop languages. Whether overt pronouns are used also as accessibility markers in Turkish is hard to predict as previous research has not addressed this question in a pro-drop language. We might expect, however, that the relation between accessibility and overt pronouns in Turkish is different from in non-pro-drop languages like Dutch in which pronouns are high accessibility markers. This is because null pronouns are high accessibility markers in Turkish, and pronouns are so far have been suggested to have a pragmatic function but not necessarily to function as accessibility markers.

As for gestures, we expect speakers of Turkish to use more gesture with less accessible referents, i.e., re-introduced referents and fewer gestures with more accessible referents, i.e., maintained referents, in line with previous research on multimodal reference tracking. We also expect more gestures with richer referring expressions like NPs and fewer gestures with reduced expressions like overt pronouns.

Next to these predictions that follow language-general multimodal strategies of reference tracking, speakers of Turkish might also differ from speakers of non-pro-drop languages in their use of gestures given that the function of overt pronouns in Turkish is likely to be different from that in non-pro-drop languages. If overt pronouns and NPs do not have such strong division in terms of their functions as accessibility markers in Turkish and if pronouns are not used as high accessibility markers, it might be the case that their likelihood of being accompanied by gestures might be different from what has been found for non-pro drop languages. That is,

Turkish speakers might not differ in how likely they are to gesture with pronouns versus NPs. We might also expect to see higher gestures with pronouns in Turkish than we would expect in non-pro-drop languages.

As for question 3.a. which asks whether there are language contact-induced changes in gesture rate in general, we first expect to find Turkish to be a higher gesture than Dutch for monolingual baselines as Mediterranean cultures are usually found to relatively higher gesture cultures (Barzini, 1964; Cavicchio & Kita, 2013; Kendon, 1992; Schefflen, 1972). As for bilinguals, we might expect bilingual speakers to reduce their gesture rate in their higher gesture language, Turkish, as an adaptation to lower gesture rate of the majority language, Dutch due to everyday contact with Dutch speakers. An alternative prediction would be that gesture rate does not differ between monolinguals and bilinguals considering that the speakers in this study have been frequently exposed to each language from very early on in their lives. This would suggest that gesture rate patterns are entrenched and therefore maintained – in line with the usage-based approaches to language production (Brooks & Tomasello, 1999; Bybee, 2006) as well as with multimodal construction grammar approaches (Cienki, 2017; Steen & Turner, 2013; Zima, 2014). Alternatively, if being bilingual poses some general constraints and high cognitive load (Broersma, Carter & Acheson, 2016; Grosjean, 2000; Sorace & Serratrice, 2009), then bilinguals might gesture more than the monolingual baselines in both Turkish and Dutch.

As for question 3.b. which is related to reference tracking gestures in language contact, we would not expect contact-induced changes in gestures that accompany subject referring expressions in discourse if we do not find major differences in speech patterns in bilinguals as speech and gesture patterns in discourse production has been found to go hand-in-hand (Debreslioska et al., 2013; Gullberg, 2006; Levy & Fowler, 2000; Levy & McNeill, 1992; Perniss & Özyürek,

2015). This prediction is also in line with *Interface Hypothesis* (Kita & Özyürek, 2002) which suggests that speech and gesture production are tightly linked.

Given these questions and our predictions, this thesis first of all aims to provide insights into cross-linguistic differences in reference tracking between pro-drop Turkish and non-pro-drop Dutch, using comparable data from a corpus. Second, it asks whether language-specific differences are maintained in language contact when bilinguals are proficient in both languages. Third, it contributes to the knowledge about multimodal reference tracking strategies in typologically different languages to see whether gestures also show variation with typological differences in the domain of reference tracking. Finally, it aims to provide knowledge about gesture patterns in a language contact context for the first time; therefore, expanding the scope of language contact research to gestures with the aim of answering whether language contact influences speech and gesture patterns in similar ways.

Before individual chapters in this thesis are described, heritage speakers of Turkish in the Netherlands and previous research on their language production are introduced, and afterwards the methodology of data collection and data coding for the multimodal corpus are presented.

4. Heritage Speakers of Turkish in the Netherlands

The start of the Turkish community in the Netherlands dates back to labor immigration during the 1960s and early 1970s and family reunifications that started soon after (see Backus, 2013 for a review). According to CBS (the Central Bureau of Statistics of the Netherlands), there are 409.877 residents with a Turkish background in the Netherlands, 193.698 of which are first generation and 216.179 are second-generation immigrants (in January 2019). Out of all the second-generation immigrants, 162.136 of them have both parents born outside of the Netherlands, and this is the population that is studied in this thesis. According to the

data on Ethnologue⁵, Turkish is the most widely spoken immigrant language in the Netherlands (391,000), followed by Moroccan Spoken Arabic (340,000) and Indonesian (134,000) (June, 2019).

The Turkish community in the Netherlands exhibits high attainment of Turkish and most second-generation speakers of Turkish continue to use Turkish in various domains next to the majority language (e.g., Extra & Yağmur, 2010). Some factors that contribute to this high degree of maintenance are the high percentage of marriages that involves spouses

Turkey (Backus, 2005), easy access to Turkish media and TV series, and summer-long holidays in Turkey (Backus, 2012). Additionally, maintenance of Turkish is often considered important and a ‘core value’ for Turkish identity (Extra & Yağmur, 2010: 131) which is also likely to motivate high language maintenance. As for the Dutch of the bilingual speakers, while the first generation includes many people whose Dutch is that of a learner variety, ranging from beginning level to advanced, the second generation participates in education in Dutch (as of 4 years old) and uses Dutch very often at work and in their social life, many reporting Dutch to be their dominant language (Extra, Yağmur & Van der Avoird, 2004).

Early empirical studies on Turkish-Dutch contact investigated mostly Turkish only and focused on the language acquisition of pre-school and primary-school children (Aarssen, 1996; Backus & Van der Heijden, 2002; Boeschoten & Verhoeven, 1987; Schaufeli, 1991). A common finding of those studies was that Turkish developed more or less the same as monolingually raised peers until around age 4. However, from age 4 onwards, children start receiving more input in Dutch and Dutch become their dominant language approximately around age eight (Backus, 2011). Recent work on proficiency in Turkish tends to focus on vocabulary development. Bilingual Turkish-Dutch children have been found to have a smaller vocabulary in Turkish than monolingual controls (Backus & Yağmur, 2017). This

⁵ Retrieved from <https://www.ethnologue.com/country/NL> in June 2019

has also been found for their Dutch (Elma, Küntay, Messer, Verhagen & Leseman, 2014).

Studies of adult heritage speakers usually do not investigate their proficiency in Dutch or Turkish, focusing instead on language use, especially general communicative strategies such as code-switching, i.e., the use of words originating in two different language systems side-by-side, and lexical and grammatical borrowings from Dutch. Those studies have revealed influence from L2 Dutch on L1 Turkish, e.g., lexical influence in the form of loanwords and loan translations (Backus & Dorleijn, 2009; Demirçay, 2017; Şahin, 2015). Only a limited degree of contact-induced change - which has often been operationalized as differences between the speech of bilinguals and that of a monolingual baseline- has been found for Turkish in the lexical domain. These differences appeared in the form of translation of L2 forms into Turkish (Doğruöz & Backus 2009), in word order, relative clauses and subordination (Doğruöz & Backus 2007, 2009; Onar Valk, 2015; Schaufeli 1996) and case morphemes (Doğruöz & Backus, 2009). With respect to the use of overt versus null pronouns, only very few instances of use of overt subject pronouns in pragmatically 'redundant' contexts were found in immigrant Turkish in conversational data (Doğruöz & Backus 2009), while interpretation of overt pronouns was not found to differ from monolingual controls (Gürel & Yılmaz, 2011). Studies which examined the Dutch of Turkish-Dutch second generation bilinguals, on the other hand, are limited to prosody (van Rijswijk, Muntendam & Dijkstra, 2017) and the semantic domain of expression of spatial relations such as 'in', 'on' and 'under' (Indefrey, Şahin & Gullberg, 2017). Studying second-generation Turkish heritage speakers in the Netherlands, Van Rijswijk, Muntendam & Dijkstra (2017) found differences between the Dutch of heritage speakers and that of monolingual speakers in the use of prosody for marking focus. The authors attributed this to the influence of Turkish. However, they did not provide data from the heritage speakers' Turkish or from a Turkish baseline. Indefrey, Şahin and

Gullberg (2017), on the other hand, found enhanced semantic congruence between translation-equivalent Turkish and Dutch topological relation markers (e.g., in, on, under) in bilingual participants, which suggests that the Turkish markers are becoming more similar to their Dutch translation equivalents.

Reference tracking strategies of adult heritage speakers in the Netherlands has not been studied before, with the exception of the work by Dođruöz and Backus (2009). Dođruöz and Backus collected informal interviews from second-generation heritage speakers and examined, among other things, the use of overt and null pronouns in Turkish only, comparing various constructions in the bilingual data to a monolingual baseline collected in Turkey. They did not find a higher frequency of overt subject pronouns in bilingual Turkish data, although there were a few cases of overt pronouns that were used in contexts in which monolinguals would not use one. Most pronouns in their data were first person, which is logical given that the method of data collection was recording and analyzing informal conversations. All in all, reference tracking strategies in Turkish in contact with Dutch are in need of thorough and systematic study with regard to the proportional distributions of referring expressions and the pragmatic and discourse contexts in which they are used. One of the aims of this thesis is to fill this gap.

This work contributes to the existing knowledge about Turkish as a heritage language by adding findings on a new empirical domain, i.e., multimodal reference tracking, and to existing knowledge about characteristics of the same domain in the majority language Dutch as spoken by bilinguals. Studying possible changes in both directions will allow us to draw a more complete picture of language change.

5. Method

All the chapters in this thesis are based on the same multimodal corpus, although each chapter investigates different research questions and focuses on different parts

of the data set. Even though each chapter has its own methodology section as they are stand-alone journal articles, here we provide a short overview as well.

5.1. Participants

In total, 20 second-generation heritage speakers contributed to the multimodal corpus that was constructed for this thesis, of which 14 were female and 6 were male. The mean age of the participants was 23.3, ranging from 19 to 29 years. All heritage speakers were born and raised in the Netherlands by first generation parents, who themselves emigrated to the Netherlands from Turkey. The mean age of immigration to the Netherlands for the parents was 15.9 years ($SD = 5.12$) for the mothers and 19.0 years ($SD = 7.24$) for the fathers. At the time of childbirth of the participants in this study, the mothers on average had already lived in the Netherlands for 9.2 years ($SD = 6.66$) and fathers for 11.15 years ($SD = 7.46$).

Bilingual participants acquired the heritage language Turkish as their first language (L1) at home during early years and Dutch as their second language (L2) in school starting from age 4. In Dutch society, Turkish is a minority language and it is mostly used in interactions with family and friends with a Turkish background.

Dutch is the majority language and it is the language of most other contexts, including school and work. While heritage speakers who have been studied in the literature so far are often more fluent in the dominant language of their society (Montrul & Polinsky, 2011; Valdés, 2001; Polinsky & Kagan, 2007), the participants in this study seem to have high attainment in both languages and speak each language often, which makes it hard to say that they are dominant in one language or the other.

As it can be seen in *Appendix C* at the end of this thesis, bilinguals' self-rated frequencies of overall Turkish and Dutch usage were not much different from each other, while participants reported to write and read mostly in Dutch. On the other hand, they reported to watch Turkish TV often. They also reported to mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among friends and siblings. However, participants did rate their overall

proficiency as higher in Dutch than in Turkish. All participants reported Dutch to be the language they speak best. Furthermore, they reported to visit Turkey regularly, and except for three participants, all participants reported to have contact with their family and friends in Turkey either via mobile calls or online chats at least once a week.

Additionally, in the data sessions, bilingual speakers were not faster or slower than their monolingual counterparts in either Turkish or Dutch. Oral fluency was measured as the number of syllables per articulation time (i.e., articulation rate, cf. De Jong & Wempe, 2009), based on 10-second samples deducted from the elicited narratives for each participant. Finally, the findings that will be presented in this thesis do not reveal significant differences between bilingual speakers and the baselines.

5.2. Data collection

The data collection sessions started with a warm-up task which asked participants, both speakers and addressees, to discuss possible tips for prospective students of their home university or the city in which they study. Later, speakers watched three short video clips and read two short texts about social dilemmas one by one, narrating what they had watched or read to the addressee. Finally, speakers talked about a book they had read or a movie they had seen, and the addressees about a trip they had taken or a party they had attended. The addressees were not confederates, and there was a different addressee in each session. Bilingual speakers repeated the task once in Turkish with a Turkish monolingual addressee and once in Dutch with a Dutch monolingual addressee, with at least a two-week interval between the two data collection sessions.

Each bilingual participant filled in a detailed socio-linguistic background questionnaire including questions about their language history, language use as well as the demographics of their care-givers. The questionnaire was inspired by parts of existing questionnaires (Flecken, 2011; Gullberg & Indefrey, 2003; Lim et al., 2008)

but fully adapted and extended to the situation of heritage speakers and took into consideration the use of social media as well. It was administered in Turkish, at the end of the Turkish session for each participant. The Turkish version of the bilingual questionnaire and the English translated version can be found in *Appendix B*, while *Appendix C* summarizes the information from this questionnaire. Both appendices can be found at the end of the thesis. The questionnaire for monolingual speakers was much shorter than the one that bilingual speakers filled out, asking mainly their language history and whether they had resided in any foreign country for longer than six months. None of the addressee participants had spent more than six months abroad, including the Netherlands for the Turkish speaking addressees.

All data collected during this project were archived within The Language Archive hosted by the Max Planck Institute for Psycholinguistics, Nijmegen under the name *Multimodal Bilingualism*⁶.

Given inevitable time limitations, only the data from two video stimuli were analyzed for this thesis. Each video featured three human characters. In one video, three women are engaged in cooking activities, i.e., kitchen video (01:10 minutes) (Perniss & Özyürek, 2015) and in the other two women and a man are engaged in office activities, i.e., office video (01:45 minutes). The videos feature three characters (as opposed to one or two characters as is the case in many gesture studies) to ensure participants had to switch between references to different characters several times when narrating the events in the videos. This in turn ensured that speakers had enough opportunities to use all three kinds of REs under investigation (i.e. NP, pronoun and null form). In addition, the characters in the videos perform both individual actions (i.e., slicing, stirring, etc.) and collective actions (e.g., giving, taking, etc.) and the actions they are involved in change during the videos to stimulate gesture elicitation. Figure 5 illustrates stills depicting different segments

⁶ The corpus can be accessed on https://archive.mpi.nl/islandora/object/lat:1839_00_961F345B_3F3F_48DD_B941_A7BB51FBD790?asOfDateTime=2018-03-02T11:00:00.000Z

from each video and *Appendix D* at the end of the thesis provides a detailed list of the events that take place in the videos.

5.3. Data coding

Video and audio annotation tool ELAN was used for data transcription and annotation of both speech and co-speech gestures (see Lausberg & Sloetjes, 2009 for more information). Figure 6 is a screen shot of an ELAN window.

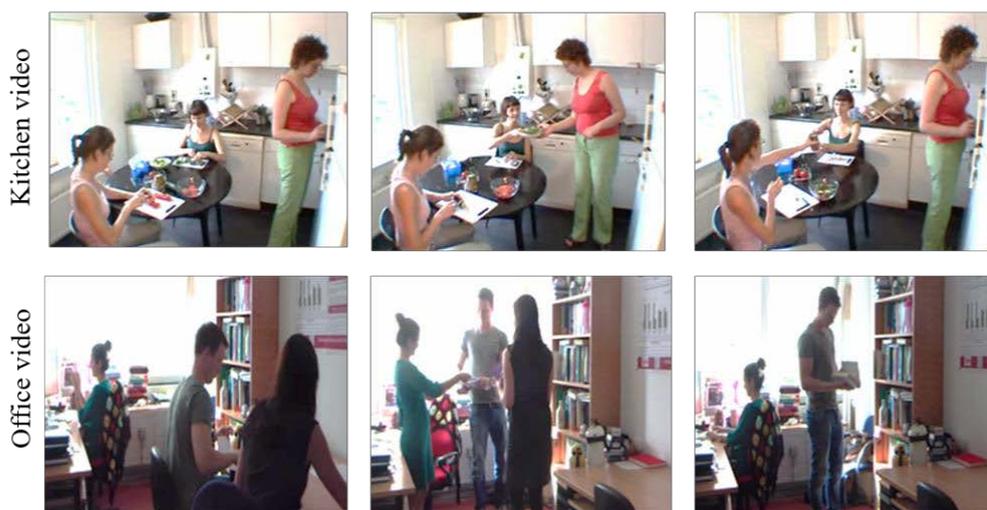


Figure 5. Stills from the stimulus videos that were used for narrative elicitation; kitchen scene on top and office video at the bottom.

5.3.1. Speech coding

Native speakers of each language transcribed the data. Narratives were first divided into clauses, units with a single subject argument and a single predicate (Berman & Slobin, 1994). Coordinated clauses were coded as separate clauses (e.g., *the woman who was helping the man stood up and she walked to the bookshelf* was coded as two clauses). Relative clauses that modified nouns (e.g., *the woman who was helping the man*) were treated as the modifier of the noun (in this case *who was helping the man* was not coded as a separate clause). This was to make sure that the coding scheme was comparable across Turkish and Dutch (relative clauses are finite in Dutch but non-finite in Turkish). Only the clauses with animate subjects were coded to control

for animacy as a possible factor that might affect the choice of referring expressions (Vogels et al., 2014), and commentary about the characters (e.g., “I think she is the mother”) was omitted from the analyses so that we could compare our results to previous studies of reference tracking in extended discourse which followed a similar coding scheme (e.g., Debreslioska, Özyürek, Gullberg, & Perniss, 2013).

As the next step, each subject referent was coded for *discourse status* and *referring expression type*. While coding for *discourse status* (re-introduced; maintained), subject-to-subject coreference was taken into account, following Hickmann and Hendricks (1999). A re-introduced subject referent is mentioned in the previous discourse but not in the immediately preceding clause. A maintained subject referent, on the other hand, is the same referent as the subject of the immediately preceding clause. A referent is maintained only if the exact same referent was mentioned as the subject argument in the previous clause. That is, changes from plural to singular (e.g., from ‘three women’ to ‘one of the women’ in the next clause) or vice versa were coded as re-introduced (cf. Debreslioska et al., 2013).

As for *referring expression type*, each subject referent was coded for one of the following referring expression (RE) types: noun phrase, overt pronoun (personal pronoun, demonstrative pronoun, indefinite pronoun) and null pronoun (omitted subject referents). Further details of coding for *referring expression type* in Turkish and in Dutch can be found in Chapter 2.

5.3.2. Gesture coding

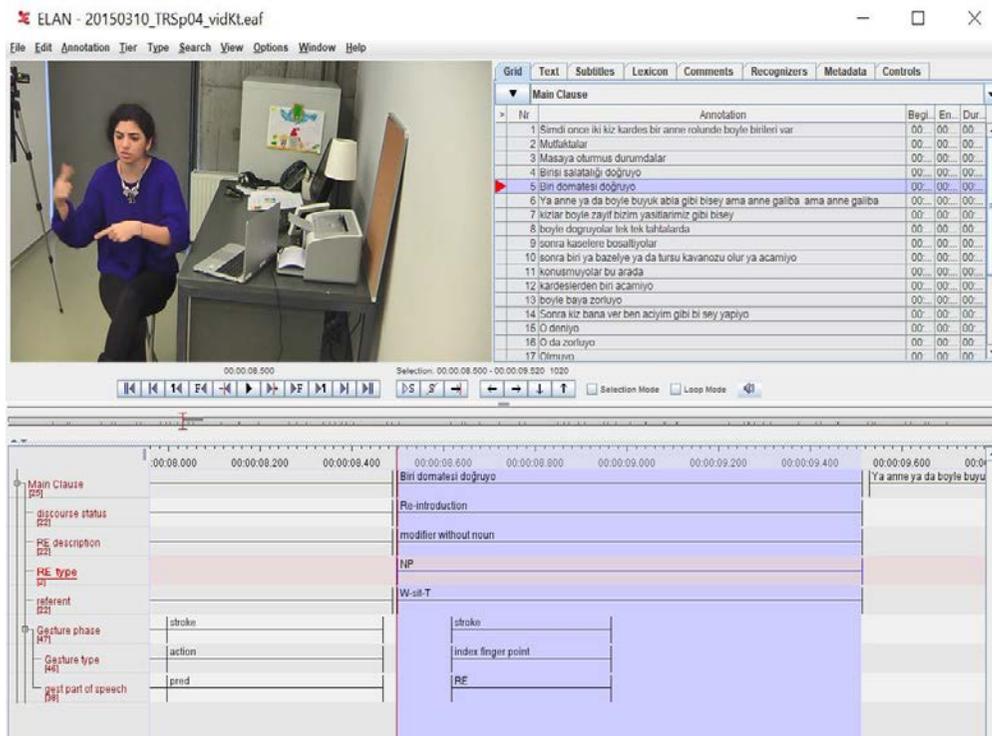


Figure 6. Screen shot of ELAN window during the coding of a monolingual Turkish session.

Gesture strokes that co-occurred with any part of the speech clauses were identified. Stroke is the meaningful part of the gestural movement (Kendon, 2004; McNeill, 1992) as the expressive segments of the stream of manual production (Kita, van der Hulst & van Gijn, 1998). We categorized strokes into iconic, deictic and non-representational gestures (gestures that do not depict information about their referent such as beat gestures). However, we analyze only iconic (see Figure 2) and deictic gestures (see Figure 3) because these two types of gestures show up most frequently in adult discourse production (McNeill, 1992) and they are more likely to be transferred by bilingual speakers (So, 2010).

Following previous studies of multimodal reference tracking (Gullberg, 2006; Yoshioka, 2008; Perniss & Özyürek, 2015), the presence or absence of a gesture that accompanied each subject referring expression in speech was coded in a categorical manner. Each gesture had a single value with regard to discourse status (re-introduced or maintained) and the accompanying RE type (NP or overt pronoun). We only analyzed the deictic gestures that accompanied subject referring expressions, anchoring subject referents in gesture space by means of an index-finger pointing or a whole-hand extended gestures (see Figure 7) because when gestures locate referents in space this way, a link is expressed between the location of those gestures in gesture space and the location of the characters in the stimulus videos (Perniss & Özyürek, 2015).

Both iconic and deictic types of gestures were included in the analysis of gesture rate (Chapter 4), although only deictic gestures were included in the analysis of gestures that accompany subject referring expressions (Chapter 5).



Figure 7. A bilingual speaker is producing (in Dutch) a whole-hand gesture (left panel) referring to the woman who is working behind the computer in the stimulus video (right panel). Her gesture is temporally aligning with the subject referent, *die dame achter de pc* ‘the woman.

6. Thesis Outline

This thesis contains four empirical chapters which are based on papers that have been published in academic journals (Chapter 2, Chapter, and Chapter 4), or in CogSci proceedings (Chapter 5). Although all studies are related to either reference tracking (Chapter 2, 3 and 5) or bilingual gestures (Chapter 4), each chapter can be viewed as a self-contained paper, with its own abstract, introduction, discussion, and reference list although there is some overlap in the literature that is reviewed across chapters. The specific research questions that are addressed and the subset of data that are analyzed in each chapter are summarized below.

Chapter 2 investigates whether bilingual speakers of Turkish and Dutch use language-specific ways of reference tracking in Turkish and Dutch in speech, or whether they show contact-induced change, including possible cross-linguistic (bidirectional) influences between the two languages. It takes into account both the discourse status of referents and the pragmatic contexts in which referring expressions are used. It analyzes the use of 3rd person subject referring expressions (i.e., NPs, overt and null pronouns) in speech only, comparing bilingual patterns to a monolingual baseline in each language.

Chapter 3 investigates whether monolingual speakers of Turkish, a pro-drop language, use language-general and/ or language-specific strategies of using referring expressions in speech and gestures accompanying these expressions. The aim of the chapter is to understand the relations between the discourse status of subject referents (i.e., whether subject referents are re-introduced or maintained), type of referring expressions (i.e., NPs, overt and null pronouns) and the use of gestures to refer to the same entities. It asks whether the presence or absence of gestures is sensitive to the richness of the spoken referring expressions (i.e., NPs vs. overt pronouns), the discourse status of referents and the pragmatic contexts (whether referents are marked or not for information such as similarity, contrast and topic shift). A whole chapter is devoted to Turkish baseline patterns because

previous studies of multimodal reference tracking have mostly focused on non-prop-drop languages such as English and German, and not much is known about pro-drop languages such as Turkish. This chapter provides a first extensive picture of multimodal reference tracking in adult Turkish as a monolingual baseline.

Chapter 4 aims to provide an overall picture of gesture rate patterns in Turkish and Dutch, as spoken by both bilingual speakers and the monolingual baseline groups before focusing on particular patterns of reference tracking in Chapter 5 as the presence/ absence of differences in the overall frequency of gestures by monolingual and bilingual speakers will be informative while interpreting findings with regard to bilingual gestures that accompany referring expressions. This chapter asks whether gesture rate (i.e., how many gestures on average speakers produce per clause) in general is influenced when languages with different gesture rate are in contact with each other, e.g., the relatively high gesture culture Turkish and the relatively low gesture culture, Dutch. Focusing on both the use of iconic and abstract deictic gestures, it entertains several hypotheses such as whether gestures of the minority language adapt to that of the majority language due to frequent interaction and exposure, or whether a high level of maintenance of the conventions of each language is attested, and finally whether some cognitive factors such as being bilingual can explain gesture use in language contact situations.

Chapter 5 zooms in on gestures accompanying referring expressions and investigates whether multimodal reference tracking strategies are influenced by language contact comparing bilinguals in Dutch and Turkish. It asks whether i) there are cross-linguistic differences in multimodal reference tracking strategies between Turkish and Dutch (adding analyses of Dutch multimodal data to what is found for Turkish in Chapter 3) and ii) language contact influences the multimodal reference tracking strategies of bilinguals (adding gesture analyses to what is found for bilingual speech for Dutch and Turkish in Chapter 2).

Finally, **Chapter 6** summarizes and discusses the findings and their theoretical implications for i) bilingualism and the influence of language contact on language production, ii) multimodal reference tracking in discourse and iii) the relations between speech and gesture production.

Chapter 2

Turkish Dutch Bilinguals Maintain Language-Specific Reference Tracking Strategies in Elicited Narratives

This chapter is based on

Azar, Z., Özyürek, A., & Backus, A. (published online 5 April 2019). Turkish-Dutch bilinguals maintain language-specific reference tracking strategies in elicited narratives. *International Journal of Bilingualism*, <https://doi.org/10.1177/1367006919838375>. Open access

and

Azar, Z., Backus, A., & Özyürek, A. (2017). Highly proficient bilinguals maintain language-specific pragmatic constraints on pronouns: Evidence from speech and gesture. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. Davelaar (Eds.), *Proceedings of the 39th Annual Conference of the Cognitive Science Society (CogSci 2017)* (pp. 81-86). Austin, TX: Cognitive Science Society.

Turkish Dutch Bilinguals Maintain Language-Specific Reference Tracking Strategies in Elicited Narratives

This chapter examines whether second-generation Turkish heritage speakers in the Netherlands follow language-specific patterns of reference tracking in Turkish and Dutch, focusing on discourse status and pragmatic contexts as factors that may modulate the choice of referring expressions (REs), i.e., noun phrase (NP), overt pronoun and null pronoun. We found that the heritage speakers used overt versus null pronouns in Turkish and stressed versus reduced pronouns in Dutch in pragmatically appropriate contexts. Therefore, unlike several studies of pronouns in language contact, we did not find differences across monolingual and bilingual speakers with regard to pragmatic constraints on overt pronouns in the minority pro-drop language. There was, however, slight increase in the proportions of overt pronouns as opposed to NPs in Turkish and as opposed to null pronouns in Dutch. We offer an explanation based on the degree of entrenchment of differential RE types in relation to discourse status as the possible source of the increase.

1. Introduction

Throughout discourse, speakers track the novelty versus continuity of the entities they mention by choosing between richer versus reduced forms of referring expressions (Ariel, 1990; Givón, 1984). For example, they may introduce a referent with a rich referring expression (RE), e.g., ‘a young woman’ but maintain that same referent with a reduced form, e.g., ‘she’ in the next clause. When referents are new in discourse, they are not highly accessible and therefore need to be expressed with richer REs such as noun phrase (NP). When referents are maintained across consecutive clauses, however, referents have highly accessible representations and reduced forms such as pronouns and in some cases null pronouns (i.e., argument drop) are informative enough for successful reference tracking (Ariel, 1990; Givón, 1984). This systematic relation between the *discourse status* of referents (i.e., whether a referent is (re)introduced or maintained) and the richness of the REs that are used for those referents has been found for several spoken as well as signed languages (Arnold, 1998; Frederiksen & Mayberry, 2018; Hickmann & Hendriks, 1999; Perniss & Özyürek, 2015). Languages, however, might show cross-linguistic differences with regard to the reduced RE form they favor. For example, they may differ in whether null pronoun is the most common form to mark reference maintenance or not (i.e., pro-drop vs. non-pro-drop) and whether the choice between the overt pronoun and the null pronoun is pragmatically motivated as is often the case in pro-drop languages such as Spanish and Turkish. In Turkish, for example, referents are maintained mainly with a null pronoun as in (1b)¹. When referents are pragmatically marked for similarity, contrast or topic shift, on the other hand, the overt pronoun is usually preferred over the null pronoun (Enç, 1986) as in (1d) where

¹ Throughout the paper when speech examples are given, subject referents are underlined and marked with subscript letters in the English translations to clarify the co-referentiality of subjects across clauses. Dropped arguments that are glossed with Ø in the original example are given in parentheses in translations. Abbreviations that were used in the examples are listed in Appendices.

the subject referent is marked for contrast and is expressed with an overt pronoun, *o* ‘she/he’ instead of a null pronoun. It has also been suggested that when an adverbial such as *gelince* ‘as for’ is present in a clause, as an overt pronoun or null pronoun can be used optionally (Kornfilt, 1997), as in (2). Note, however, the optionality of overt pronouns in Turkish has not been studied extensively and the exact structural mechanisms which drive it are not known.

(1)

- a. *Murat_m dün sinema-ya git-ti.*
Murat yesterday cinema-DAT go-PAST.3SG
‘Murat_m went to the cinema yesterday.’
- b. *Ø_m film-i beğen-me-miş.*
Ø movie-ACC like-NEG-PAST.EV.3SG
‘(He)_m did not like the movie.’
- c. *Aynı film-i Suzan_i da izle-miş.*
Same movie-ACC Suzan too watch-PAST.EV.3SG
‘Suzan_i also saw the same movie.’
- d. *Ama o_i çok beğen-miş.*
But she a.lot like-PAST.EV.3SG
‘But she_i liked it a lot.’

(2)

- a. *Ben_i Dünya mutfağ-ı-nı çok takip.etmem.*
I world cuisine-POSS.ACC much follow-NEG.PRS.1SG
‘I don’t follow world cuisine very much.’
- b. *Derya_k’ya gel-ince, o/Ø Kore mutfağ-ı-nı çok sev-er.*
Derya-DAT come- upon she/ Ø Korea cuisine-ACC much like-PRS.3SG
‘As for Derya, she likes Korean cuisine very much.’

This paper examines reference tracking strategies of bilingual speakers in a contact situation. Comparing bilingual data to a monolingual baseline in each language, it asks whether second-generation heritage speakers of Turkish in the Netherlands follow language-specific patterns of reference tracking in Turkish and in Dutch. Note that throughout the paper, we use ‘monolingual’² as an operational

²We investigate whether patterns of use by heritage speakers are different those by speakers who grew up speaking only one of the languages we are interested in. To demonstrate that, we need to

term to refer to participants who were raised monolingually (i.e., in Turkey for Turkish and Netherlands for Dutch) and spoke only one of the languages that we study, Turkish or Dutch. All participants in this study, both bilingual and monolingual speakers, reported to have knowledge of English to some extent. However, none of the participants grew up with English as an early first language and they were all exposed to English after the age of 10 in a classroom context.

Turkish is a pro-drop language in which the choice between overt and null pronouns is assumed to be modulated by pragmatic context (Enç, 1986; Turan, 1995) but not so much by the discourse status of referents. On the other hand, Dutch is a non-pro-drop language where the choice between overt and null pronouns is not assumed to be pragmatically motivated (Carminati, 2002). However, Dutch differentiates between a stressed (*zij/ hij* ‘she/he’) and a reduced variant (*ze/ ie* ‘she/he’) of the third-person personal pronouns. The stressed variant has been suggested to be sensitive to pragmatic contexts, i.e., the presence of contrast and/or topic shift (Kaiser & Trueswell, 2004; Kaiser, 2011), similar to what triggers the use of an overt versus a null pronoun in Turkish. This paper aims to investigate whether bilingual speakers of Turkish and Dutch use language-specific ways of reference tracking in relation to both the discourse status of referents and the pragmatic contexts in which REs are used.

Reference production by bilingual speakers of a pro-drop language in contact with a non-pro-drop language has been previously studied, mostly focusing on the relative distribution of overt and null pronouns in relation to pragmatic contexts. The predominant pattern that came out of those studies is that bilingual speakers might loosen the discourse-pragmatic constraints on overt pronouns in the pro-drop

compare heritage speakers to speakers who were not bilinal speakers of Turkish and Dutch, which would be our ‘baseline’. The term ‘monolingual baseline’ may not be the ideal one, but it is the one generally used in heritage language literature (cf., Laleko & Montrul, 2011; Treffers-Daller, Daller, Furman, Rothman, 2016; Pablo, 2016; Polinsky, in press, 2008). Sociolinguistically, we certainly do not pass judgment on the immigrant variety.

language. That is, they may use overt pronouns in pragmatically ‘redundant’ contexts, for example when a referent is not marked for similarity, contrast or topic shift (Flores-Ferrán, 2004; Gürel, 2004; Montrul, 2004, Silva-Corvalan, 1994). The ability to use null pronouns, on the other hand, was suggested to stay intact, with the exception of severe cases of attrition (Polinsky, 1995).

The majority of previous studies on pronouns have examined the contact between pro-drop Spanish and the non-pro-drop English in the US (e.g., Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalan, 1994). Additionally, in many studies, the heritage speakers did not have high attainment of the pro-drop language (Montrul, 2004; Polinsky, 1995; Silva-Corvalán, 1994). Here, we study the contact between Turkish and Dutch as an understudied language pair in the domain of reference tracking. Furthermore, there is usually high language attainment in the Turkish community in the Netherlands (Backus, 2013). The heritage speakers use both Turkish and Dutch regularly in diverse settings (Backus, 2013; Extra & Yağmur, 2010) and they have high proficiency in each language. There are not enough data available from such populations with high attainment in the pro-drop language and not much known is about whether those speakers still show loosening of the pragmatic constraints on overt pronouns in the pro-drop language.

Apart from providing data from an understudied language pair in the domain of reference tracking, we contribute to the literature in the following novel ways. First, we study both the minority and the majority language (Turkish and Dutch, respectively), comparing bilingual data to the monolingual baseline in each language to investigate whether bilingualism has consequences for both languages (Brown & Gullberg, 2011; Pavlenko, 2003). Most often, only the minority language is studied because it is usually weakly mastered by most speakers and it is not expected to influence the majority language. Second, we study not only overt and null pronouns but also richer forms of referring expressions, i.e., NPs, with the aim of understanding reference production in a more comprehensive way. NPs are often

left out of the analysis in previous studies because their use as opposed to reduced forms of referring expressions usually does not show cross-linguistic variation across pro-drop and non-pro-drop languages, unlike the use of overt versus null pronouns. However, as we take subject referring expressions as our empirical domain of interest, we also study NPs as well as overt and null pronouns. Finally, in addition to *pragmatic context* that may modulate the use of overt versus null pronouns in pro-drop languages, we also take into account the *discourse status* of referents, i.e., whether referents are *re-introduced* into discourse after some intervening clauses or *maintained* across consecutive clauses. Overall, the relative distribution of null and overt pronouns in pro-drop languages has been mainly studied with regard to only pragmatic contexts so far. However, especially for Turkish, we do not know much about whether and how the discourse status of referents also plays a role on the quantitative distribution of these two forms and whether the discourse status effect may also exhibit cross-linguistic influence.

Before we lay out the present study, we introduce how discourse status and pragmatic context may influence the choice of differential RE types and we review previous studies of bilingual reference tracking.

2. Background

2.1. Discourse status and reference tracking

Previous studies have shown that there is a systematic relation between the discourse status of a referent and how much information speakers provide while referring to that referent (Aksu-Koç & Nicolopoulou, 2015; Arnold, 1998; Azar & Özyürek, 2015; Contemori & Dussias, 2016; Givón, 1984; Gullberg, 2006; Hendriks, Koster & Hoeks, 2014; Hickmann & Hendriks, 1999; Perniss & Özyürek, 2015). Referents that are maintained across consecutive clauses are expressed with reduced forms such as pronouns. These forms do not contain rich information because their referents have active and accessible representations in the memories of speakers and

addressees (Ariel, 1990; Foraker & McElree, 2007). Referents that are new or re-introduced after some intervening clauses, on the other hand, are usually expressed with richer forms such as NPs because when a referent has a less accessible representation in memory, speakers and addressees need to activate more information to initiate that referent (Fukumura, van Gompel, Harley, & Pickering, 2011).

Studies that have examined reference tracking in bilingualism in relation to discourse status have mainly focused on adult second language (L2) learners. A common finding from those studies is that overall, the L2 learners are sensitive to discourse status, but they are sometimes more explicit than the L1 speakers, similar to the so-called ‘waffle phenomenon’ suggesting that L2 speakers may use paraphrases when they cannot find specific referring expression, for example repeating NPs as longer expressions instead of using pronouns as reduced forms (Edmondson & House, 1991). For example, the L2 learners may use an NP in contexts in which the L1 speakers would use a pronoun (Gullberg, 2006; Yoshioka, 2008), especially in maintained referent contexts. Over-explicitness in the L2 has been observed for learners of both pro-drop (Sorace & Filiaci, 2006; Yoshioka, 2008) and non-pro-drop languages (Gullberg, 2006), and it seems to be modulated by language proficiency. Over-explicitness usually occurs in the discourse when the L2 learners reach intermediate proficiency (Hendriks, 2003; Frederiksen & Mayberry, 2018) and disappears with high proficiency (Polio, 1995).

Studies that have examined reference production by adult heritage speakers have mostly focused on the use of overt pronouns in relation to pragmatic contexts but not so much in relation to the discourse status of referents. Given that the relation between referring expressions and discourse status may vary between typologically different languages (e.g., overt pronoun being the default marker of reference maintenance in non-pro-drop languages but not in pro-drop languages), discourse

status is also an important factor to examine in connection to bilingual reference tracking. In this study we do so.

2.2. Pragmatic context and reference tracking

Languages may show cross-linguistic variation with regard to whether pragmatic context influences the use of REs, in particular regarding the choice between overt and null pronouns. For example, the choice between overt and null subjects in pro-drop languages such as Spanish and Turkish is often regulated by the pragmatic context, e.g., whether the subject is marked for similarity, contrast or topic-shift (Enç, 1986; Silva-Corvalán, 1994, Tsimpli, Sorace, Heycock & Filliaci, 2004) though such choice is not assumed to be pragmatically motivated in non-pro-drop languages such as German and English (Carminati, 2002). On the other hand, the overt pronoun is the most frequently used referring expression in maintained referent contexts in non-pro-drop languages (Contemori & Dussias, 2016; Gullberg, 2006; Hendriks et al., 2014; Flecken, 2011) while null pronoun is the preferred form in such contexts in pro-drop languages (Montrul, 2004; Torres Cacoullos & Travis, 2010). In non-pro-drop languages, however, null pronouns are restricted to certain structures such as ellipsis and finite coordinate clauses (Davidson, 1996).

Although the choice between the overt and the null pronoun in non-pro-drop languages is not assumed to be pragmatically motivated, some non-pro-drop languages such as Dutch and Estonian, have stressed and reduced variations of personal pronouns and the stressed variant has been suggested to be sensitive to contrast and/or topic switch (Kaiser, 2010, 2011; Kaiser & Trueswell, 2004). The distinction between stressed and reduced pronouns in non-pro-drop languages, however, has not received as much attention as the distinction between overt and null pronouns in pro-drop languages (Kaiser, 2010). Additionally, we are not aware of studies which investigated contact between a pro-drop language and a non-pro-drop language which has stressed and reduced pronouns, which is the case in this study.

Due to the abovementioned cross-linguistic differences between pro-drop and non-pro-drop languages, the production and the processing of overt and null pronouns by bilinguals have been studied intensely, mostly focusing on whether bilingual speakers learn and maintain the pragmatic constraints on the use of subject pronouns in the pro-drop language. It is usually found that bilingual speakers produce and accept overt subject pronouns in pragmatically “redundant” contexts more often than monolinguals, e.g., when referents are not pragmatically marked for similarity, contrast or topic shift. Such patterns have been attested for advanced L2 learning (Belletti, Bennati, & Sorace, 2007; Sorace & Filiaci, 2006), language attrition (e.g. Gürel, 2004; Silva-Corvalán, 1994; Tsimpli et al., 2004; Polinsky, 1995), bilingual language acquisition (Pinto, 2006; Haznedar, 2010; Paradis & Navarro, 2003; Serratrice, Sorace & Poali, 2004) and also for heritage speakers (Keating, VanPatten, Jegerski, 2011; Montrul, 2004; Montrul & Polinsky, 2011).

Previous findings on bilingual subject pronouns have been interpreted as showing that overt pronouns in a pro-drop language are vulnerable to cross-linguistic influence from a non-pro-drop language in which overt pronouns are frequently used and are not pragmatically marked (in comparison to null pronouns) (Gürel, 2004; Montrul, 2004; Müller & Hulk, 2000; Schmitt, 2000; Tsimpli et al., 2004). It has also been suggested that the cause of the vulnerability to cross-linguistic influence of overt pronouns in pro-drop languages is the syntax-pragmatics interface (e.g., Müller & Hulk, 2000). The most tested formulation of this proposal, the Interface Hypothesis (IH) (Sorace & Filiaci, 2006), proposes that some linguistic structures, such as the production and processing of overt pronouns in pro-drop languages, require the integration and coordination of syntactic and pragmatic information in real time. Bilinguals might be less efficient at integrating information from different domains and updating the mental discourse model when needed, possibly due to less automatized syntactic processing strategies. Therefore, interface phenomena are harder to acquire and more vulnerable to cross-linguistic influence than structures

that require only syntactic knowledge, e.g. the use of null pronouns. This vulnerability may lead to the overgeneralization of the overt pronoun as a ‘default’ unmarked form to relieve processing overload (Chamorro, Sorace & Sturt, 2016; Sorace, 2011; Sorace & Filiaci, 2006; Sorace & Serratrice, 2009).

Although bilingual speakers have been found to use overt pronouns in unmarked contexts in the pro-drop language more often than monolinguals, the majority of these findings come from studies with participants who had relatively low proficiency in the pro-drop language. Therefore, we do not know whether previous findings about pragmatically ‘redundant’ overt pronouns also hold for speakers with high proficiency in the pro-drop language. In one study, however, Montrul (2004) found for Spanish in the US that speakers with an intermediate proficiency level in Spanish used 50% of their overt pronouns in pragmatically redundant contexts whereas only 9% of overt pronouns was used in such contexts by speakers with an advanced proficiency level (p. 137). On the other hand, none of the pronouns were used in pragmatically redundant contexts in monolingual baseline data. It is then plausible that the level of proficiency in the pro-drop language may modulate the extent to which bilingual speakers use redundant overt pronouns. Such a proposal would be in line with a *usage-based approach* to language acquisition (Tomasello, 2003; Bybee, 2006).

The usage-based approach proposes that there is a link between the frequency of use of a pattern and how strong its representation is in the memory of an individual speaker, i.e., its degree of entrenchment (Brooks & Tomasello, 1999; Bybee, 2006). Constructions that are frequently used have strong representations in memory, thus they are strongly entrenched. Therefore, they will stay activated and accessible for the speakers (de Bot and Clyne, 1989; Green, 2003; Paradis, 2007) and can easily be retrieved for further use (Bybee, 2010; Croft, 2000; Ellis, 2016; Langacker, 1987; MacWhinney, 2012). Constructions that are weakly entrenched, on the other hand, will have less accessible representations in memory and this may make them more

vulnerable to cross-linguistic influence (Backus, 2013). Speakers will have less automatized processing routines for those constructions, which will induce a higher cognitive cost during processing and production compared to constructions with high levels of entrenchment. Note that unlike IH, the usage-based approach was not originally proposed to account for reference tracking strategies of bilingual speakers and has most profitably been developed to account for first language acquisition. Findings from other studies on language contact suggest its usefulness, however. Language use (in terms of frequency, range, and contexts), for example, has been found to be a predictor of grammatical accuracy (Albirini, 2014), including the ‘appropriate’ use of pronouns in language contact situations (Travis, Torres Cacoullos & Kidd, 2017).

Studying heritage speakers with high proficiency in the pro-drop language and who uses both Turkish and Dutch on a daily basis, we will lay out our predictions following IH and a usage-based approach and will later evaluate how well either approach accounts for the data we present. Note, however, that this study was not set up to test either approach: it is rather a first extensive exploratory study of reference tracking in Dutch and Turkish by second-generation heritage speakers of Turkish in the Netherlands.

3. Present Study

This study asks whether second-generation Turkish heritage speakers in the Netherlands follow the language-specific strategies of reference tracking in Turkish and in Dutch with regard to the discourse status of referents and their pragmatic contexts. It elicits narratives using two short silent videos, providing data that resemble everyday-like contexts while at the same time controlling for the broad topics to be narrated. The data consist of Turkish and Dutch narratives produced by the same set of heritage speakers as well as monolingually-raised speakers of Turkish in Turkey and monolingually-raised speakers of Dutch in the Netherlands. With this

study, we aim to contribute to existing literature on reference tracking by bilinguals in the following novel ways.

First, we provide data from an understudied language pair in the domain of reference tracking in language-contact situations, which has been mostly studied for Spanish in the US. Second, we study both the minority and the majority language as bilingualism may have consequences for both (Brown & Gullberg, 2011; Pavlenko, 2003). Most often, only the heritage language is studied, which is usually the weaker language of the bilingual speakers. The population we study here is different in the sense that the Turkish community in the Netherlands exhibits high attainment of the heritage language. Some factors that contribute to high attainment of Turkish are high percentages of marriages to spouses from Turkey, easy access to Turkish media and TV series, and summer-long holidays in Turkey (see Backus, 2013 for a review). Additionally, maintenance of Turkish is often considered important and a ‘core value’ for Turkish identity (Extra & Yağmur, 2010: 131) which is also likely to motivate high language maintenance within the Turkish community. We do not know much about reference tracking by such bilingual speakers who have high proficiency in the heritage language and use it on a regular basis. Third, we study not only overt and null pronouns but also richer forms of REs i.e., NPs, with the aim of understanding reference production in more comprehensive ways. Previous studies have mostly focused on the use of overt pronouns in relation null pronouns as these two forms show prominent cross-linguistic differences with regard to reference tracking across pro-drop and non-pro-drop languages. However, as we take subject referent expression as our empirical domain of interest, we study all forms of expressions that refer to subject arguments.

Finally, we study both the overall proportional distribution of overt and null pronouns and the pragmatic contexts in which these two forms are used. Some previous studies only looked at the overall distribution and found higher proportions of overt pronouns in bilinguals compared to monolinguals (Albirini, Benmamoun &

Saadah, 2011; Koban Koç, 2016). Some studies, on the other hand, looked at the pragmatic distribution of overt pronouns and found that bilinguals were more likely to use overt pronouns in pragmatically ‘redundant’ contexts where referents were not marked for pragmatic information such as similarity, contrast or topic shift (Montrul, 2004; Tsimpli et al., 2004). Therefore, it seems that the overall proportional distribution of overt and null pronouns as well as pragmatic contexts in which they are used are the aspects for which bilingual speakers may divert from the monolingual baseline. In this paper, we study reference tracking considering both the discourse status of referents and the pragmatic contexts in which referring expressions are used.

3.1. Cross-linguistic differences between Turkish and Dutch

In Turkish, many clauses have null subjects and the subject referent is marked through person inflection on the verb. In contrast, in Dutch null subjects are restricted to certain structures such as ellipsis and finite coordinate clauses (Davidson, 1996). Furthermore, overt pronouns are pragmatically marked forms in Turkish and they mark information such as emphasis, contrast and topic switch (Enç, 1986; Erguvanlı-Taylan, 1986; Özsoy, 1987; Kerslake, 1987; Turan, 1995). In Dutch, like in other non-pro-drop languages, the use of overt pronouns as opposed to null pronouns is not assumed to be pragmatically motivated (Carminati, 2002). However, Dutch differentiates between a stressed (*zij/ hij* ‘she/he’) and a reduced variant (*ze/ ie* ‘she/he’) of the third-person personal pronouns. The stressed variant has been suggested to be sensitive to the presence of contrast and/or topic switch (Kaiser & Trueswell, 2004; Kaiser, 2011), similar to what triggers the use of an overt pronoun as opposed to a null pronoun in Turkish.

Turkish and Dutch also differ with regard to gender marking on personal pronouns. Third-person pronouns in Turkish (*o* ‘he/she’ for singular and *onlar* ‘they’ for plural) do not encode gender and they have the same phonological form as the

distal demonstrative pronoun ‘that / those’. Dutch, on the other hand, marks gender on the third-person singular pronouns: *hij/ ie* is the equivalent of ‘he’ and *ze/ zij* is the equivalent of ‘she’ in English. The third-person plural pronouns *ze* ‘they’, on the other hand, does not mark gender. In Dutch, there is no form overlap between the personal and demonstrative pronouns although the distal demonstrative *die* ‘that’ can be used for both animate and inanimate third-person singular and plural subject referents (Kaiser, 2011; Vogels, Maes & Krahmer, 2014).

3.2. Reference tracking in Turkish in contact situations

Studies of reference tracking by speakers of Turkish who also speak a non-pro-drop language have mostly focused on children. Bilingual Turkish speaking children in contact situations were found to be sensitive to the language-specific ways of reference tracking. They did not show any differences from the monolingual children in Turkey with regard to the overall frequency of overt and null pronouns (Aarssen 1996; Schaufeli 1994; Verhoeven 1990) or the pragmatic contexts in which overt pronouns were used (Özcan, Keçik, Topbaş & Konrat, 2000).

As for adult bilingual speakers, Doğruöz and Backus (2009) looked at subject pronouns in informal interviews with second-generation heritage speakers of Turkish in the Netherlands. They found no cross-linguistic influence with regard to the frequency of overt subject pronouns, though a few cases of the 1st person pronoun were attested in contexts in which monolinguals would not use a pronoun. In a recent study, Koban Koç (2016) collected interview data from first and second-generation Turkish heritage speakers in New York City and found that heritage speakers used significantly higher percentages of overt pronouns than the speakers in Turkey. Note, however, that this study does not consider the pronouns in relation to pragmatic contexts which makes the interpretation of the findings difficult as a comparison of the sheer number of overt pronouns is not always informative. Thus, there is a need for thorough and systematic studies with regard to the proportional distributions of referring expressions and the pragmatic and discourse contexts in which they are

used in Turkish as used in language contact situations. This paper aims to fill this gap, offering data from each language of the bilinguals and also from monolingual baselines.

3.3. Predictions

We expect bilingual speakers to behave similarly to the monolingual baselines, and therefore to re-introduce referents mainly with NPs and to maintain them mainly with overt pronouns in Dutch and with null pronouns in Turkish.

Based on previous studies of bilingual reference tracking in a pro-drop language (e.g., Montrul, 2004; Polinsky, 1995; Tsimplici et al., 2004), one could expect a higher proportion of overt pronouns in bilingual Turkish compared to the monolingual baseline. In line with the predictions of the IH (Sorace & Filliaici, 2006), we could also expect bilinguals to generalize overt pronouns to pragmatically unmarked contexts in Turkish and use ‘redundant’ overt pronouns in contexts that do not signal similarity, contrast or topic shift. Assuming the use of stressed personal pronouns as opposed to reduced variants in Dutch is also sensitive to the presence of contrast and/ or topic shift (Kaiser & Trueswell, 2004; Kaiser, 2011), similar to what triggers the use of an overt pronoun as opposed to a null pronoun in Turkish, we can also expect bilinguals to use ‘redundant’ stressed pronouns in Dutch more often compared to the monolingual baseline.

If the presence and the extent of cross-linguistic influence on subject pronouns, however, are modulated by language use and proficiency, then we would not expect differences in bilingual use of pronouns compared to the monolingual baselines with regard to either the proportional distribution or the pragmatic contexts, considering the bilingual speakers in this study are highly proficient in both Turkish and Dutch. Reference tracking is characterized by extremely high frequency as all speakers practice it many times a day. From a *usage-based approach* (Tomasello, 2003; Bybee, 2006), this would lead us to expect that overt pronouns are highly entrenched as pragmatically marked forms in Turkish in the memory of bilingual

speakers. Considering that the level of entrenchment is a main determiner of how well constructions are maintained in bilingualism (Backus, 2013; Paradis, 2007; Travis et al., 2017), we would then expect overt pronouns as pragmatically marked forms in Turkish to be resistant to cross-linguistic influence from Dutch where subjects are typically overtly expressed and have an unmarked status. In this case, bilingual speakers would maintain the pragmatic constraints on the choice of overt pronouns and would *not* be likely to use ‘redundant’ pronouns, at least not more often than monolingual speakers. Similarly, we would *not* expect bilinguals to produce ‘redundant’ stressed pronouns in Dutch more often than monolingual speakers.

4. Method

4.1. Participants

20 heritage speakers of Turkish studying in Nijmegen, the Netherlands (14 females; $M_{age} = 23.3$, $SD = 2.95$), 20 monolingually-raised speakers of Turkish studying in Istanbul, Turkey (17 females; $M_{age} = 22.2$, $SD = 1.75$) and 20 monolingually-raised speakers of Dutch studying in Nijmegen, the Netherlands (14 females; $M_{age} = 21.5$, $SD = 2.73$) participated in the study for payment or course credit. Bilingual participants filled in a detailed survey about their language history and language use as well as the demographics of their care-givers.

All heritage speakers were second-generation immigrants who were born and raised in the Netherlands by first-generation parents, who themselves emigrated to the Netherlands from Turkey. The mean age of immigration to the Netherlands was 15.9 ($SD = 5.12$) for the mothers and 19.0 ($SD = 7.24$) for the fathers. When the participants in this study were born, the mothers on average had already lived in the Netherlands for 9.2 years ($SD = 6.66$) and fathers for 11.15 years ($SD = 7.46$). As previously mentioned, there is overall a high level of language attainment in the Turkish community in the Netherlands and there are not many speakers who cannot

speak Turkish well (Backus, 2013; Extra & Yağmur, 2010), which is in line with previous sociolinguistic studies on Turkish immigrant groups in Western Europe, summarized in Backus (2013) and Yağmur (2016) which generally report high levels of language maintenance.

The bilingual speakers in this study acquired the heritage language Turkish as their first language (L1) at home during early years and Dutch as their second language (L2) to which they have had increasing exposure after they started to attend school at age 4. They did not have schooling or formal language training in Turkish. Bilinguals reported that their parents had spoken to them more often in Turkish than in Dutch during the early years (between the age of 0-5) while some parents started to mix Turkish and Dutch in their input in later years. On a 5-point Likert scale, the bilingual speakers rated their current language use in various environments and with various interlocutors (1 = never; 2 = rarely; 3 = sometimes; 4 = most of the time; 5 = all the time) as well as their overall and speaking proficiency in both Turkish and Dutch (1 = native; 2 = native-like; 3 = advanced; 4 = intermediate 5 = beginner) and their comprehension level (1 = everything; 2 = almost everything; 3 = most parts; 4 = partially; 5 = quite little).

Bilinguals' self-rated frequencies of language use for Turkish and Dutch did not differ significantly ($\beta = -0.484$, $SE = 0.330$, $t\text{-value} = -1.465$, $p = .143$)³. They rated their overall proficiency in Turkish as well as their speaking proficiency to be somewhere between native-like and advanced, although the rating scores were even higher for Dutch ($\beta = 0.900$, $SE = 0.15$, $t\text{-value} = 2.853$, $p = .004$ and $\beta = 1.300$, $SE = 0.284$, $t\text{-value} = 4.582$, $p < .001$, respectively). They also reported to overall

³Linear mixed-effect models do not provide p values. With regard to t values, a rule of thumb is that the values greater than 2.00 can be considered significant. This method, however, is sensitive to sample size, being somewhat anti-conservative for smaller sample sizes (Luke, 2017). As it is the tradition to report p values in psycholinguistics research, we also calculated p values from the t values obtained in the linear mixed effect model output. We treated the t values as they were drawn from a normal distribution, using the *pnorm* function in R.

comprehend almost everything in Turkish, although the rating scores were again higher for Dutch ($\beta = 1.050$, $SE = 0.161$, $t\text{-value} = 6.528$, $p < .001$) (see Table 2.1. in *Appendix 2* for the random effect structure of the analyses). Table 1 summarizes the mean scores for language use and proficiency. Bilingual speakers also reported to mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among friends (11 participants out of 20 reported to have mainly friends of Turkish descent). All participants reported Dutch as the language they speak the best.

Table 1. *Self-rated language use and proficiency by bilingual speakers (Standard Deviation of the mean)*

Self-rated frequency of language use		
	Mean	(SD)
Turkish	2.43	0.92
Dutch	2.91	1.305
Self-rated overall proficiency		
	Mean	(SD)
Turkish	2.40	1.27
Dutch	1.50	0.76
Self-rated speaking proficiency		
	Mean	(SD)
Turkish	2.55	1.23
Dutch	1.25	0.44
Self-rated comprehension level		
	Mean	(SD)
Turkish	2.15	0.67
Dutch	1.10	0.31

Using a *Praat* script (De Jong & Wempe, 2009), we also measured oral fluency (i.e., articulation rate = number of syllables/ articulation time) in both Turkish and Dutch, based on 10-second samples deducted from the elicited narratives for each participant. Bilingual speakers were not significantly faster or slower than their monolingual counterparts in Dutch $t(38) = 0.934$, $p = .356$, but they showed a trend of speaking slower than monolinguals in Turkish $t(38) = 1.994$, $p =$

.053. Figure 1⁴ represents the mean articulation rates for bilingual and monolingual speakers. Articulation rate did not significantly correlate with self-rated proficiency or the amount of self-reported language use either in Turkish ($r_s = -.124$, $p = .604$ and $r_s = -.099$, $p = .677$, respectively) or in Dutch ($r_s = -.185$, $p = .435$ and $r_s = .184$, $p = .438$, respectively).

We chose to use an oral fluency measure as an indicator of overall language proficiency because telling a coherent narrative fluently requires proficiency in the lexical, syntactic and discourse-pragmatic domains as well as in utterance planning (Polinsky 2008). “More proficient speakers seem to have less of a problem with

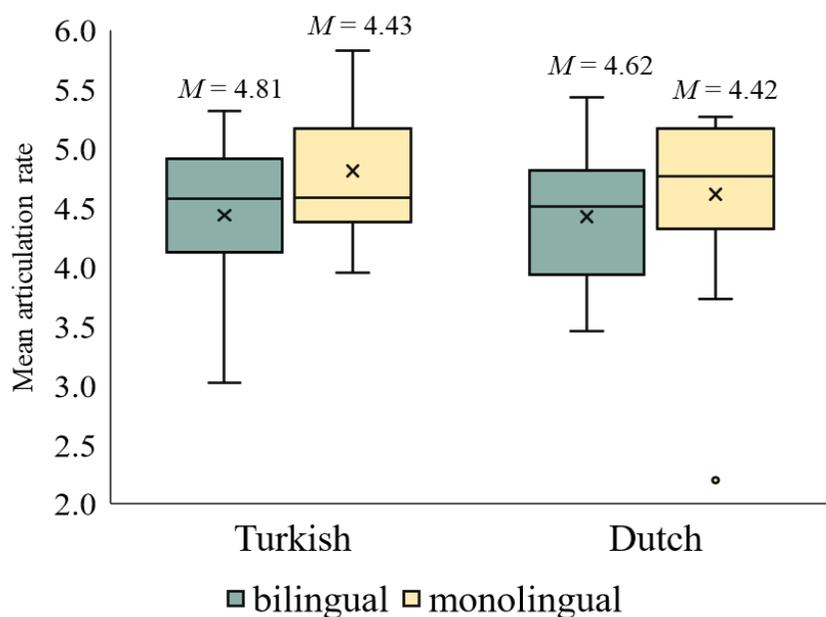


Figure 1. Main articulation rate, calculated as the number of syllables divided by speech time.

⁴ In all the boxplots, the intermediate horizontal lines indicate the median (the mid-point of the data), the boxes represent the range of the middle 50% of the data, the whiskers represent the range of the upper and lower 25% of the data. The horizontal lines at the end of the whiskers indicate the maximum and the minimum values, excluding the outliers. Outliers are indicated by filled circles if there are any and mean values are indicated by the cross marks. Mean values are given as text on top of the plots as well.

lexical access and general construction of the clause. This in turn accounts for a faster speech rate” (Polinsky, 2008: 60). Speech rate as a proficiency measure has been previously used in language contact research (Benmamoun et al., 2013; Polinsky 2008, 2011; van Suchtelen, 2016). Additionally, the script we used was previously used in a study of Turkish-German bilinguals, and there the articulation rate was shown to correlate with speakers’ C-test (a text completion test) scores (Daller, Yıldız, de Jong, Kan & Basbağı, 2010).

4.2. Stimuli

We used two short silent videos (cf. Azar, Backus & Özyürek, 2016, 2017) to elicit narratives. In one video, three women are engaged in cooking activities (kitchen video, Perniss & Özyürek, 2015) and in the other two women and a man are engaged in office activities (office video). Figure 2 illustrates stills depicting different segments from each video. See *Appendix D* at the end of the thesis for a detailed list of the events that take place in each video.

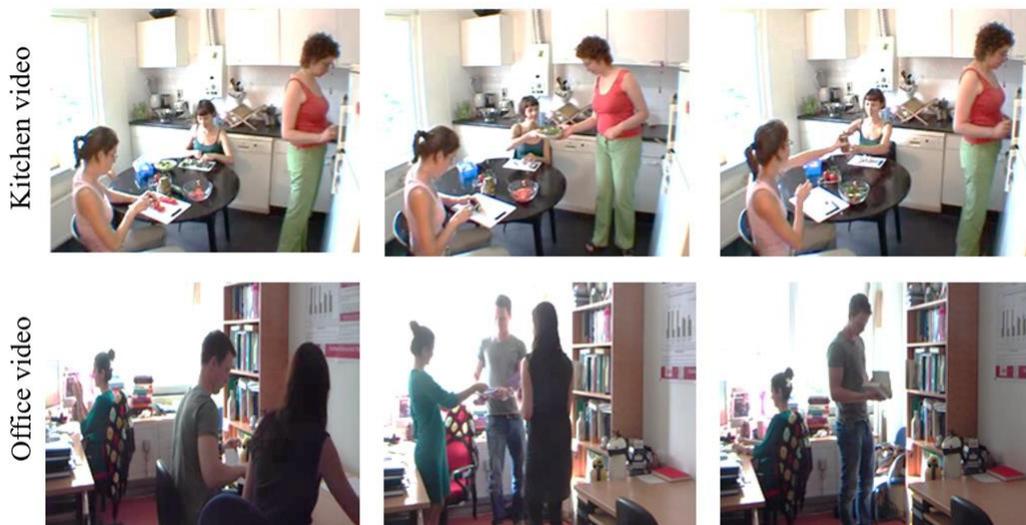


Figure 2. Stills from the two video stimuli, kitchen video at the top and office video at the bottom.

4.3. Procedure

Participants watched the two stimulus videos one by one on a computer screen and narrated what they had seen to an addressee. The computer screen turned white after each video and stayed white during the narrations. The addressees were not confederates, there was a different addressee in each session and they did not see the videos before or during the narrations. They were instructed that they were going to answer two short written questions about each narrative and that they could ask clarification questions after the narration was done. Once the instructions were given, the experimenter left the room and came back after each narration with questions for the addressee. Bilingual speakers repeated the task once in Turkish with a Turkish monolingual addressee and once in Dutch with a Dutch monolingual addressee, with at least a two-week interval between the two data collection sessions. The order of the two videos and language was counterbalanced. All sessions were videotaped. Monolingual speakers performed the task once.

4.4. Data coding

Native speakers of each language transcribed the data. We first divided the narratives into clauses, units with a single subject argument and a single predicate (Berman & Slobin, 1994). We coded coordinated clauses as separate clauses (e.g., *the woman who was helping the man stood up and she walked to the bookshelf* was coded as two clauses). We did not code relative clauses that modified nouns (e.g., *the woman who was helping the man*) as separate clauses but treated them as the modifier of the noun (in this case *who was helping the man* was not coded as a separate clause). This was to make sure that the coding scheme was comparable across Turkish and Dutch (relative clauses are finite in Dutch but non-finite in Turkish). We coded only the clauses with animate subjects to control for animacy as a possible factor that might affect the choice of referring expressions (Vogels et al., 2014) and omitted commentary about the characters (e.g., “I think she is the mother”) from the analyses to be able to compare our results to previous studies of

reference tracking in extended discourse which followed a similar coding scheme (e.g., Debreslioska, Özyürek, Gullberg, & Perniss, 2013).

Next, we coded the resulting set of animate subject arguments for *discourse status* (cf. Hickmann & Hendriks, 1999). We coded subject referents as *maintained* if they referred to the same entity as the subject of the immediately preceding clause. Referents that were mentioned in the discourse previously but not in the immediately preceding clause, either as the subject or object argument, were coded as *re-introduced*. We did not analyze the cases of *introduction* (first mention of referents) as we were only interested in how speakers track references once they were introduced. Note that although we did not code and analyze the subject referents of commentary clauses, we took them into account while coding the continuity of subject arguments. We later coded re-introduced and maintained subject arguments for the type of the referring expression: *noun phrase* (e.g., bare noun, determiner plus noun or nouns modified by an adjective or relative clause), *overt pronoun* (personal pronoun, demonstrative pronoun, indefinite and stressed and reduced personal pronoun for Dutch) or *null pronoun* (see *Appendix E* at the end of the thesis for the detailed list of noun phrase constructions that occurred in our dataset, but note these were all collapsed). Example (3) from bilingual Turkish and (4) from bilingual Dutch show the discourse status and RE type coding categories extracted from our datasets.

Finally, two speakers of Turkish and two speakers of Dutch coded overt and null subject pronouns for pragmatic context, that is whether speakers organized clauses in a way that would signal *similarity* or *contrast* between different referents or between the propositions related to the referents, or *topic switch*. (3e) is an example of *similarity* marking such that subject argument of (3e) walks towards the bookshelf and this is similar to the action that is expressed in (3b). The similarity between the actions of the two referents is marked with an overt subject pronoun, *o* ‘she’ in (3e). (4d) on the other hand, is an example of *contrast* such that the subject argument in (4d) manages to open the jar *in contrast* to the action of the subject

argument in (4b). The contrast between the actions of the two referents is marked with a stressed personal pronoun, *zij* ‘she’ in (4d). There were only a few cases of *topic shift* in our dataset, therefore we mainly refer to similarity and contrast when we talk about pragmatic marking in the remainder of this paper. The two coders reached 100% agreement for each language in a meeting where the initial discrepancies were discussed and resolved. Table 2 summarizes the initial agreement values.

(3)

- a. *Sonradan gel-en kadın kalk-ıyo.*
 Later come-REL woman stand-PROG.3SG
 ‘The woman who came later_k stands up.’ re-introduced/ NP
- b. *Ø kitaplığ-a doğru gid-iyo.*
 Ø bookshelf-DAT towards go-PROG.3SG
 ‘(She)_k walks towards the bookshelf.’ maintained / null pronoun
- c. *Büro-da otur-an oğlan kağıt-lar-ı toplu-yo.*
 Office-LOC sit-REL boy paper-PL-ACC collect- PROG.3SG
 ‘The boy who is sitting at the desk_j collects the sheets.’ re-introduced/ NP
- d. *Sonra Ø kalk-ıyo.*
 Then Ø stand-PROG.3SG
 ‘Then (he)_j stands up.’ maintained / null pronoun
- e. *O da kitaplığ-a doğru gid-iyo.*
 He too bookshelf-DAT towards go-PROG.3SG
 ‘**H**_e too walks towards to the shelf.’ maintained / pronoun

(4)

- a. *Het meisje met 't roze T-shirt wil-t een potje openmak-en.*
 The girl with the pink T-shirt want-PRS.3SG a jar open-INF
 ‘The girl with the pink T-shirt_i wants to open a jar.’ re-introduced/ NP
- b. *Maar die krijg-t ze niet los.*
 But that get- PRS.3SG she not loose
 ‘But she_i cannot get it loose.’ maintained/ pronoun
- c. *Degene die staa-t probeer-t ook.*
 The.one that stand- PRS.3SG try- PRS.3SG also
 ‘The one who is standing_i also tries.’ re-introduced/ NP

d. *En zij_t krijg-t 't uiteindelijk los.*
 And she get- PRS.3SG the finally loose
 ‘And **she** finally gets it loose (opens the jar).’ maintained/ pronoun

Table 2. *Inter-rater reliability for the pragmatic context coding*

	Turkish		Dutch	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
Cohen’s kappa	.802	.838	.925	.953
p-value	<.001	<.001	<.001	<.001

5. Analyses

We analyze Turkish and Dutch data separately, comparing bilingual data to a monolingual baseline in each language. This is because we are mainly interested in whether there are possible differences in heritage speakers’ reference tracking strategies from the monolingual baselines, which then would be informative about the possible effects of language contact on the production of subject referring expressions.

We analyze the data using generalized logistic mixed effect regression using *glmer* function from the *lme4* package (cf. Bates, Maechler, Bolker & Walker, 2015) in the software R, version 3.4.3 (see Contemori & Dussias, 2016 for a similar analysis of reference tracking in L1 and L2 discourse). All analyses made use of variants of the generalized linear model with binomial error structure because the dependent variables were binary. Analyses accounted for individual variance by including random intercepts for participants and random slopes for Pragmatic Context and/or the Discourse Status by participants (see Baayen, Davidson & Bates, 2008 for more information on mixed-effects modelling in language research). Sometimes a maximal model with both random intercepts and slopes (cf. Barr, Levy, Scheepers & Tilly, 2013) did not converge, or the model returned a perfect correlation (+/- 1.00) between the random factors, which suggests the data might

have been over-fitted. We explain below the procedure that we followed in those cases for each analysis. Fixed effect structures of the statistical models of all models are provided in *Appendix 1* (see Table 1.1. for Turkish and Table 1.2. for Dutch) at the end of this chapter and random effect structures are provided in *Appendix 2* (see Table 2.2.).

Although all analyses were run on presence/ absence of a category as the dependent variable, figures show mean proportions of a category across all participants for ease of illustration.

6. Results

6.1. Reference tracking in Turkish narratives

There were in total 1713 subject referring expressions in Turkish: 744 from bilingual speakers and 969 from monolingual speakers. Table 3 shows that the most frequently used RE types in Turkish are NPs and null pronouns; NPs are mainly used in re-introduced referent contexts and null pronouns in maintained referent contexts, in line with Turkish being a pro-drop language.

Table 3. *The distribution of RE types in Turkish bilingual and monolingual narratives. Raw number (percentage)*

	Maintained Referent Contexts		Re-introduced Referent Contexts	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
NP	22 (5%)	58 (10%)	260 (78%)	300 (74%)
overt pronoun	46 (11%)	54 (10%)	31 (8%)	29 (7%)
<u>null pronoun</u>	<u>340 (84%)</u>	<u>449 (80%)</u>	<u>45 (14%)</u>	<u>79 (19%)</u>
<i>Total</i>	<i>408 (100%)</i>	<i>561 (100%)</i>	<i>336 (100%)</i>	<i>408 (100%)</i>

6.1.1. Overt versus null pronouns

We first analyzed the relative distribution of overt and null pronouns in Turkish narratives, excluding NPs from the analysis. The dependent variable was presence/absence of an overt pronoun as opposed to a null pronoun and the fixed factors were Discourse Status (maintained, re-introduced), Language Status (bilingual, monolingual) and Pragmatic Context (marked, unmarked). The maximal model with both random intercepts for participants and random slopes (for discourse status and pragmatic context) by participants did not converge. We first take out the interaction for random slopes from the model, which did not converge, either. Next, we forced the random intercepts and random slopes not to be correlated, which did not converge. Then we removed the random intercepts from the model. This did not converge, either. Finally, we simplified the model by taking out the random slopes from the model and re-introduced random intercepts into the model⁵. The analysis with random intercepts only returned a significant main effect of Discourse Status ($\beta = 1.110$, $SE = 0.458$, $z\text{-value} = 2.428$, $p = .015$) such that the relative frequency of overt pronouns as opposed to null pronouns was higher in re-introduced referent contexts than in maintained referent contexts. The analysis also returned a significant main effect of Pragmatic Context ($\beta = -2.673$, $SE = 0.355$, $z\text{-value} = -7.529$, $p < .00001$) with overt pronouns being used more frequently in pragmatically marked contexts compared to pragmatically unmarked contexts, which is in line with the previous theoretical analyses of overt versus null pronouns in Turkish. On the other hand, we did not find a significant main effect of Language Status ($\beta = 0.199$, $SE = 0.337$, $z\text{-value} = 0.589$, $p = .556$), suggesting bilingual speakers did not

⁵ Because there was a non-significant effect of language status in the model with random intercepts only, we tried to take out language status from the model and add random slopes of discourse status and pragmatic contexts instead so that the model could better account for the individual variation in the data. Only the model with the random slopes for pragmatic contexts converged, however it did not account for more variation in the data than the model with random intercepts only $\chi^2(2) = 0.437$, $p = .804$. Additionally, that model returned a perfect correlation between random effects, suggesting the data might have been over-fitted. We therefore report the simplified model in *Results*.

significantly vary from the monolingual speakers in how they used overt and null pronouns with regard to discourse status or pragmatic context. We did not find any significant two-way or three-way interactions, either. Figure 3 represents the mean proportions of *overt pronouns* in maintained and re-introduced referent contexts in bilingual and monolingual Turkish and Table 4 summarizes the distribution of overt and null pronouns in marked and unmarked contexts.

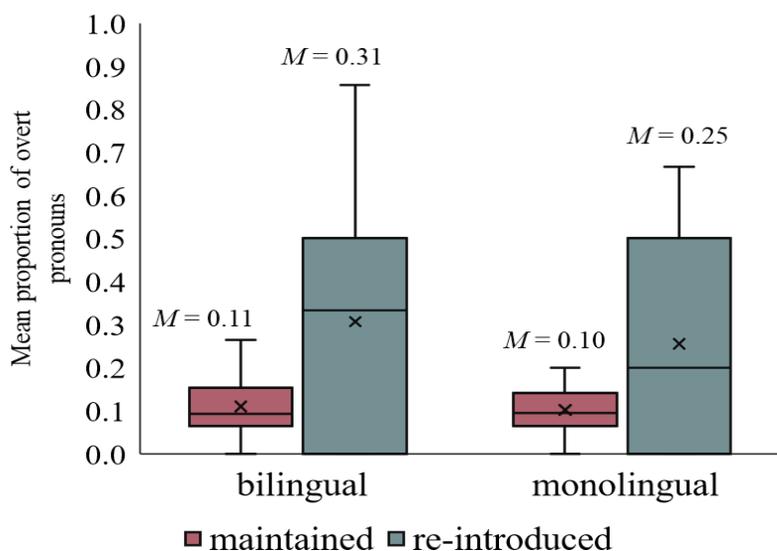


Figure 3. The mean proportions of overt pronouns out of all overt and null pronouns in maintained and re-introduced referent contexts in bilingual and monolingual Turkish.

Table 4. The distribution of overt and null pronouns across marked and unmarked contexts in bilingual and monolingual Turkish narratives. Raw number (percentage)

	Marked Contexts		Unmarked Contexts	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
overt pronoun	53 (52%)	61 (54%)	24 (7%)	22 (5%)
null pronoun	49 (48%)	53 (46%)	336 (93%)	475 (95%)
<i>Total</i>	<i>102 (100%)</i>	<i>114 (100%)</i>	<i>340 (100%)</i>	<i>497 (100%)</i>

Note that null pronouns were used relatively often in re-introduced referent contexts in Turkish. This occurred mainly when referents had been previously introduced as a group performing a joint activity a few clauses earlier (e.g., *İki kız masada sebze doğruyo* ‘Two girls are slicing vegetables at the table’). When those referents were re-introduced further in the discourse, they were re-introduced with a null pronoun (e.g., *Ø bi kavanoz açamaya çalışıyorlar* ‘(They) are trying to open a jar’) and the predicate was marked for 3rd person plural (*-lAr*) and therefore the subject referent was unambiguous.

Even though we found that overt pronouns were sensitive to pragmatic context, surprisingly they were not the ‘default’ form for pragmatically marked contexts, unlike what has been suggested in previous literature. Especially in maintained referent contexts, the overt pronoun was used about as often as the null pronoun in both monolingual and bilingual narratives. It is possible that the association of overt pronouns with the marked status of a referent is less categorical in Turkish than it is in other pro-drop languages. We will come back to this in the *Discussion*. Null pronouns on the other hand were the ‘default’ choice in pragmatically unmarked contexts.

6.1.2. Overt pronouns versus NPs

We next analyzed the relative distribution of overt pronouns and NPs, excluding null pronouns from the analysis. The dependent variable was presence/ absence of an overt pronoun as opposed to an NP and the fixed factors were Discourse Status

(maintained, re-introduced) and Language Status (bilingual, monolingual). The maximal model with random intercepts for participants and random slopes for discourse status by participants returned a significant main effect of Discourse status ($\beta = -3.155$, $SE = 0.400$, $z\text{-value} = -7.880$, $p < .0001$) and a significant main effect of Language Status ($\beta = -0.818$, $SE = 0.335$, $z\text{-value} = -2.441$, $p = .015$), but no significant interaction of the two ($\beta = 0.689$, $SE = 0.500$, $z\text{-value} = 1.377$, $p = .168$). The analysis showed that both monolingual and bilingual speakers were less likely to choose an overt pronoun as opposed to an NP in re-introduced referent contexts in comparison to maintained referent contexts. Overall, however, bilingual speakers used more overt pronouns and fewer NPs than monolingual speakers. Figure 4 represents the mean proportions of *overt pronouns* in maintained and re-introduced referent contexts in bilingual and monolingual Turkish.

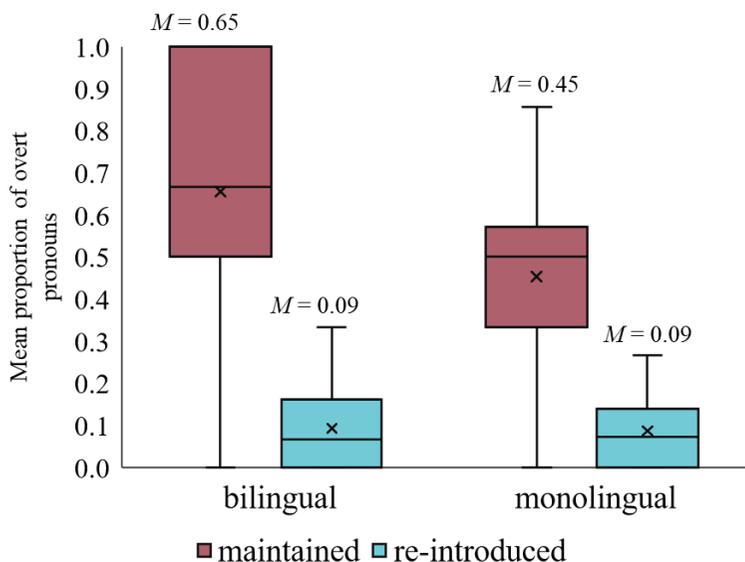


Figure 4. The mean proportions of overt pronouns out of all overt pronouns and NPs in maintained and re-introduced referent contexts in bilingual and monolingual Turkish.

6.2. Reference tracking in Dutch narratives

There were in total 1449 subject referring expressions in Dutch narratives: 748 from bilingual speakers and 701 from monolingual speakers. Table 5 shows that NPs and overt pronouns are the most frequently used RE types in Dutch; NPs are mainly used in re-introduced referent contexts and overt pronouns in maintained referent contexts, in line with Dutch being a non-pro-drop language.

Table 5. *The distribution of RE types in Dutch bilingual and monolingual narratives. Raw number (percentage)*

	Maintained Referent Contexts		Re-introduced Referent Contexts	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
NP	16 (5%)	21 (5%)	242 (70.5%)	268 (75%)
overt pronoun	299 (83%)	277 (71%)	99 (29%)	87 (24%)
null pronoun	43 (12%)	93 (24%)	2 (0.5%)	2 (1%)
<i>Total</i>	<i>358 (100%)</i>	<i>391 (100%)</i>	<i>343 (100%)</i>	<i>357 (100%)</i>

6.2.1. Overt versus null pronouns

We first analyzed the distribution of overt and null pronouns in Dutch narratives, excluding NPs from the analysis. Unlike in Turkish, pragmatic context is not considered to influence the distribution of overt versus null pronouns in non-pro-drop languages (Carminati, 2002), therefore we did not include pragmatic context as a predictor in our analysis. Due to the low number of null pronouns in re-introduced referent contexts ($N = 4$), we analyzed the presence of overt pronouns as opposed to null pronouns only in maintained referent contexts with Language Status (bilingual, monolingual) as fixed factor. The model also included random intercepts for participants. The analysis returned a significant main effect of Language Status ($\beta = -1.084$, $SE = 0.465$, $z\text{-value} = -2.330$, $p = .020$) with bilingual speakers using more overt pronouns than the monolinguals did. Figure 5 represents the mean proportions

of *overt pronouns* in maintained referent contexts in bilingual and monolingual Dutch.

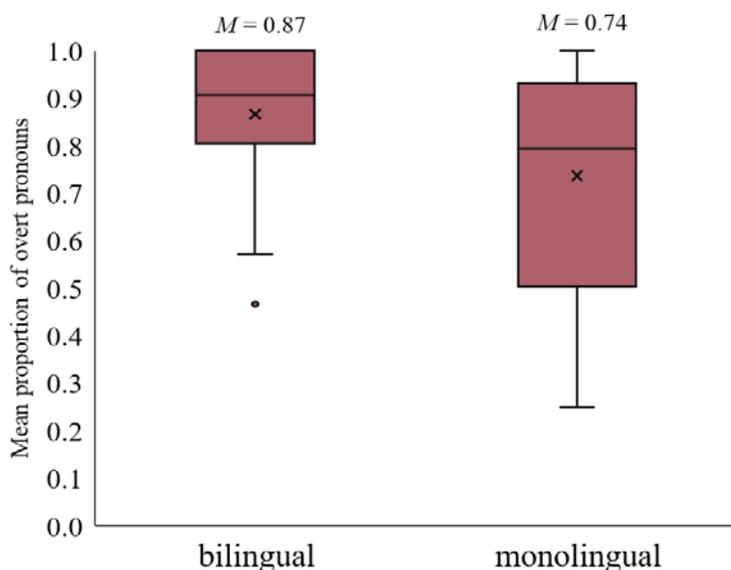


Figure 5. The mean proportions of overt pronouns out of all overt and null pronouns in maintained referent contexts in bilingual and monolingual Dutch.

Note that the proportions of overt and null pronouns add up to 100%, meaning monolingual speakers used more null pronouns ($M = 0.27$) than the bilingual speakers ($M = 0.13$). Examples (5) from monolingual Dutch and (6) from bilingual Dutch exemplify the difference across monolingual and bilingual Dutch in the use of pronouns.

(5)

a. *Kom-t een meisje binnen.*

Come-PRS.3SG a girl inside

‘A girl_i comes in’.

introduced/ NP

b. *Ø pak-t een bureaustoel.*

Ø pick- PRS.3SG an office.chair

‘(She)_i takes a chair.’

maintained/null pronoun

c. *En Ø gaat naast die jongen zit-ten.*

And Ø go- PRS.3SG next.to that boy sit-INF

- ‘And (she)_j sits next to that boy.’ maintained/ null pronoun
- (6)
- a. *Toen kwam-∅ er een meisje binnen.*
 Then PAST/come-3SG there a girl inside. (cf. nonpast *kom-t*)
 ‘Then a girl_j came in.’ introduced/ NP
- b. *En ze ging-∅ naast die jongen zit-ten.*
 And she PAST/go-3SG next.to that boy sit-INF (cf. nonpast *gaa-t*)
 ‘And she_j sat next to that boy.’ maintained/ pronoun
- c. *En ze ging-∅ help-en met ’t orden-en.*
 And she PAST/go-3SG help-INF with the sort-INF (cf. nonpast *gaa-t*)
 ‘And she_j helped with the sorting.’ maintained/ pronoun

Given that Dutch is a non-pro-drop language, it is perhaps surprising that the relative frequency of null pronouns in comparison to overt pronouns was relatively high in the monolingual Dutch data. We examined whether the differences in frequency of overt and null pronouns across monolingual and bilingual narratives might be modulated by differences in the use of certain linguistic structures, in particular subject-verb inversion and clause coordination.

Subject-verb inversion in Dutch (e.g., *Vanavond ga ik sporten* ‘Tonight go I sporting’; i.e. ‘tonight I’ll exercise’) requires an overt subject: dropping the subject would be ungrammatical. There were similar proportions of clauses with inversed subject-verb in monolingual Dutch (32%) and bilingual Dutch (39%). Additionally, when we examined only clauses without inversion, bilinguals still used overt pronouns (79% overt and 21% null pronouns) more often than monolinguals (63% overt and 37% null pronouns). Bilinguals also did not seem to differ in how often they coordinated clauses with a coordinating word, a structure which, if used to different extents, could have modulated the frequency of null pronouns in Dutch. 51% of null pronouns in monolingual Dutch and 63% of null pronouns in bilingual Dutch were used in coordinated clauses with coordinating conjunctions such as *en* ‘and’, *of* ‘or’, or *dus* ‘thus’. Hence, we can eliminate differential use of particular syntactic constructions as possible causes of the difference in frequency of overt and

null pronouns across monolingual and bilingual Dutch. We will later discuss other explanations for the lower frequency of null pronouns in bilingual Dutch.

6.2.2. Stressed versus reduced pronouns

We next analyzed the distribution of stressed and reduced personal pronouns in Dutch narratives. We focused only on feminine pronouns, stressed pronoun *zij* ‘she’ and reduced pronoun *ze* ‘she’, because the masculine reduced pronoun *ie* ‘he’ is a clitic and cannot occur in sentence-initial subject positions (Donaldson, 1997; Kaiser & Trueswell, 2004). There were in total 376 cases of *ze* (206 in the bilingual and 170 in the monolingual narratives) and 70 cases of *zij* (46 in the bilingual and 24 in the monolingual narratives). Table 6 summarizes the distribution of the stressed and reduced variants of pronouns in relation to the discourse status and Table 7 in relation to the pragmatic contexts.

The maximal model with both random intercepts for participants and random slopes (for discourse status and pragmatic context) by participants did not converge. We first take out the interaction for random slopes from the model, which did not converge, either. Next, we forced the random intercepts and random slopes not to be correlated, which did not converge. Then we removed the random intercepts from the model. This did not converge, either. Finally, we simplified the model by taking out the random slopes from the model and re-introduced random intercepts into the model⁶. The analysis with random intercepts only returned a significant main effect of Pragmatic Contexts ($\beta = -1.832$, $SE = 0.525$, $z\text{-value} = -3.487$, $p = .0005$), such that *zij* as opposed to *ze* was more likely to be used in pragmatically marked contexts

⁶ Because there was a non-significant effect of language status in the model with random intercepts only, we tried to take out language status from the model and add random slopes of discourse status and pragmatic contexts instead so that the model could better account for the individual variation in the data. Two separate models with random slopes for pragmatic contexts only and with random slopes for discourse status only did converge, however either model did not account for more variation in the data than the model with random intercepts only ($\chi^2(2) = 5.320$, $p = .07$ and $\chi^2(2) = 4.180$, $p = .124$, respectively). Additionally, those two models returned a perfect correlation between random effects, suggesting the data might have been over-fitted. We therefore report the simplified model in *Results*.

compared to pragmatically unmarked contexts. We did not find a significant main effect of Discourse Status ($\beta = 0.191$, $SE = 0.522$, $z\text{-value} = 0.366$, $p = .715$) or Language Status ($\beta = -0.829$, $SE = 0.531$, $z\text{-value} = -1.561$, $p = .119$). There were no significant two-way or three-way interactions, either.

Table 6. *The distribution of zij and ze in maintained and re-introduced referent contexts in Dutch. Raw number (percentage)*

	Maintained Referent Contexts		Re-introduced Referent Contexts	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
zij	31 (17%)	10 (7%)	15 (21%)	14 (25%)
ze	150 (83%)	128 (93%)	56 (79%)	42 (75%)
<i>Total</i>	<i>181 (100%)</i>	<i>138 (100%)</i>	<i>71 (100%)</i>	<i>56 (100%)</i>

Table 7. *The distribution of zij and ze in marked and unmarked contexts in Dutch. Raw number (percentage)*

	Marked Contexts		Unmarked Contexts	
	<i>bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
zij	20 (40%)	11 (28%)	26 (13%)	13 (8%)
ze	30 (60%)	29 (72%)	176 (87%)	141 (92%)
<i>Total</i>	<i>50 (100%)</i>	<i>40 (100%)</i>	<i>202 (100%)</i>	<i>154 (100%)</i>

6.2.3. Overt pronouns versus NPs

Finally, we analyzed the influence of discourse status on the likelihood of using an overt pronoun as opposed to an NP in Dutch, excluding null pronouns from the data. The maximal model with both random intercepts for participants and random slopes for discourse status by participants did not converge. We first take out the interaction for random slopes from the model, which did not converge, either. Next, we forced the random intercepts and random slopes not to be correlated, which this time returned a converging model. However, the levels of Discourse Status had a perfect correlation (1.00) which suggest the model is overfitted. We therefore, simplified

the model by taking out the random slopes from the model⁷. The analysis with random intercepts only returned a significant main effect of Discourse Status ($\beta = -3.929$, $SE = 0.292$, $z\text{-value} = -13.467$, $p < .00001$) with overt pronouns being used less frequently in re-introduced referent contexts than in maintained referent contexts. We did not find a significant main effect of Language Status ($\beta = -0.352$, $SE = 0.381$, $z\text{-value} = -0.923$, $p = .356$) or a significant interaction between Discourse Status and Language Status ($\beta = 0.044$, $SE = 0.395$, $z\text{-value} = 0.111$, $p = .911$). Figure 6 represents the mean proportions of *overt pronouns* in maintained and re-introduced referent contexts in bilingual and monolingual Dutch.

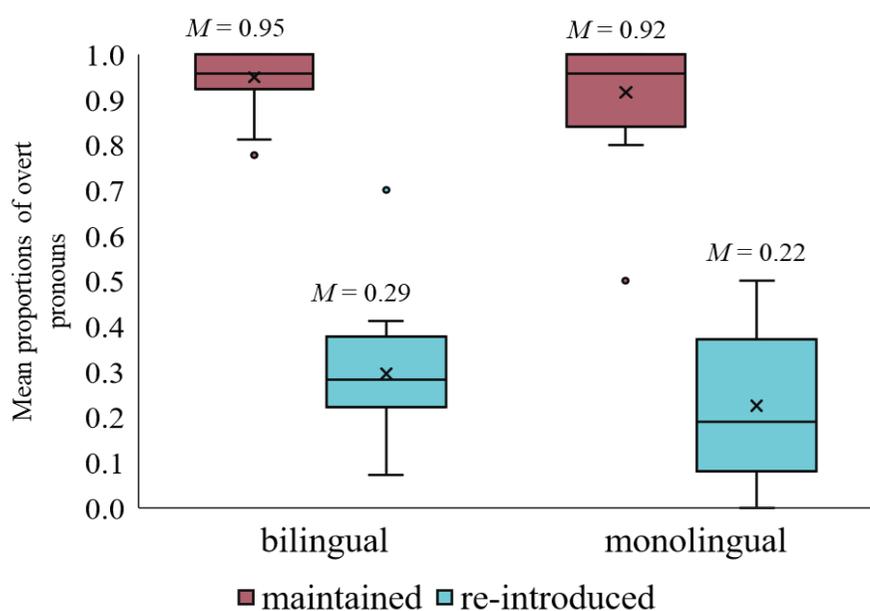


Figure 6. The mean proportions of overt pronouns out of all overt pronouns and NPs in maintained and re-introduced referent contexts in bilingual and monolingual Dutch.

⁷ Because there was a non-significant effect of language status in the model with random intercepts only, we tried to take out language status from the model and add random slopes of discourse status instead so that the model could better account for the individual variation in the data. The model this time did converge, however, it returned a perfect correlation between random effects, suggesting the data might have been over-fitted. We therefore report the simplified model in *Results*.

7. Summary of the Findings and Discussion

This paper investigated reference tracking strategies of second-generation Turkish heritage speakers in the Netherlands who use both Turkish and Dutch on a daily basis and who have high proficiency in each language. We elicited narratives using two short videos and studied how bilingual speakers used different types of referring expressions (REs), i.e., NPs, overt and null pronouns, for subject referents in those narratives, comparing the bilingual data to monolingual baselines in Turkish and Dutch. We examined the distribution of RE forms taking into account both the discourse status of referents (i.e., re-introduced or maintained) and the pragmatic contexts in which they are used (i.e., whether they were marked for similarity or contrast). Overall, we did not find much difference between bilingual and monolingual speakers, especially with regard to pragmatic constraints. We found, however, some patterns that we did not expect. We will first summarize the findings for the influence of discourse status and then the pragmatic contexts on the use of REs. We will discuss our findings in relation to the IH (Sorace & Filiaci, 2006) and the *usage-based account* (Albirini, 2014; Bybee, 2010; Travis et al., 2017), the two theoretical approaches that we outlined in the *Introduction* and *Predictions*.

7.1. Discourse Status and reference tracking

With regard to the influence of *discourse status* on the use of REs, we had predicted that bilingual speakers would behave similar to the monolingual baseline and re-introduce referents mainly with NPs and maintain them mainly with overt pronouns in Dutch and null pronouns in Turkish. We did indeed find that bilingual speakers re-introduced referents with richer forms of referring expressions and they also followed the language-specific strategies of reference maintenance in both Turkish and Dutch: they maintained referents mainly with null pronouns in Turkish and with overt pronouns in Dutch. At the same time, however, we found some patterns that

we did not expect, especially in maintained referent contexts. We discuss the findings for Turkish first.

7.1.1. Turkish

We did not find an increase in the relative distribution of overt subject pronouns in relation to null subject pronouns in bilingual Turkish. Bilingual speakers did not significantly differ from the monolingual baseline with regard to the proportion of overt versus null subject pronouns. Recall that several previous studies had attested an increase in overt subject pronouns in a pro-drop language in contact with a non-pro-drop language (Albirini et al., 2011, Montrul, 2004; Polinsky, 1995, Koban Koç, 2016). However, we did find an increase in the use of overt pronouns in relation to NPs in the bilingual narratives. Bilingual speakers used relatively more overt pronouns and fewer NPs than their monolingual peers. Looking at the distribution of overt pronouns and NPs across the two discourse status contexts, the differences between bilingual and monolingual speakers seem to be driven by maintained referent contexts as the proportions of overt pronouns and NPs in re-introduced referent contexts ($M = 0.09$ and 0.91 , respectively) are the same across bilingual and monolingual narratives.

We argue that the differences we found can be explained by a usage-based account (cf. Bybee, 2010), more specifically the importance it attaches to the level of entrenchment of NPs and overt pronouns in relation to discourse status in Turkish and Dutch. Neither NPs nor overt pronouns are likely to be much more highly entrenched than the other as reference maintenance markers in Turkish since monolingual speakers do not seem to have a strong preference for either form in maintained referent contexts (55% NPs opposed to 45% overt pronouns). When all RE forms in maintained referent contexts were considered, 80% were null pronouns in monolingual Turkish as opposed to only 10% NPs and 10% overt pronouns (Table 3). Therefore, for most speakers, both NPs and overt pronouns may be only weakly entrenched as maintenance markers for speakers of Turkish. In Dutch, on the other

hand, speakers have a strong preference for overt pronouns over NPs as reference maintenance markers (8% NPs as opposed to 92% overt pronouns in monolingual narratives, Table 5), with null pronouns playing only a minor role. Due to their much high frequency, overt pronouns as markers of maintained reference are likely to be highly entrenched for most speakers of Dutch. We suggest that this high degree of entrenchment in Dutch competes with the weakly entrenched representation of NP as reference maintenance markers in Turkish. Bilingual speakers, then, might have transferred the dominant and entrenched pattern from Dutch to Turkish and replace some of the NPs with overt pronouns in maintained referent contexts. Such transfer, however, did not replace null pronouns. For monolingual Turkish speakers, null pronouns have highly entrenched representations as reference maintenance markers, as opposed to overt pronouns (90% null pronouns as opposed to 10% overt pronouns). This probably makes null pronouns resistant to influence from Dutch and not likely to be replaced by overt pronouns.

7.1.2. Dutch

We found that bilingual speakers used comparatively more overt pronouns and fewer null pronouns in maintained referent contexts in Dutch than monolingual speakers. Following a usage-based reasoning, we argue that bilinguals mostly stick to the overt pronoun in those contexts because null pronouns, not very frequent in Dutch to begin with, may have weaker representations as reference maintenance markers in the bilinguals' Dutch than in the monolinguals' Dutch. Because null subjects are not particularly frequent in maintained referent contexts, they are unlikely to be strongly entrenched as markers of reference maintenance. Overt pronouns, on the other hand, are by far the most frequently used forms in those contexts. Therefore, bilinguals may have replaced some of the null pronouns with the dominant form of reference maintenance, i.e., overt pronouns. To explain why bilingual speakers appear to have weaker representations of these null pronouns, it may be useful to consider their Dutch-speaking sociolinguistic environment.

The weaker entrenchment of null pronouns as reference maintenance markers in bilingual Dutch compared to monolingual Dutch might be related to the variety of Dutch spoken in the Turkish immigrant community. Given the presence of many first-generation immigrants in the community, our participants' social networks will always have included many people whose Dutch is that of a learner, from beginning level to very advanced. L2 learners may make more use of explicit referring expressions, such as overt pronouns, given that over-explicitness is often reported for L2 learners (Frederiksen & Mayberry, 2018; Gullberg, 2006; Hendriks, 2003). As a result, null pronouns may have been more infrequent in the input for our bilingual second-generation participants than for their monolingual Dutch peers. If null subjects were used rarely in the input, this would have triggered a stronger association of the overt pronoun with reference maintenance than it may have in monolingual speakers, conditioning bilingual speakers to use overt pronouns without much variation whenever a referent is maintained. Relative lack of exposure to certain forms may explain the differences between bilingual and monolingual speakers (Rinke & Flores, 2014), in our case the relative lack of exposure to null subjects in Dutch. In the absence of a comprehensive picture of Dutch as used by the Turkish immigrant community, however, we cannot know whether low use of null pronouns is indeed typical of their speech. Nonetheless, we may interpret the fact that all bilinguals in this study had parents who were late L2 learners of Dutch and that over-explicitness has been frequently reported for L2 speech as support for this suggested explanation.

If we consider the findings for Turkish and Dutch together, bilingual speakers seem to use overt pronouns more often than the monolingual baselines in both languages, but *only* in relation to the forms used infrequently for reference maintenance, that is NPs in Turkish and null pronouns in Dutch. We propose that the strongly entrenched forms compete with the weakly entrenched forms in each language and therefore some of the null pronouns in maintained referent contexts get

replaced with overt pronouns in bilingual Dutch while some of NPs in the same contexts get replaced by overt pronouns in bilingual Turkish. We argue that when the relation between a certain RE form and a certain discourse status is weakly entrenched, bilinguals may replace it with the more strongly entrenched form.

7.2. Pragmatic contexts and reference tracking

With regard to the influence of pragmatic contexts on the use of REs, we had different predictions. In line with the predictions of the IH (Sorace & Filliaci, 2006), we expected bilinguals to generalize overt pronouns to pragmatically unmarked contexts in Turkish and thus use ‘redundant’ overt pronouns in contexts that do not signal similarity, contrast or topic shift. Assuming stressed personal pronouns in Dutch are also sensitive to pragmatic information such as, contrast and topic shift, we also expected bilinguals to use ‘redundant’ stressed pronouns in Dutch more often compared to monolingual speakers. On the other hand, if cross-linguistic influence in bilingualism is modulated by language use and proficiency, we would not have expected differences in bilingual use of pronouns compared to the monolingual baselines in either Turkish or Dutch, in line with a *usage-based approach* (Tomasello, 2003; Bybee, 2006). Because bilingual speakers in this study use Turkish regularly and on a daily basis, they are expected to have highly entrenched representations of the overt pronoun as a pragmatically marked form. Similarly, we would not expect bilinguals to produce ‘redundant’ stressed pronouns in Dutch either, considering bilingual speakers use Dutch on a regular basis, as well.

For *Turkish*, we found that both bilingual and monolingual speakers were more likely to use overt pronouns, as opposed to null pronouns, in pragmatically marked contexts, in line with previous accounts of pronouns in Turkish (cf. Enç, 1986). Some previous studies had found that bilingual speakers of a pro-drop language that is in contact with a non-pro-drop language were more likely to accept or use pragmatically “redundant” overt pronouns, that is, when referents were not marked for similarity, contrast or topic-shift (Keating et al., 2011; Montrul, 2004).

This was not the case for the bilingual population that we studied here as there were no statistically significant differences in the frequency of overt pronouns in pragmatically unmarked context in Turkish across the bilingual ($M = 0.07$) and monolingual narratives ($M = 0.05$).

For *Dutch*, we found that both bilingual and monolingual speakers were more likely to use the stressed pronoun *zij* -as opposed to the reduced pronoun *ze-* in pragmatically marked contexts. Furthermore, there were no significant differences between bilingual and monolingual speakers in terms of the frequency of stressed *zij* in pragmatically unmarked contexts in Dutch ($M = 0.13$ and $M = 0.08$ for bilinguals and the monolinguals, respectively). Considering that we found no differences in the use of subject pronouns in relation to pragmatic contexts across bilingual and monolingual narratives, either in Turkish or in Dutch, our findings seem to be more in line with the predictions of the usage-based approach than those of the IH.

It is interesting that in the Turkish baseline, we found that not all overt pronouns were used in marked contexts (see Table 4), given that overt pronouns in pro-drop languages are strongly associated with pragmatic markedness. For example, in Montrul's (2004) Spanish data almost 100% of overt pronouns occurs in pragmatically marked contexts. It is possible that the association of overt pronouns with a pragmatically marked status of a referent is less categorical in Turkish than in Spanish. However, our data and analyses do not enable us to give a clear account of what might be behind this less categorical association. Future research should investigate other possible conditions that might govern the use of overt pronouns in Turkish, for example whether certain verb classes, tense categories or the presence of negation favor overt pronouns more than others, as has been suggested for Spanish (Harrington & Pérez-Leroux, 2016; Orozco, 2016; Travis et al., 2017).

We would like to note that constructions which show variation in the monolingual baseline have been previously suggested to be harder to acquire and to

be more vulnerable to cross-linguistic influence due to the inconsistency in the input (De Prada Pérez & Pascual y Cabo, 2012; Rinke & Flores, 2014). It seems that the distribution of overt and null pronouns in pragmatically marked contexts in Turkish shows quite some variation in the monolingual baseline. It is remarkable that bilingual speakers who are second-generation immigrants have maintained the pragmatic constraints on overt pronouns despite this variation and the possibility that the syntax-pragmatic interface induces further uncertainty.

Overall, our findings for the relative distribution of overt and null pronouns are not in line with the findings from the majority of studies on bilingual subject pronouns, which found that bilingual speakers overuse overt pronouns (Albirini et al., 2011) or use them in pragmatically unmarked contexts (Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalán, 1994). We suggest that the difference in the findings is related to the high language attainment of Turkish heritage speakers in the Netherlands. We would like to suggest that even though interface structures might be more vulnerable to cross-linguistic influence due to the processing cost associated with them (a proposal that this paper did not set out to test), this cost might be reduced when bilingual speakers have high proficiency in their pro-drop language and use it regularly. In those cases, bilingual speakers would have strong entrenchment of routines associated with the integration of syntactic and pragmatic information which would lead to fairly automatized processing of overt pronouns as pragmatically marked forms. This might explain why not all bilingual speakers show indeterminacy at the syntax-pragmatics interface, just like the highly advanced Spanish heritage speakers in Montrul's study (2004). Those speakers used overt pronouns in pragmatically unmarked contexts to a much lesser degree ($M = 0.09$) than the speakers with intermediate proficiency ($M = 0.50$).

8. Conclusion

We studied reference tracking in an understudied language pair, i.e., pro-drop Turkish in contact with non-pro-drop Dutch in the Netherlands. We found that bilingual reference tracking strategies were overall similar to the monolingual baseline in both Turkish and Dutch. For Turkish, we did not find differences in either the proportional distribution of overt versus null subject pronouns or the pragmatic contexts in which those forms were used. Bilinguals were *not* more likely than monolingual speakers to use overt pronouns in pragmatically unmarked contexts. Therefore, we provided evidence that bilingual speakers of a pro-drop language in contact with a non-pro-drop language do not always show indeterminacy with regard to the realization of overt pronouns in their pro-drop language. For the particular population we studied, continuous use and exposure to the pro-drop language might have led bilingual speakers to maintain the pragmatic constraints on overt pronouns (Albirini, 2014). We therefore suggested that even if there is processing cost associated with interface phenomena (cf. Sorace & Filliaci, 2006), it might be reduced when speakers have high language proficiency in their pro-drop language and use the language frequently.

Although bilingual speakers seemed to exhibit monolingual-like patterns overall, we also found some subtle differences between bilingual and monolinguals, characterized by an increase in the use of overt pronouns for both languages, especially in maintained reference contexts. While maintaining referents, bilinguals used more overt pronouns and fewer NPs than monolingual speakers in *Turkish* and they used more overt pronouns and fewer null pronouns than monolingual speakers in *Dutch*. We offered an explanation based on the degree of entrenchment of different RE types in relation to maintained referent contexts as the possible source of differences in bilingual narratives. Note, however, that in the case of the data we present here, it is not possible to determine independently how deeply entrenched a structure is. The suggestions we present here would merit further research that

combines corpus analysis with controlled experiments. Corpus analysis would provide the circumstantial evidence of frequency (widely assumed to be one of the major determinants of entrenchment) while experimental data (e.g. reaction times in lexical decision tasks) would provide evidence about ease of activation (widely assumed to reflect degree of entrenchment).

Given some intriguing results and the suggestions we made to account for them, we want to stress that future research should include indices of language use and proficiency as a controlled variable in their design and study speaker groups with more variation in these two aspects for a better understanding of how they are related to differences in bilingual reference tracking strategies. Here, we explored reference tracking strategies of adult Turkish heritage speakers in the Netherlands in a controlled setting for the first time. Doing so, we constructed a usage-based account for our findings and we feel this has at the very least something to add to the formal linguistic theories that have been suggested on the basis of earlier work. We would like to draw attention to the importance of interpreting formal approaches to language use in the light of psycholinguistic and usage-based approaches for a more complete understanding of the many factors that contribute to language change as “usage feeds into the creation of grammar just as much as grammar determines the shape of usage” (Bybee, 2006, p. 730).

9. Acknowledgements

This research is funded by the Center for Language Studies, Radboud University Nijmegen, the Netherlands and partially by the Erasmus Staff Training grant granted to the first author by the International Office Radboud University. The Max Planck Institute for Psycholinguistics also provided technical support. We thank Dr. Ayşe Caner and Dr. Nihan Ketrez for providing the location and participants for the data collection in Istanbul, Turkey. We also thank Dr. Pamela Perniss for the kitchen stimulus video, Dr. Ercenur Ünal for the pragmatic context reliability coding for

Turkish and Marlou Rasenberg for the pragmatic context reliability coding for Dutch. We are also grateful to Dr. Susanne Brouwer for advice with the statistical analyses.

10. Appendices

Appendix 1. Fixed effect structure of the statistical models

Table 1.1. *Fixed effect structure for the models for Turkish*

Dependent variable	Fixed Factors					
	<i>Name</i>	<i>Estimate</i>	<i>SE</i>	<i>z-value</i>	<i>p-value</i>	
Pronoun type (overt/ null)	Intercept	-0.281	0.255	-1.102	0.270	
	<i>Discourse Status</i> (maintained/ re-introduced)	1.110	0.458	2.428	.015	
	<i>Pragmatic Context</i> (marked/ unmarked)	-2.673	0.355	-7.529	5.13e-14	
	<i>Language Status</i> (bilingual/ monolingual)	0.199	0.337	0.589	.556	
	<i>Discourse Status X Pragmatic Context</i>	0.349	0.654	0.534	.593	
	<i>Discourse Status X Language Status</i>	-0.290	0.638	-0.455	.649	
	<i>Pragmatic Context X Language Status</i>	-0.628	0.499	-1.259	.208	
	<i>Discourse Status X Pragmatic Context X Language Status</i>	0.047	0.918	0.051	.959	
	RE type (overt pronoun/ NP)	Intercept	0.741	0.268	2.762	0.006
		<i>Discourse Status</i> (maintained/ re-introduced)	-3.155	0.400	-7.880	3.27e-15
<i>Language Status</i> (bilingual/ monolingual)		-0.818	0.335	-2.441	.015	
<i>Discourse Status X Language Status</i>		0.689	0.500	1.377	.168	

Table 1.2. *Fixed effect structure for the models for Dutch*

Dependent variable	Fixed Factors				
	<i>Name</i>	<i>Estimate</i>	<i>SE</i>	<i>z-value</i>	<i>p-value</i>
Pronoun type (overt/ null)	Intercept	2.417	0.359	6.737	1.61e-11
	<i>Language Status</i> (bilingual/ monolingual)	-1.084	0.465	-2.330	.020
RE type (overt pronoun/ NP)	Intercept	3.000	0.284	10.566	<2e-16
	<i>Discourse Status</i> (maintained/ re-introduced)	-3.929	0.292	-13.467	<2e-16
	<i>Language Status</i> (bilingual/ monolingual)	-0.352	0.381	-0.923	.356
	<i>Discourse Status X Language Status</i>	0.044	0.395	0.111	.911
Pronoun type (zij/ ze)	Intercept	-2.151	0.321	-6.705	2.01e-11
	<i>Discourse Status</i> (maintained/ re-introduced)	0.191	0.522	0.366	.715
	<i>Pragmatic Context</i> (marked/ unmarked)	-1.832	0.525	-3.487	.0005
	<i>Language Status</i> (bilingual/ monolingual)	-0.829	0.531	-1.561	.119
	<i>Discourse Status X Pragmatic Context</i>	-0.668	0.823	-0.812	.416
	<i>Discourse Status X Language Status</i>	1.254	0.817	1.535	.125
	<i>Pragmatic Context X Language Status</i>	-0.444	0.945	-0.470	.639
	<i>Discourse Status X Pragmatic Context X Language Status</i>	0.092	1.318	0.070	.944

Appendix 2. Random effect structure of the statistical models

Table 2.1. *Random effect structure for the models for language use and proficiency*

Fixed Effect	Language use			Language proficiency		
	Estimate	SE	<i>t</i> -value	Estimate	SE	<i>t</i> -value
Intercept	2.910	0.246	11.817*	1.500	0.229	6.562*
Language Type	-0.484	0.330	-1.465	0.900	0.315	2.853*

Table 2.2. *Random effect structure for the models for Turkish and Dutch*

	Dependent variable	Group	Random Factors			
			Name	Variance	SD	Correlation
Models for Turkish	pronoun type (overt/null)	participant	Intercept	0.035	0.188	
			Intercept	0.042	0.204	
			Discourse Status	0.527	0.726	-0.11
Models for Dutch	pronoun type (overt/null)	participant	Intercept	1.437	1.199	
			Intercept	0.514	0.717	
			Intercept	0.232	0.482	

Chapter 3

General and Language Specific Factors Influence Reference Tracking in Speech and Gesture in Discourse

This chapter is based on

Azar, Z., Backus, A., & Özyürek, A. (2019). General and language specific factors influence reference tracking in speech and gesture in discourse. *Discourse Processes*, 56(7), 553-574, DOI: <https://doi.org/10.1080/0163853X.2018.1519368>. Open access

General and Language Specific Factors Influence Reference Tracking in Speech and Gesture in Discourse

Referent accessibility influences expressions in speech and gestures in similar ways. Speakers mostly use richer forms as noun phrases (NPs) in speech and gesture more when referents have low accessibility whereas they use reduced forms like pronouns more often and gesture less when referents have high accessibility. We investigated the relations between speech and gesture during reference tracking in a pro-drop language, i.e., Turkish. Overt pronouns were not strongly associated with accessibility but with pragmatic context (i.e., marking similarity, contrast). Nevertheless, speakers gestured more when referents were re-introduced as opposed to maintained and when referents were expressed with NPs as opposed to pronouns. Pragmatic context did not influence gestures. Furthermore, pronouns in low-accessibility contexts were accompanied with gestures -possibly for reference disambiguation- more often than previously found for non-pro-drop languages in such contexts. These findings enhance our understanding of the relations between speech and gesture at the discourse level.

1. Introduction

In order to produce coherent discourse, speakers track the novelty versus continuity of the entities they mention by choosing between richer versus reduced forms of referring expressions (Ariel, 1990; Givón, 1976). Speakers usually introduce referents with a richer referring expression (RE), e.g., ‘a child’ and tend to maintain reference to the same entity with a reduced form, e.g., ‘she’ later in the discourse. Speakers vary the richness of the referring expression they use taking the accessibility and the discourse status of referents into account. When referents are *introduced* into discourse, they are new and they do not have activated and accessible representations in the memories of speakers and the addressees. Therefore, they need to be expressed with richer forms of referring expressions for a successful communication. When referents are *maintained*, however, reduced forms as pronouns and in some cases null pronouns (i.e., argument drop) may be sufficient to track referents because those referents have already accessible representations. Varying the richness of referring expressions in relation to accessibility and discourse status (i.e., whether referents are (re)introduced or maintained) has been shown to be a language-general strategy across typologically different languages (Aksu-Koç & Nicolopoulou, 2015; Arnold, 2010; Contamori & Dussias, 2016; Debreslioska & Gullberg, 2019; Hickmann & Hendriks, 1999; Hendriks, Koster & Hoeks, 2014; Perniss & Özyürek, 2015).

Recent research has shown that reference tracking is a multimodal phenomenon and that referent accessibility influences referring expressions in speech and gestures in similar ways (Gullberg, 2006; Levy & McNeill, 1992; So, Kita, Goldin-Meadow, 2009). During reference tracking, speakers may produce gestures that accompany referring expressions and vary the presence versus absence of gestures according to the discourse status of referents. For example, speakers tend to produce gestures more often with re-introduced referents as opposed to maintained referents (Levy & Fowler, 2000; Levy & McNeill, 1992; Debreslioska, Özyürek,

Gullberg, & Perniss, 2013; Perniss & Özyürek, 2015). Gestures that accompany referring expressions are also found to be sensitive to the richness of expressions in speech. Speakers tend to gesture more with referents that are expressed with richer referring expressions in speech such as NPs as opposed to reduced referring expressions such as overt pronouns (Debreslioska & Gullberg, 2019; Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioka, 2008). Therefore, speech and gesture are closely related at the level of discourse production (Levy & McNeill, 1992).

The abovementioned studies that approached reference tracking as a multimodal phenomenon have mostly focused on non-pro-drop languages like English and German. In such languages, referent accessibility and the richness of referring expressions in speech go hand-in-hand. That is, NPs as richer referential forms are used for referents with low accessibility and overt pronouns as reduced referential forms are used for referents with high accessibility (Arnold, 1998; Carminati, 2002; Kibrik, 2011). Looking at non-pro drop languages only, however, it is not possible to disentangle whether speakers gesture with NPs more than they do with overt pronouns because the richness of expression in gesture parallels that of speech- which can be attributed to speech and gesture being part of an integrated system (Kita & Özyürek, 2003; McNeill, 1992; So et al., 2009) -or because it is a function of the accessibility context that modulates the production of referring expressions in speech and gestures in similar ways.

Here, we study a typologically different language than the majority of previous research has focused on, i.e., Turkish which is a pro-drop language where the relation between the use of overt pronouns and referent accessibility is less prominent and less understood. In pro-drop languages like Turkish, NPs mark low accessibility but it is null pronouns, i.e., argument drop, rather than overt pronouns that are the preferred markers of high accessibility (Carminati, 2002; Kibrik, 2011). That is, speakers of Turkish usually maintain referents with a null pronoun as in

(1b)¹. Furthermore, the use of overt pronouns in pro-drop languages has been suggested to be motivated mainly by the pragmatic context, i.e., whether referents are marked for pragmatic information such as similarity, contrast, topic shift or not (Enç, 1986). For example, the subject referent in (2b), *ablam* ‘(my) sister’ is maintained with an overt pronoun in (2c), rather than with a null pronoun because it is contrasted with the subject referent in (2a), *annem* ‘(my) mother’. In Turkish, pronouns as reduced forms might be mainly markers of pragmatic information and may *not* necessarily go hand-in-hand with accessibility of the referents unlike in non-pro-drop languages. This poses interesting questions for orchestration of speech and gesture use in discourse. Very little is known about how gestures and referring expressions are used for reference tracking in such languages as Turkish.

- (1) a. *Dün anne-m_h yemeğ-e gel-di.*
 Yesterday mother-POSS dinner-DAT come-PAST.3SG
 ‘Yesterday (my) mum_h came over for dinner.’
 b. *Trafik yüzünden Ø_h bir saat gecikti.*
 Traffic because Ø an hour late-PAST.3SG
 ‘Because of traffic, (she)_h was an hour too late.’

- (2) a. *Dün annem_h yemeğ-e gel-di.*
 Yesterday mother-POSS dinner- DAT come-PAST.3SG
 ‘Yesterday (my) mum_h came over for dinner.’
 b. *Abla-m_j da gel-ecek-ti.*
 Sister-POSS too come-FTR-PAST.3SG
 ‘(My) sister_j was also going to come.’
 c. *Fakat o_j son an-da iptal et-ti.*
 But she last moment-LOC cancel-PAST.3SG
 ‘But she_j cancelled at the last moment.’

¹ Throughout the paper when speech examples are given, subject referents are underlined and subscripts denote co-referentiality. Dropped arguments that null pronouns refer to are given in parenthesis in translations.

The aim of this study to understand the relations between the discourse status of subject referents (i.e., whether subject referents are re-introduced or maintained) and the use of richer and reduced forms of referring expressions (i.e., NPs, overt and null pronouns) in elicited narratives in Turkish and the use of gestures in relation to these types of expressions. For speech, we examine whether the use of overt pronoun versus null pronoun is influenced by discourse status of referents and/ or pragmatic context (i.e., similarity or contrast among referents as well as topic shift). We also examine whether discourse status also influences the use of overt pronouns as opposed to NPs in Turkish. We expect that overt pronouns will be less influenced by the discourse status of referents but mainly by pragmatic context -unlike in non- pro drop languages. If so, this raises interesting questions such as whether the presence/ absence of gestures still align with the richness of referring expressions in speech (i.e., NPs vs. overt pronouns) and/ or discourse status of referents and the pragmatic context. As such, this study aims to be the first comprehensive investigation of speech and gesture synchrony in discourse in a pro-drop language. The findings of this study will expand and generalize our understanding of the principles of coordinating information in speech and gesture during reference tracking as a multimodal phenomenon.

2. Background

2.1. Reference tracking in speech

Previous studies have shown that speakers vary the form of referring expressions (REs) they use depending on the discourse status of referents that they mention. They tend to introduce and re-introduce referents with richer forms as noun phrases (NPs) but maintain them with reduced forms as pronouns. This relation between the richness of the referring expression and the discourse status conforms to the *Principle of Quantity* for topic continuity (Arnold, 2010; Givón, 1984; Perniss & Özyürek, 2015) and the *Accessibility Theory* (Ariel, 1990). That is, new and less

accessible referents are expressed with richer expressions while reduced referring expressions are usually informative enough for maintained and more accessible referents. This principle is found to be present across typologically different spoken languages as well as in sign languages (Aksu-Koç & Nicolopoulou, 2015; Contamori & Dussias, 2016; Debreslioska & Gullberg, 2019; Hickmann & Hendriks, 1999; Hendriks, Koster & Hoeks, 2014; Perniss & Özyürek, 2015).

Even though different languages adhere to above principles during reference tracking, languages show variation with regard to which REs they prefer to mark the same discourse status. For example, while speakers of pro-drop languages like Italian and Turkish drop highly accessible referents (i.e., using null pronouns), speakers of non-pro-drop languages prefer using overt pronouns in such contexts (Carminati, 2002; Kibrik, 2011). Overt pronouns as referring expressions are also available in pro-drop languages, yet they are used for marking similarity, contrast or topic shift between the referents and therefore they are pragmatically marked forms compared to null pronouns (Carminati, 2002; Enç, 1986; Silva-Corvalán, 1994). It is not clear, however, whether and how discourse status of referents also influences the use of pronouns in pro-drop languages, and whether this influence interacts with the influence of pragmatic marking on referents.

Although there is rich literature on the use of overt and null pronouns in Turkish, the initial analyses were only theoretical (Enç, 1986; Erguvanlı-Taylan, 1986; Özsoy, 1987) or drew their data from fiction novels (Kerslake, 1987; Turan, 1995). A few studies with naturalistic production data from adults either focused on one form only (e.g. NPs only in Küntay, 2002) or collapsed overt and null pronoun in one category as a function of discourse status without focusing on the distribution of pronouns in pragmatic contexts (Aksu-Koç & Nicolopoulou, 2015). Hence, data driven analysis of overt pronouns in relation to null pronouns during reference tracking in adult Turkish is missing from the literature. In particular, whether discourse status of referents modulates the use of overt pronouns is still not very

clear. Additionally, previous studies of subject pronouns in pro-drop languages in general and also in Turkish have mostly focused only on the contexts in which pronouns *are* present and described the discourse–pragmatic function of the pronouns *only* in those contexts without looking for example also at the contexts in which null pronouns are used (e.g. Haznedar, 2010; Dođruöz, 2007). In this study, we address the use of referring expressions in Turkish in relation to both discourse status and pragmatic contexts with the aim of contributing to the existing literature on reference production.

2.2. Reference tracking in gesture

Speakers employ co-speech gestures in systematic ways during reference tracking. Similar to speech, gestures that accompany referring expressions have been found to be sensitive to accessibility and the discourse status of referents. Speakers are more likely to gesture while re-introducing referents than while maintaining them (Azar & Özyürek, 2015; Gullberg, 2006; Levy & Fowler, 2000; Levy & McNeill, 1992; Perniss & Özyürek, 2015; So & Lim, 2012; So, Lim & Tan, 2014; Yoshioka, 2008). Gestures are also argued to be sensitive to the richness of expression in speech such that speakers are more likely to gesture with referents that are expressed with richer forms in speech, e.g., NPs, as opposed to reduced forms, e.g., pronouns (Azar & Özyürek, 2015; Gullberg, 2006; Levy & McNeill, 1992; Marslen-Wilson, Levy, & Tyler, 1982; Perniss & Özyürek, 2015). Hence, similar to speech, gestures are sensitive to the *Principle of Quantity* for topic continuation (Givón, 1984) and the *Accessibility Theory* (Ariel, 1990).

The majority of previous findings on speech-gesture relation in discourse are based on non-pro-drop languages where the richness of the RE in speech (e.g., NPs vs. pronouns) goes hand-in-hand with discourse status of referents. That is, NPs are mainly used for re-introduced referents (low accessible) and pronouns for maintained (less accessible) referents in non-pro-drop languages (Contemori & Dussias, 2016; Hendriks et al., 2014; Perniss & Özyürek, 2015). Thus, in such languages it is not

possible to differentiate whether it is the richness of the expressions and/or the discourse status of the referent that gestures are sensitive to. Therefore, studying pro-drop languages where overt pronouns might *not* be associated with a particular discourse status can enable us to dissociate the influence of the richness of expression in speech from that of discourse status of referents on gesture production. This will shed new light into the relation of gesture production in relation to speech production during reference tracking.

As stated previously, the use of pronouns in pro-drop languages is assumed to be governed by the pragmatic context. As another novel contribution to the literature on multimodal reference tracking, here we also explore whether co-speech gestures that speakers use during reference tracking are also sensitive to pragmatic context in which overt pronouns are used. That is, we look at whether speakers are more likely to accompany pronouns with gestures when pronouns do mark referents for similarity or contrast in speech (regarding subject referents' states and actions) as opposed to when they do not. Although such relation has not been explored so far, it has been shown that prosodic prominence as a pragmatic marker in speech is mostly associated with beat gestures in both production and processing of language (Krahmer & Swerts, 2007). Beat gestures are short and quick hand movements such as up and down, or back and forth (McNeill, 1992) and they do not express content in relation to the speech they accompany. Whether gestures that accompany referring expressions during reference tracking are also sensitive to pragmatic marking is not known yet.

Research that has investigated speech-gesture interaction cross-linguistically and also in Turkish has mostly focused on motion event expressions (e.g. Furman, Küntay & Özyürek, 2014; Kita & Özyürek, 2003; Özyürek, 2002, Özçalışkan, 2016). Studies examining co-speech gestures accompanying referring expressions in Turkish on the other hand are very few and mostly about children's utterances. In a recent study, Ateş and Küntay (2018) found that by age 1;09, children showed

sensitivity to discourse status by using deictic gestures predominantly with new referents. Additionally, Turkish speaking children were found to use gestures to clarify potentially ambiguous speech (Ateş & Küntay, 2018; Demir, Özyürek & Goldin-Meadow, 2012). In Ateş and Küntay, for example, children were approximately six times more likely to use reduced REs (overt and null pronouns) for new referents when they did accompany those new referents with a pointing gesture as opposed to when they did not. It should, however, be noted that children in those two studies had referents available in their physical surrounding during data collection, which allowed them to point to the present objects when they underspecified them in speech (i.e., when they used overt or null pronouns for new referents). Most of these cases occurred when the children and the caregivers interacted about an object during toy-play. Therefore, how adult speakers of Turkish use gestures while referring to physically absent third person referents during narrative production and how discourse status, the type of referring expression that is used in speech, and the pragmatic marking of referents influence multimodal reference tracking are still open questions.

3. Present Study

This study examines multimodal reference tracking strategies in a pro-drop language, Turkish by eliciting narratives of two silent videos. With regard to speech, we ask how discourse status of referents modulates the use of overt pronouns as opposed to null pronouns and NPs. Additionally, we ask whether pragmatic context indeed modulates the use of overt versus null pronouns as previously suggested (Enç, 1986). With regard to gestures, we ask whether both discourse status of referents and the richness of the expressions in speech, i.e., NPs versus pronouns, modulate the presence/ absence of gestures even though pronouns in Turkish may not be associated with a certain discourse status (unlike in non-pro-drop languages where pronouns usually mark maintained referents). We also explored whether co-speech

gestures accompanying overt subject pronouns were sensitive to pragmatic context. That is, we analyzed whether overt pronouns that do mark similarity or contrast between referents in speech are more likely to be accompanied by gestures than overt pronouns that do not mark such information in speech.

As for our contribution to the literature on Turkish, first we study reference tracking in a controlled setting -controlling for the topics to be narrated and in a context in which referents to be mentioned are not physically present. Second, we do not a priori assume that pronouns are mainly used to mark pragmatic information. Instead, we examine the influence of the discourse status of referents in addition to pragmatic contexts as a possible factor that may also modulate the use of overt pronouns. Thus, we aim for a quantitative, hypothesis-testing driven approach to understanding the role of pronouns in Turkish rather than only describing the contexts where pronouns are used. Finally, we aim to understand reference tracking with a multimodal approach and study the use speech and gesture for third person subject referents in narratives by adult speakers of Turkish for the first time (see, however, Azar & Özyürek, 2015 for a similar research question with a smaller sample size).

3.1. The pronominal system of Turkish

Turkish is a pro-drop language that may have clauses without overt subject arguments (Kerslake, 1987) and the discourse-pragmatic context determines the choice between overt and null pronouns (Enç, 1986; Erguvanlı-Taylan, 1986; Özsoy, 1987; Kerslake, 1987; Turan, 1995). The third person pronoun in Turkish (*o* for singular and *onlar* for plural) does not encode gender or animacy. Furthermore, it has the same form as the distal demonstrative pronoun (Göksel & Kerslake, 2005).

Overt pronouns in Turkish are suggested to be mainly used when speakers mark pragmatic information such as similarity (see 3d) or contrast (see 4c) between different discourse referents and/or actions performed by those referents (Enç 1986; Kerslake, 1987). For example, in (3d), the similarity of the actions of the two

discourse referents, i.e. ordering coffee, is highlighted by the use of an overt pronoun as opposed to a null pronoun and the overt pronoun is accompanied by *da* ‘also’ which is a clitic that marks topic and focus in Turkish (Azar, Backus & Özyürek, 2016; Bican, 2000). In (4c) on the other hand, the overt pronoun is preferred over the null pronoun in order to contrast the actions of the two discourse referents in terms of failing versus passing the exam.

- (3) a. *Dün* \emptyset_j *Boğaz'da kahve iç-iyor-du-m.*
 Yesterday \emptyset Bosphorus-LOC coffee drink-PROG-PAST-1SG
 ‘Yesterday (I)_j was having coffee by the Bosphorus’
- b. *Pelin_k ben-i gör-müş.*
 Pelin I-DAT see-PAST.EV.3SG
 ‘Pelin_k saw me.’
- c. *\emptyset_k hemen yan-ım-a gel-di.*
 \emptyset at once next-POSS-DAT come-PAST.3SG
 ‘(She)_k came by at once.’
- d. *Q_k da bir kahve söyle-di.*
 She too a coffee order-PAST.3SG
 ‘She_k, too, ordered coffee.’
- (4) a. *Ahmet_i matematik sınav-ın-dan kal-mış.*
 Ahmet math exam-POSS-GEN fail-PAST-EV.3SG
 ‘Ahmet_i failed the math exam.’
- b. *Selin_m de aynı sınav-a gir-miş.*
 Selin too same exam-DAT take- PAST-EV.3SG
 ‘Selin_m too took the same exam.’
- c. *Ama q_m geç-miş.*
 But she pass- PAST-EV.3SG
 ‘But she_m passed.’

Overall, the relative distribution of null and overt pronouns in Turkish has been mainly studied only with regard to pragmatic context so far. However, it is not known whether and how discourse status of referents also plays a role on the quantitative distribution of these two forms in narratives.

3.2. Predictions

With regard to speech, we expect speakers to use mainly NPs to reintroduce referents and to use null pronouns to maintain referents considering Turkish is a pro-drop language (Enç, 1986). Therefore, we do not expect overt pronouns to be the dominant form in either re-introduced or maintained referent contexts. As for the use of overt pronouns in relation to null pronouns, one might expect the *relative* distribution of overt pronouns to be higher in reintroduced referent contexts than in maintained referent contexts considering *null pronouns* are assumed to be the default forms to mark high accessibility in pro-drop languages. We also expect the speakers to use overt pronouns mainly in contexts that signal similarity or contrast among discourse referents or their actions and states (i.e., pragmatically marked contexts) and to use null pronouns in contexts that do not signal such information (i.e., pragmatically unmarked contexts), in line with previous theoretical accounts of pronouns in Turkish (cf. Enç, 1986). As for the use of overt pronouns in relation to NPs, we expect the *relative* distribution of overt pronouns to be possibly higher in maintained referent contexts as we expect speakers to use mainly NPs in re-introduced referent contexts, considering such pattern has been found for several languages (Aksu-Koç & Nicolopoulou, 2015; Arnold, 2010; Contamori & Dussias, 2016; Hendriks, Koster & Hoeks, 2014; Perniss & Özyürek, 2015).

With regard to gestures, we expect to find an effect of both discourse status and the richness of RE on the production of gestures in Turkish. We predict that the speakers will be sensitive to the general principles of referent accessibility and they will be more likely to gesture with re-introduced referents than maintained referents. Furthermore, we expect speakers to be more likely to produce gestures when they express referents with NPs in speech compared to overt pronouns even though pronouns in Turkish might not be strongly associated with a certain discourse status in Turkish. Finally, if gestures are sensitive to pragmatic prominence of pronouns, we expect that overt pronouns will be more likely to be accompanied by gestures

when they mark similarity or contrast compared to when they do not mark such information.

4. Method

4.1. Participants

20 pairs of native speakers of Turkish studying in Istanbul (17 females; $M_{age} = 22.2$) participated in the study in return for payment or course credits. They had normal or corrected-to-normal vision and no history of language impairment.

4.2. Stimuli

We used two short silent videos to elicit narratives. In one video (kitchen video) three women were engaged in cooking activities (Perniss & Özyürek, 2015) and in the other video (office video) two women and a man were engaged in office activities (Azar et al., 2016, 2017). Both videos contained three characters to give speakers enough opportunities to switch between different characters so that they produce several referring expressions in each discourse status context. Figure 1 illustrates

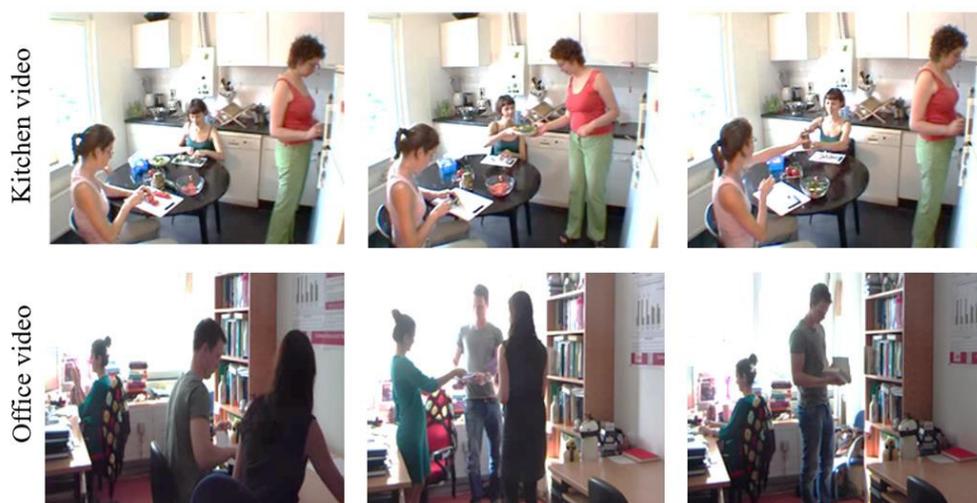


Figure 1. Stills from the two video stimuli, kitchen video at the top and office video at the bottom.

stills depicting different segments from each video. See *Appendix D* at the end of the thesis for a detailed list of the events that take place in each stimulus video.

4.3. Procedure

Participants were assigned roles as speaker or addressee randomly. Speakers watched two stimulus videos one by one on a laptop screen and narrated what they had watched to the addressees. The computer screen turned white after each video played and stayed white during the narrations. The addressees did not see the videos before or during the narrations. They could ask clarification questions once each narration was complete. They were also informed that they would be given two written short questions about each narrative. The purpose of this was to ensure that speakers included enough details in their narratives and that addressees paid attention to the narratives. Once the instructions were given, the experimenter left the room and came back after each narrative with the questions for the addressee. Each session was video-recorded.

4.4. Data coding

We used video and audio annotation tool ELAN for data transcription and annotation of both speech and co-speech gestures (see Lausberg & Sloetjes, 2009 for more information).

4.4.1. Speech coding

A native speaker of Turkish transcribed the data from 20 speakers. First, we divided the narratives into clauses, units with a single subject argument and a single predicate (Berman & Slobin, 1994). We coded coordinated clauses as separate clauses (e.g., “the woman who is cooking took the vegetables and she put them into the pan” was coded as two clauses). We coded only animate subjects to control for animacy as a possible factor affecting referent accessibility (Vogels, Maes & Krahmer, 2014; Rohde & Kehler, 2014) and omitted commentary about the characters (e.g., “I think she is the mother”) from the analyses to be able to compare our results to previous

studies of reference tracking in extended discourse, which followed a similar coding scheme (e.g., Debreslioska, Özyürek, Gullberg, & Perniss, 2013; Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioka, 2008).

Discourse status and referring expression type

We coded each subject referent for *discourse status* (*re-introduced*; *maintained*) taking into account subject-to-subject coreference, following Hickmann and Hendricks (1999). A *re-introduced* subject referent is mentioned in the previous discourse but not in the immediately preceding clause. A *maintained* subject referent, on the other hand, is the same referent as the subject of the immediately preceding clause. A referent is *maintained* only if the exact same referent was mentioned as the subject argument in the previous clause. That is, changes from plural to singular (e.g., from ‘three women’ to ‘one of the women’ in the next clause) or vice versa were coded as re-introduced (cf. Debreslioska et al., 2013). The first mention of referents, coded as *introduced*, was not included in the analyses, as we are interested in the use of REs once referents are introduced into discourse. Note that although we did not code and analyze the subject referents of commentary clauses, we took them into account while coding the subject of the next clause as either re-introduced or maintained.

We later coded each subject referent for one of the following referring expression (RE) types: *noun phrase (NP)* (see *Appendix E* at the end of the thesis for the detailed list of noun phrase constructions that occurred in our dataset, but note these were all collapsed), *overt pronoun* (personal pronoun, demonstrative pronoun, indefinite pronoun) and *null pronoun* (omitted subject referents). We coded constructions with omitted head nouns as NPs. Those were partitive constructions with an ablative where the head noun was omitted, e.g., (*kadınlardan*) *iki tanesi* ‘two of (the women)’ and constructions where the head noun that a relative clause modified was omitted e.g., *domates kesen (kadın)* ‘the (woman) who is/was cutting tomatoes’ (cf. Göksel & Kerslake, 2005). We coded pronominalized indefinite

determiners '*diğeri / öbürü*' 'other one' as pronouns, following Göksel and Kerslake (2005). Those pronouns were used scarcely and exclusively for re-introduced referents ($N = 14$). A second coder coded around 10% of the subject referring expressions for RE type and the two coders had 100% agreement, *Cohen's kappa* = 1.000, $p < .001$. Example (5) exemplifies coding of discourse status and RE type.

- (5) a. *Bir kadın_i bilgisayar-da çalış-ıyor.*
 A woman computer-LOC work-PROG.3SG
 'A woman_i is working on a computer.' introduced / NP
- b. *Bir erkek_i de kağıtları düzen-e sok-uyor.*
 A man paper-PL-ACC order-DAT put-PROG.3SG
 'A man_i is organizing sheets of paper.' introduced / NP
- c. *Ø_i sınıflandır-ıyor.*
 Ø categorize-PROG.3SG
 '(He)_i is categorizing (them).' maintained / null pronoun
- d. *Kadın_i telefon-u-nu al-ıyor.*
 Woman phone-POSS-ACC take-PROG.3SG
 'The woman_i is getting (her) phone.' re-introduced / NP

Pragmatic context

Two native speakers of Turkish coded clauses with an overt or a null subject pronoun for whether speakers organized clauses in a way that would signal *similarity* or *contrast* between different referents or between the propositions related to referents as well as *topic shift*. The two coders reached 100% agreement in a meeting where the initial discrepancies were discussed and resolved (*Cohen's kappa* for the initial agreement was .838, $p < .001$). (6c) is an example of *similarity* context; the subject referent of (6c) cannot open the jar in the stimulus video similar to the subject referent of (6a) who fails to open the jar as well. (6e) on the other hand is an example of *contrast*; the third woman in the stimulus video, the subject referent of (6e), opens the jar after the other two women fail to do so. (7e) is an example of *topic shift*. Clauses (7a-d) are about the cooking activities performed by the characters in the stimulus video while in (7e), the topic shifts from kitchen activities to speakers' not

talking to each other. There were only 4 cases of topic shift, which were all encoded with null pronouns and accompanied by topic markers as *bu arada* ‘by the way’.

- (6) a. *Domates kes-en kadın, bir kavanoz-u aç-am-ıyor.*
 Tomato cut-REL woman a jar-ACC open-NEG-PROG.3SG
 ‘The woman who is cutting tomatoes_t cannot open a jar.’ re-introduced / NP
- b. *Daha sonra diğer kızj al-ıyor.*
 Later other girl take-PROG.3SG
 ‘Later, the other girl_j takes (it).’ re-introduced / NP
- c. ***Q**da aç-am-ıyor.*
 She too open-NEG-PROG.3SG
 ‘**She**_j too cannot open (it).’ maintained / overt pronoun
- d. *Daha sonra anne-ler-ik dön-üyor.*
 Later mum-PL-POSS turn-PROG.3SG
 ‘Later, (their)mum_k turns around.’ re-introduced / NP
- e. ***Q**k aç-ıyor.*
 She open-PROG.3SG
 ‘**She**_k opens (it).’ maintained / overt pronoun
- (7) a. *Üç tane bayan_k var.*
 Three women there are
 ‘There are three women_k.’ introduced / NP
- b. *Ø_k yemek yap-ıyor-lar.*
 Ø cook-PROG-PL.3PL
 ‘(They)_k are cooking.’ maintained / null pronoun
- c. *İki tane-si_z masa-da.*
 Two-ACC table-LOC.3PL
 ‘Two (of them)_z are at the table.’ re-introduced / NP
- d. *Masa-da-ki-ler_z domates salatalık falan kes-iyor-lar.*
 Table-LOC-REL-PL tomato cucumber cut-PROG-PL.3PL
 ‘The ones who are at the table_z are cutting tomato, cucumber. maintained / NP
- e. *Bu arada Ø_z hiç konuş-mu-yor-lar.*
 By the way Ø none talk-NEG-PROG-PL.3PL
 ‘By the way, (they)_z are not talking at all.’ maintained / null pronoun

Additionally, we coded whether pronouns were accompanied by the emphatic marker *da* ‘also’ (as in 6c). This clitic has been suggested to be a focus

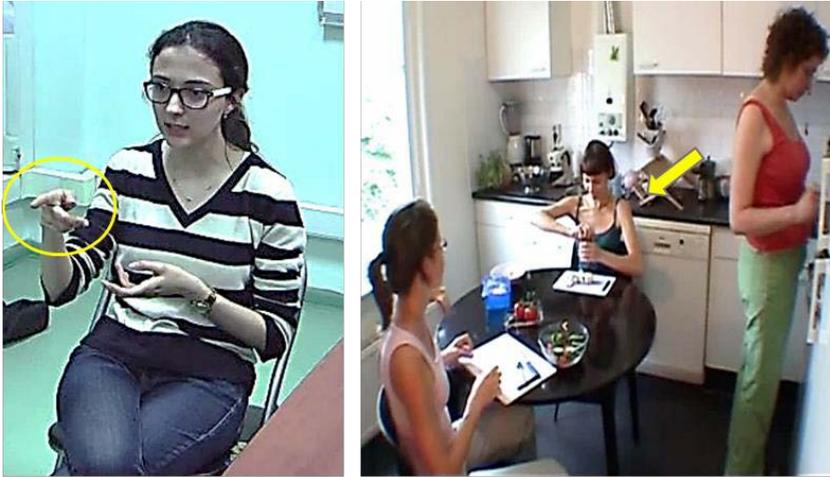
marker (Enç, 1986) in Turkish and it has been shown to accompany pronouns when used for maintained subjects marking similarity (Azar et. al., 2016).

4.4.2. Gesture coding

We first identified the gesture strokes, the meaningful part of the gestural movement (Kendon, 2004; McNeill, 1992) as the expressive segments of the stream of manual production (Kita, van der Hulst, & van Gijn, 1998). Later we coded co-speech gestures that temporally aligned with subject arguments in speech. Following previous studies of multimodal reference tracking (Gullberg, 2006; Yoshioka, 2008; Perniss & Özyürek, 2015), we coded the presence/ absence of a gesture for each subject referring expression in speech. Therefore, each gesture that accompanied a referring expression had a single value with regard to discourse status (re-introduced or maintained) and the RE type in speech (NP or overt pronoun). Note that when the subject argument was dropped in speech as in the case of null pronouns, the subject slot was linguistically empty and therefore, it was not possible for gestures to temporally align with the subject. Hence, we only analyzed co-speech gestures that temporally aligned with subject arguments that were expressed with either an NP or an overt pronoun in speech.

We only analyzed the gestures that anchored subject referents in gesture space (see Figure 2 and Figure 3) by means of an *index-finger* pointing or a *whole-hand* extended gesture because when gestures were located as such, there was a link between the location of those gestures in gesture space and the location of the characters in the stimulus videos. This made it easier to judge whether gestures were indeed associated with the subject referents. There were in total 210 subject referring expressions that were accompanied by such gestures and both types of gestures occurred equally frequently in the data set (47% index-finger and 53% whole-hand gestures). A second coder coded around 30% of the gestures for reliability. The two coders had an initial agreement of 85% for the presence of a stroke and high agreement for the gesture type (index finger or whole hand gestures versus any other

category of gestures, *Cohen's kappa* = .884, $p < .001$). The two coders resolved all disagreements in a meeting.



Daha sonra **diğer kız** alıyor (kavanozu). re-introduced / NP
 ‘Then **the other girl** is taking (the jar).’

Figure 2. The speaker re-introduces the character that is highlighted in the picture with an NP in speech. Her index-finger pointing gesture temporally aligns with the subject NP **in bold**.



a. Yan tarafta anne_k var. introduced / NP
 b. **O_k** da bir şeyler doğruyor. maintained / overt pronoun

a. ‘There is mum_k at the side.’
 b. ‘**She_k** too is chopping something.’

Figure 3. The speaker maintains the character that is highlighted in the picture with an overt pronoun in speech. Her index-finger pointing gesture temporally aligns with the subject pronoun **in bold**.

We excluded two classes of gestures that we believed were unlikely to be associated with subject referents, that is, iconic and beat gestures. We excluded beat gestures because they do not depict information about the referent but rather direct attention to the rhythmical peak of speech (McNeill, 1992). We excluded iconic gestures (e.g., a *stirring* gesture or a *cutting* gesture) because we considered them to be more about the predicate rather than specifically about subjects as they were not localized in gesture space associated with subject referents and most of them overlapped not only with subject REs but their production was temporally extended to the production of the predicates of the clauses. In total we excluded 55 gestures that temporally aligned with subject referring expressions; 25 of those gestures were iconic gestures and 30 were beat gestures.

5. Analyses

We analyzed the data using generalized logistic mixed effect regression using the *glmer* function from the *lme4* package in *R software* (cf. Bates, Maechler, Bolker & Walker, 2015), version 3.3.2. All analyses made use of variants of the generalized linear model with binomial error structure because the dependent variables were binary, coded as 1 for presence and as 0 for absence of a category (following Debreslioska & Gullberg, 2019). The analyses accounted for the random variation for participants by including random intercepts and random slopes in the models (see Baayen, Davidson & Bates, 2008 for more information on mixed-effects modelling in language research). Sometimes a *maximal* model with both random intercepts and slopes (cf. Barr, Levy, Scheepers & Tilly, 2013) did not converge, or the model returned a perfect correlation (± 1.00) between the random factors, which suggests the data might have been over-fitted. See *Appendix 1* at the end of this chapter for fixed and random effect structures of the statistical models.

Below, we explain the procedure that we followed in those cases for each analysis. Although all analyses were run on presence/ absence of a category as the

dependent variable, figures show mean proportions of a category across all participants for ease of illustration.

6. Results

6.1. Reference tracking in speech

The speakers produced 969 subject referring expressions in total, 561 of which were maintained referents (10 % NPs, 10% overt pronouns, 80% null pronouns) and 408 were re-introduced referents (74% NPs, 7% overt pronouns, 19% null pronouns). This distribution shows that the most commonly used RE types in Turkish are NPs and null pronouns; NPs mainly used for re-introduced referents and null pronouns for maintained referents. We will first report the analyses on the use of overt pronouns as opposed to null pronouns, and later on the use of overt pronouns as opposed to NPs.

6.1.1. Overt versus null pronouns

We first examined the effect of discourse status and pragmatic context on the use of overt as opposed to null pronouns, excluding NPs from the analysis. Figure² 4 illustrates the proportions of overt pronouns in re-introduced and maintained referent contexts (note that the proportion of overt and null pronouns together add up to 100% in each context). See (6c) and (6e) for examples of subject referents in pragmatically marked contexts, that is the contexts that signal similarity or contrast between referents or the actions related to them. The dependent variable was presence/absence of overt pronoun and the fixed factors were Discourse Status (maintained, re-introduced) and Pragmatic Context (marked, unmarked). The maximal model

² In all the boxplots, the intermediate horizontal lines indicate the median (the mid-point of the data), the boxes represent the range of the middle 50% of the data, the whiskers represent the range of the upper and lower 25% of the data. The horizontal lines at the end of the whiskers indicate the maximum and the minimum values, excluding the outliers. The Outliers are indicated by filled circles if there are any and mean values are indicated by the cross marks. Mean values are given as text on top of the plots as well.

with random intercepts for participants and by-participant random slopes for Discourse Status and Pragmatic Context did not converge. Following the advice in Brauer and Curtin (2017, p.16), we first removed the interaction of random slopes for Discourse Status and RE Type from the model, however the model still did not converge. Next, we forced random intercept and slopes not to be correlated, which again returned a non-converging model. We then removed the random intercepts from the model, however the model still did not converge. Finally, we removed the random slopes and re-introduced random intercepts into the model³, which this time converged. Note that by excluding the random slopes from the model, we assume that the effect of Discourse Status and Pragmatic Context on the use of REs is invariant across participants. The analysis did not return a significant main effect of Discourse Status ($\beta = 0.818$, $SE = 0.446$, $z\text{-value} = 1.834$, $p = .066$), but there was a significant main effect of Pragmatic Context ($\beta = -3.299$, $SE = 0.351$, $z\text{-value} = -9.391$, $p < .00001$). There was no significant interaction of Discourse Status and Pragmatic Context ($\beta = 0.397$, $SE = 0.642$, $z\text{-value} = 0.619$, $p = .536$).

The analysis suggests that the discourse status of referents did not influence the use of overt pronouns as opposed to null pronouns – even though there was a trend for using overt pronouns as opposed to null pronouns more often in re-introduced referent context than in maintained referent contexts. On the other hand, the speakers used overt pronouns as opposed to null pronouns more often in marked contexts than in unmarked contexts, which is in line with previous theoretical analyses of overt versus null pronouns in Turkish. Table 1 summarizes the

³When the model with random slopes failed to converge, we also tried a different approach where we started with a ‘simpler’ model with only fixed factors and by-participant random intercepts, added random slopes for one fixed factor at a time (first Discourse Status, then removing Discourse Status and introducing Pragmatic Context) and compared the ‘fuller’ model with the random slope to the intercept-only model. The likelihood ratio test examining the variation accounted for when including/excluding random slopes in the model showed that adding by-participant random slopes for Discourse Status or Pragmatic Context did not account for more variation than the model with by-participant random intercepts only $\chi^2(2) = 1.112$, $p = .573$ and $\chi^2(2) = 0.819$, $p = .664$, respectively. We therefore report the model only with random intercepts.

distribution of overt and null pronouns across marked and unmarked contexts in re-introduced and maintained referent contexts. 62% of overt pronouns that were used in pragmatically marked contexts marked referents for *similarity* and 38% for *contrast*. Additionally, once speakers used pronouns to mark the similarity of actions performed by two referents, they accompanied 100% those pronouns ($N = 38$) with the focus marker *dA* ‘also’.

Note that the speakers used null pronouns in re-introduced referent contexts relatively often. This occurred mainly when referents had been previously introduced as a group performing a joint activity a few clauses earlier (e.g., two girls are slicing vegetables at the table). When those referents were re-introduced further in the discourse, they were re-introduced with a null pronoun (e.g., *Ø bir kavanoz açamaya çalışıyorlar* ‘(They) are trying to open a jar’) and the predicate was marked for 3rd person plural (*-IAr*) and therefore the subject referent was unambiguous.

Table 1. *The distribution of overt and null pronouns that were used for pragmatically marked and unmarked referents in maintained and re-introduced referent contexts*

	Maintained Referent Contexts		Re-introduced Referent Contexts	
	Marked	Unmarked	Marked	Unmarked
Overt pronoun	40 (48%)	14 (3%)	21 (68%)	8 (10%)
Null pronoun	43 (52%)	406 (97%)	10 (32%)	69 (90%)
<i>Total</i>	<i>83 (100%)</i>	<i>420 (100%)</i>	<i>31 (100%)</i>	<i>77 (100%)</i>

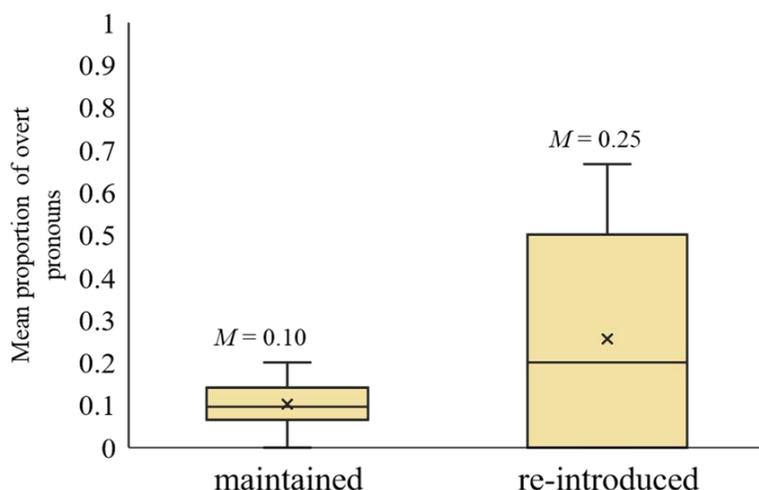


Figure 4. Mean proportions of overt pronouns out of all overt and null pronouns in maintained ($N = 503$) and re-introduced ($N = 108$) referent contexts. The intermediate horizontal lines indicate the median and the cross marks indicate mean values.

6.1.2. Overt pronouns versus NPs

We next examined whether discourse status also influenced the use of overt pronouns as opposed to NPs in Turkish. This time we analyzed overt pronouns and NPs only, excluding null pronouns from the analysis. The dependent variable was presence/absence of overt pronoun (as opposed to an NP) and the fixed factor was Discourse Status (maintained, re-introduced). Figure 5 illustrates the proportions of overt pronouns in re-introduced and maintained referent contexts. The maximal model with random intercepts for participants and by-participant random slopes for Discourse Status returned a perfect correlation between the random factors (1.00), which indicates that the model might have been over-fitted. We first took out the interaction of random factors by forcing the random intercepts and random slopes not to be correlated. That model still returned a perfect correlation (1.00) between the slopes for two levels of Discourse Status (maintained, re-introduced). We then simplified the model by taking out random slopes. Note that by excluding the

random slopes for Discourse Status from the model, we assume that the effect of Discourse Status on the use of REs is invariant across participants. The simplified model⁴ with only random intercepts returned a significant main effect of Discourse Status ($\beta = -2.293$, $SE = 0.278$, $z\text{-value} = -8.243$, $p < .00001$) such that speakers used overt pronouns as opposed to NPs less frequently in re-introduced referent contexts than in maintained referent contexts.

The findings so far show that speakers of Turkish prefer null pronouns over overt pronouns to maintain referents, and NPs over overt pronouns to re-introduce referents. Therefore, it seems that the use of overt versus null pronouns in Turkish is not strongly associated with discourse status but with pragmatic context.

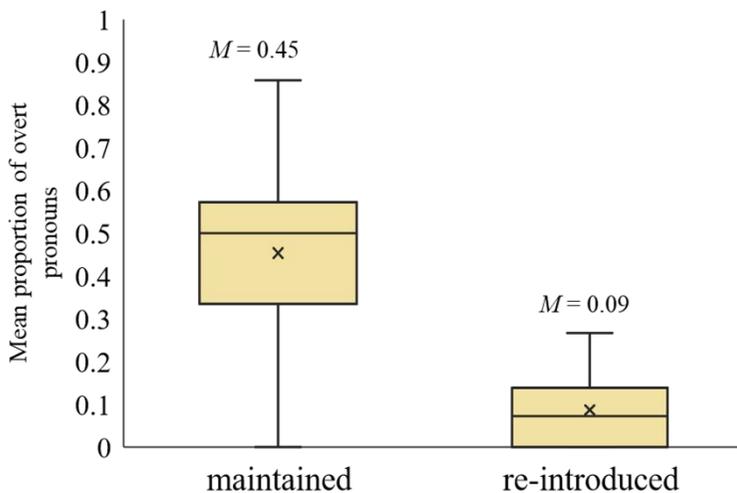


Figure 5. Mean proportions of overt pronouns out of all overt pronouns and NPs in maintained ($N = 112$) and re-introduced ($N = 329$) referent contexts. The intermediate horizontal lines indicate the median and the cross marks indicate mean values.

⁴The log likelihood ratio test comparing the models with and without random slopes suggested that the model with random slopes did not account for more variation $\chi^2(3) = 1.152$, $p = .765$.

6.2. Reference tracking in gesture

Out of 441 subject referring expression in speech (NPs and pronouns), 210 were accompanied by gestures that temporally aligned with them. Table 2 summarizes the raw speech and gesture data across referring expression types and discourse status categories.

Table 2. *The total number of referring expressions in speech and gestures accompanying them in maintained and re-introduced referent contexts*

	Speech		Gesture	
	NP	Overt Pronoun	NP	Overt Pronoun
Maintained	58	54	22	11
Re-introduced	300	29	164	13
<i>Total</i>	<i>358</i>	<i>83</i>	<i>186</i>	<i>24</i>

We first tested the effect of Discourse Status (maintained, re-introduced) and richness of expression in speech (i.e., RE Type - NP or overt pronoun) on the speakers' likelihood of accompanying subject referents with a gesture (see Figure 6 for the mean proportions of NP and overt pronouns in speech that were accompanied by gestures across maintained and re-introduced referent contexts). The dependent variable was presence/ absence of a gesture. The maximal model with random intercepts for participants and by-participant random slopes for Discourse Status and RE Type did not converge. We followed the same procedure as in the analysis for the influence of discourse status and pragmatic context on the use of overt as opposed to null pronouns in speech. That is, we first removed the interaction of random slopes for Discourse Status and RE Type, however the model still did not converge. Next, we forced the random intercepts and slopes not to be correlated, which returned a converging model. The analysis returned a significant main effect of Discourse Status ($\beta = 0.676$, $SE = 0.328$, $z\text{-value} = 2.062$, $p = .039$) and a significant main effect

of RE Type ($\beta = -1.134$, $SE = 0.538$, $z\text{-value} = -2.109$, $p = .035$) but no significant interaction of the two ($\beta = 0.834$, $SE = 0.686$, $z\text{-value} = 1.216$, $p = .224$). The analyses revealed that the speakers were more likely to gesture with re-introduced referents than with maintained referents and also were more likely to gesture with NPs than with pronouns.

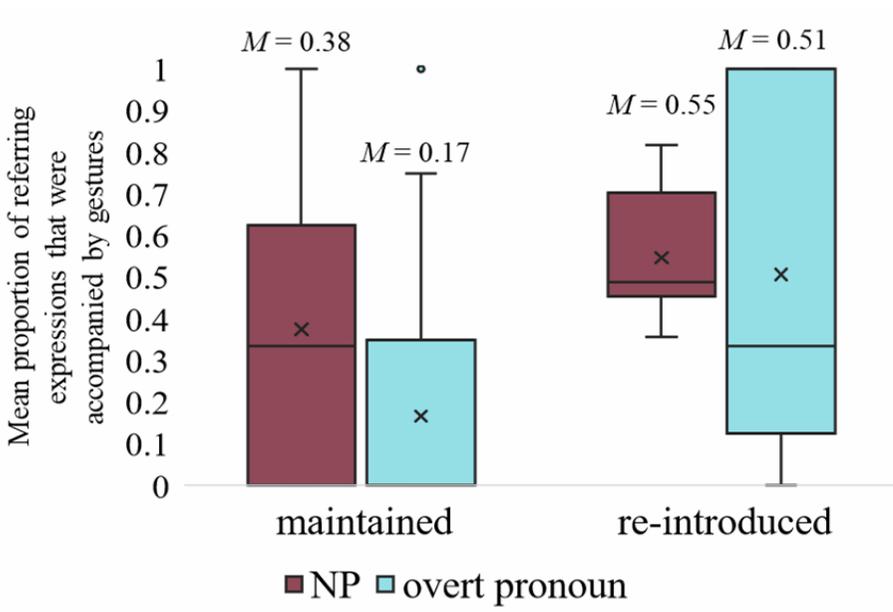


Figure 6. Mean proportions of NPs and overt pronouns in maintained and re-introduced referent contexts that were accompanied by gestures (calculated as the number of REs that were accompanied by gestures divided by the number of REs in speech across participants). The intermediate horizontal lines indicate the median and the cross marks indicate mean values.

Finally, we examined whether pragmatic context influenced the speakers' likelihood of accompanying overt pronouns by gestures. The dependent variable was the presence/absence of a gesture accompanying pronouns and the fixed factor was Pragmatic Context. The maximal model with random intercepts for participants and by-participant random slopes for Pragmatic Context returned a perfect correlation between the random factors (1.00). We first took out the interaction of random factors by forcing the random intercepts and random slopes not to be

correlated. That model still returned a perfect correlation (1.00) between the slopes for the two categories of Pragmatic Context (marked, unmarked). We then simplified the model by taking out random slopes⁵. Note that by excluding the random slopes for Pragmatic Context from the model, we assume that the effect of Pragmatic Context on the use of gestures with overt pronouns is invariant across participants. The simplified model with only random intercepts for participants did not return a significant main effect of Pragmatic Context ($\beta = 0.199$, $SE = 0.568$, z -value = 0.350, $p = .726$). The analysis suggests that the gestures accompanying subject pronouns during reference tracking in Turkish are not sensitive to pragmatic information the pronouns mark in speech. Table 3 summarizes the proportion of pragmatically marked and unmarked overt pronouns that were accompanied by gestures.

Table 3. *Proportion of pragmatically marked and unmarked overt pronouns in speech that were accompanied by gestures. The proportions were calculated as the number of pronouns that were accompanied by gestures divided by the number of pronouns in speech*

	Number of pronouns in speech	Number of pronouns with gestures	Proportion
Marked	61	16	26 %
Unmarked	22	7	32%
<i>Total</i>	83	23	30%

7. Summary of the Findings and Discussion

In this study, we investigated multimodal reference tracking strategies in Turkish as a typologically different language than the majority of languages that have been studied in this domain. Previous studies in non-pro-drop languages (e.g., English, German) have shown that gestures are more likely to accompany re-introduced referents than maintained referents and also the referents that are expressed with

⁵The log likelihood ratio test comparing the models with and without random slopes suggested that the model with random slopes did not account for more variation $\chi^2(3) = 0.005$, $p = .999$.

richer expressions in speech as opposed to reduced expressions. In those languages, however, the richness of the referring expressions (REs) in speech (e.g., NPs vs. pronouns) goes hand-in-hand with discourse status of referents. That is, NPs are mainly used for re-introduced referents (low accessible) and pronouns for maintained (less accessible) referents. Therefore, in non-pro-drop languages, it is not possible to differentiate whether it is the richness of the REs and/or accessibility of the referents that gestures are sensitive to. Here, we investigated whether previous findings for the influence of discourse status and richness of referring expressions in speech (i.e., NP versus pronoun) on gesture production also held for pro-drop Turkish, a language where the use of pronouns may not necessarily be associated with the discourse status of referents but with pragmatic context, i.e., whether referents are marked for pragmatic information such as similarity, contrast, topic shift or not.

7.1. Reference tracking in speech

We investigated the role of discourse status and pragmatic contexts on the use of subject referring expressions (NPs, overt and null pronouns) in Turkish in a comprehensive way.

In line with the general principles of reference tracking, we found that speakers of Turkish used richer forms, i.e., NPs, dominantly for re-introduced referents and they used reduced forms, i.e., null pronouns, for maintained referents. As for the use of overt pronouns as opposed to null pronouns, there was no strong association between the discourse status of referents and the use of pronouns –even though there was a trend for using overt pronouns more often in re-introduced referent contexts than in maintained referent contexts. This trend may suggest that the competition between overt and null pronouns is stronger in re-introduced referent contexts (25% overt pronouns as opposed to 75% null pronouns) than in maintained referent contexts (10% overt pronouns and 90% null pronouns). Note, however, that the relative distribution of the two forms in Turkish differs from that in non-pro-drop

language where null pronouns would be infrequently used and overt pronouns would be preferred over null pronouns in maintained referent contexts.

On the other hand, pragmatic context modulated the use of overt pronouns as opposed to null pronouns. Speakers were more likely to use overt pronouns in the contexts that signaled similarity or contrast among discourse referents (i.e., pragmatically marked contexts) while null pronouns were dominantly used in the contexts that did not signal such information (i.e., pragmatically unmarked contexts). These findings are in line with previous theoretical accounts of the pragmatic status of pronouns in Turkish.

As for the use of overt pronouns as opposed to NPs, we found that speakers used fewer overt pronouns in re-introduced referent contexts compared to maintained referent contexts. Additionally, they did not seem to have a strong preference for overt pronouns over NPs in maintained referent contexts (45% overt pronouns and 55% NPs). This is different from what we would see in non-pro-drop languages where speakers would have a strong preference for overt pronouns in such contexts (e.g., 97% overt pronouns and 3% NPs in maintained referent contexts in German in Perniss and Özyürek, 2015).

Overall speech findings showed that speakers of Turkish preferred null pronouns over overt pronouns to maintain referents, and NPs over overt pronouns to re-introduce referents. Considering overt pronouns were not used as a default/preferred marker of a certain discourse status, we can say that overt pronouns in Turkish are not strongly associated with discourse status but their main function is to mark pragmatic information. Based on our findings, we suggest that even though discourse status is a universal strategy that governs the choice between richer and reduced REs in general, the scope and the details of its effect may show cross-linguistic variation.

7.2. Reference tracking in gesture

With regard to gestures, we investigated whether both discourse status of referents and the richness of the expressions in speech, i.e., NPs versus overt pronouns, modulated the presence/ absence of gestures. We also explored whether co-speech gestures accompanying overt subject pronouns were sensitive to pragmatic context. That is, we analyzed whether overt pronouns that do mark similarity or contrast between referents in speech are more likely to be accompanied by gestures than overt pronouns that do not mark such information in speech.

Even though we did not find the use of overt pronouns to be strongly associated with the discourse status of referents in speech, we found that gestures were influenced by both the discourse status of referents and the richness of referring expressions that were used in speech. Speakers of Turkish were more likely to gesture with re-introduced referents than with maintained referents. Speakers were also more likely to accompany referents with gestures when referents were expressed with an NP as opposed to a pronoun in speech. Hence, speakers of Turkish produced gestures in ways that were in line with the *Principle of Quantity* for topic continuity (Givón, 1984) and the *Accessibility Theory* (Ariel, 1990). Therefore, our findings are in line with those of previous studies that examined multimodal reference tracking mainly in non-pro-drop languages (Debreslioska & Gullberg, 2019; Gullberg, 2006; Levy & McNeill, 1992; Perniss & Özyürek, 2015). As a novel contribution to the literature, we showed that this is also the case in a pro-drop language, suggesting that speakers take both discourse status and the richness of speech into account while accompanying discourse referents with gestures as a possibly language-general strategy of multimodal referent tracking. Additionally, speakers of Turkish gestured with NPs more than with pronouns even though pronouns were not strongly associated with the discourse status of referents in Turkish, which contributes to the idea that speech and gesture are parts of an integrated system (Kita & Özyürek, 2003; McNeill, 1992; So et al., 2009) and

gestures are sensitive to the richness of expression in speech. Our findings show that this is the case also in a pro-drop language.

As an additional note, the speakers in this study accompanied 51% of overt pronouns with gestures when overt pronouns were used in re-introduced referent contexts. If we compare this proportion to that in German, for example, Perniss and Özyürek (2015) found that only 15% of overt pronouns in re-introduced referent contexts were accompanied by gestures (we calculated the proportions from the numbers provided in Table 1 in Perniss & Özyürek, 2015). It seems that pronouns in Turkish are relatively frequently accompanied by gestures when they are used in low-accessibility contexts compared to non-pro-drop German (see Figure 7 for an example of gestures accompanying pronouns in re-introduced referent contexts in the narratives we elicited). We suggest that this difference might point to a language-specific effect. Speakers of German may not frequently accompany overt pronouns with gestures because pronouns are habitually high accessibility markers in German, and expressions that mark high accessibility in speech are usually not accompanied by gestures. Thus, pronouns may be associated with infrequent gestures in German. In Turkish, however, pronouns are not strongly associated with high accessibility and possibly not with infrequent gestures, either. Pronouns then may be more likely to be accompanied with gestures in Turkish compared to a non-pro-drop language like German. It is also possible that speakers of Turkish use gestures to disambiguate referents when they are underspecified in speech in low-accessibility contexts, as it would be the case when pronouns are used for re-introduced referents. This would be in line with what Ateş and Küntay (2018) found for Turkish speaking children. That is, children usually accompanied pronouns with gestures to disambiguate their speech when they used pronouns in low-accessibility contexts. Speakers of Turkish from very early on may develop a strategy of using gestures to specify potentially ambiguous referents when they use reduced expressions in speech, which they continue doing when they are adults, as well. Note that we did not systematically

investigate the relation between under-specificity in speech and gestures in this study. Hence, a proposal like we outlined here would merit further research.

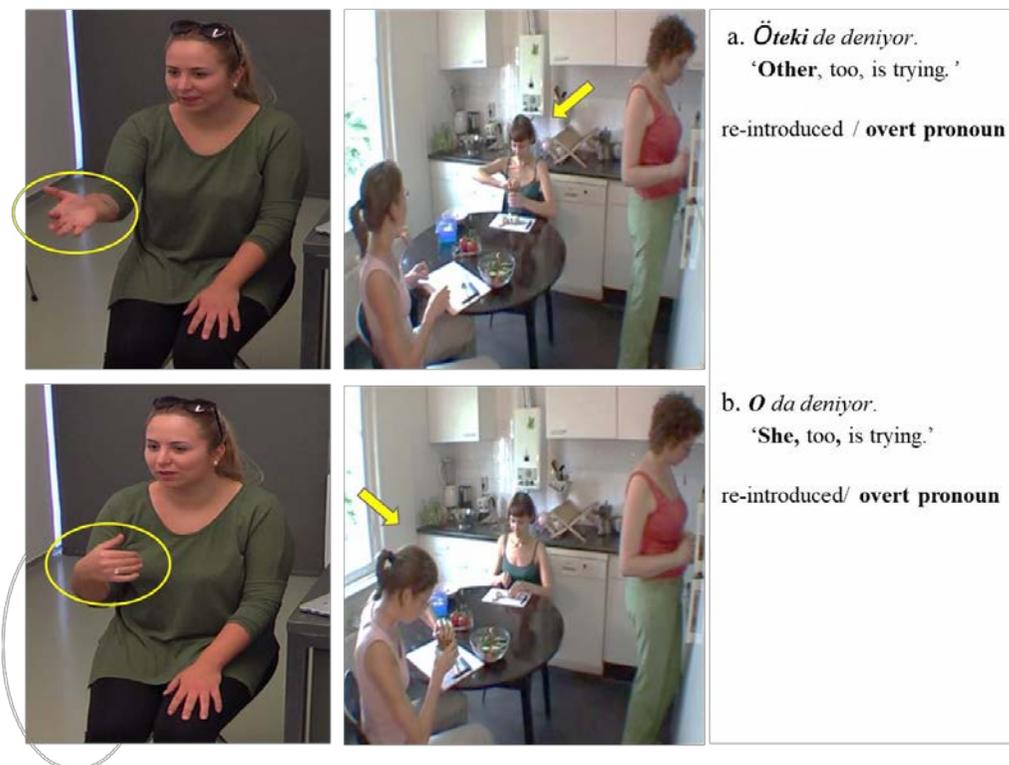


Figure 7. The speaker first mentions that the two women sitting at the table cannot open a jar. Then she re-introduces the character that is highlighted in still (a) with a pronominalized indefinite determiner and the character that is highlighted in still (b) with a third-person pronoun. Her whole-hand gestures temporally align with the subject pronouns **in bold** in both (a) and (b).

8. Conclusion

We investigated the relations between speech and gesture during reference tracking in a pro-drop language, i.e., Turkish. We showed that overt pronouns were not strongly associated with the discourse status of referents in Turkish unlike in non-pro-drop languages where overt pronouns are the most commonly used RE type for maintained referents. Nevertheless, we found that speakers of Turkish were more likely to accompany subject referents with gestures when referents were re-

introduced as opposed to maintained and when referents were expressed with NPs as opposed to overt pronouns in speech. Our findings, therefore, support those from previous research on multimodal reference tracking which showed that the discourse status of referents and the richness of expression used in speech influence the use of gestures in discourse. Studying multimodal reference tracking extensively in a pro-drop language for the first time, we showed that both of these factors influence gesture production possibly as a language-general strategy. Furthermore, as a possible language-specific finding, when pronouns were used in low-accessibility contexts in Turkish, they were likely to be accompanied by gestures more often than found for non-pro drop languages in such contexts - possibly to disambiguate referents. The claims we present here, however, would merit further research on pro-drop languages different from Turkish. Finally, we showed that even though pronouns in pro-drop languages were modulated by whether referents are pragmatically marked or not (e.g., for similarity or contrast), gestures were not sensitive to this kind of pragmatic information.

Studying a typologically different language, the findings we presented here illuminate further mechanisms underlying the orchestration of speech and gesture and they could be important for theories that try to account for the relations between information encoded in speech and gesture at the discourse level.

9. Acknowledgements

This research is funded by the Center for Language Studies, Radboud University Nijmegen, the Netherlands and partially by the Erasmus Staff Training grant granted to the first author by the International Office Radboud University. The Max Planck Institute for Psycholinguistics also provided technical support. We thank Dr. Ayşe Caner and Dr. Nihan Ketrez for providing the location and participants for the data collection in Istanbul, Turkey. We also thank Dr. Pamela Perniss for the kitchen stimulus video, Dr. Ercenur Ünal for the pragmatic context reliability coding, Dr.

Derya Demirçay for referring expression type reliability coding and Dr. Kazuki Sekine for the gesture reliability coding. We are also grateful to Dr. Susanne Brouwer for advice with the statistical analyses.

10. Appendices

Appendix 1. Fixed and random effect structures of the statistical models

Table 1.1. *Fixed effect structures of the statistical models*

	Dependent variable	Name	Fixed Factors			
			Estimate	SE	z-value	p-value
Models for Speech	RE type (overt pronoun/ null pronoun)	<i>Intercept</i>	-0.079	0.227	-0.347	.729
		<i>Discourse Status</i> (maintained/ re-introduced)	0.818	0.446	1.834	.066
		<i>Pragmatic Context</i> (marked/ unmarked)	-3.299	0.351	-9.391	< 2e-16
	RE type (overt pronoun/ NP)	<i>Discourse Status X Pragmatic Context</i>	0.397	0.642	0.619	.536
		<i>Intercept</i>	-0.092	0.212	-0.431	.666
		<i>Discourse Status</i> (maintained/ re-introduced)	-2.293	0.278	-8.243	< 2e-16
Models for Gesture	gesture presence (yes/ no)	<i>Intercept</i>	-0.487	0.286	-1.704	.088
		<i>Discourse Status</i> (maintained/ re-introduced)	0.676	0.328	2.062	.039
		<i>RE Type</i> (NP/ pronoun)	-1.134	0.538	-2.109	.035
		<i>Discourse Status X RE Type</i>	0.834	0.686	1.216	.224

gesture presence (yes/no) (for overt pronouns)	<i>Intercept</i>	-1.017	0.350	-2.908	.004
	<i>Pragmatic Context</i> (marked/ unmarked)	0.199	0.568	0.350	.726

Table 1.2. *Random effect structure of the statistical models for speech and gesture*

		Random Factors				
	Dependent variable	Group	Name	Variance	SD	Correlation
Models for Speech	RE type (overt pronoun/ null pronoun)	participant	Intercept	0.021	0.146	
	RE type (overt pronoun/ NP)	participant	Intercept	0.132	0.364	
Models for Gesture	gesture presence (yes/ no)	participant	Intercept	1.318e-10	0.00001	
		participant	RETypeNP	0.098	0.314	
		participant	RETypePronoun	0.396	0.629	0.50
	participant	DiscourseStatusRe-introduced	0.326	0.571	-0.95 -0.20	
	gesture presence (yes/ no) with overt pronouns	participant	Intercept	0.277	0.527	

Chapter 4

Language Contact Does Not Drive Gesture Transfer

This chapter is based on

Azar, Z., Backus, A., & Özyürek, A. (published online 30 April 2019). Language contact does not drive gesture transfer: Heritage speakers maintain language specific gesture patterns in each language. *Bilingualism: Language and Cognition*, <https://doi.org/10.1017/S136672891900018X>. Open access

Language Contact Does Not Drive Gesture Transfer

This paper investigates whether there are changes in gesture rate when speakers of two languages with different gesture rates (Turkish-high gesture; Dutch-low gesture) come into daily contact. We analyzed gestures produced by second-generation heritage speakers of Turkish in the Netherlands in each language, comparing them to monolingual baselines. We did not find differences between bilinguals and monolingual speakers, possibly because bilinguals were proficient in both languages and used them frequently -in line with a usage-based approach to language. However, bilinguals produced more deictic gestures than monolinguals in both Turkish and Dutch, which we interpret as a bilingual strategy. Deictic gestures may help organize discourse by placing entities in gesture space and help reduce the cognitive load associated with being bilingual, e.g., inhibition cost. Therefore, gesture rate does not necessarily change in contact situations but might be modulated by frequency of language use, proficiency, and cognitive factors related to being bilingual.

1. Introduction

Understanding the influence of language contact, that is the interaction between different language communities, on the languages one speaks has been one of the central issues of bilingualism research (Matras, 2009; Thomason, 2001). Previous research on language contact has so far almost exclusively focused on the spoken modality, i.e., speech. Language production, however, is often multimodal and speakers tend to accompany their speech with gestures (Goldin-Meadow, 2003; McNeill, 1992), including speakers who are blind from birth (Iverson & Goldin-Meadow, 1997; Özçalışkan, Lucero & Goldin-Meadow, 2016). There is also growing evidence that gesture and speech form a single, integrated system (McNeill, 1992; Kendon, 2004; see Özyürek, 2017 for a review). Gestures convey lexical, syntactic and pragmatic information that is relevant to what is encoded in the speech they temporally overlap with (Alferink, 2015; Brown & Gullberg, 2008; Kendon, 2004; Kita & Özyürek, 2003; Kraemer & Swerts, 2007; Özçalışkan, 2016). Importantly, gestures differ crosslinguistically in terms of frequency and form (see Kita, 2009; Nicoladis, 2007; Özyürek, 2017 for review). Based on recurrent and frequent speech and gesture usage patterns within and across languages, some scholars have even argued for multimodal construction units in language within the tradition of Construction Grammar. (CG). These constructions are symbolic units that comprise multiple channels of conceptualization and expression (e.g., Langacker, 2008; Zima, 2014; Kok & Cienki, 2016). Moreover, language input is multimodal (Clark & Estigarribia, 2011; Goldin-Meadow, 2013) and from early on, bilingual children are exposed to the gestural repertoire of the two languages they grow up speaking.

Given the tight links observed between speech and gesture patterns and the crosslinguistic variations, it is an intriguing question whether and how gestures are influenced when two languages come into contact. Even though there is previous research on gesture production by second language (L2) learners with different

proficiency levels in their first and second language (e.g., Aziz & Nicoladis, published online 18 June 2018; Gullberg, 2006; Nicoladis, Pika, Yin & Marentette, 2007; Sherman & Nicoladis, 2004), no study so far has investigated what happens to gestures when languages come into contact by speakers of a heritage /minority language who were born and raised in a majority language context. Heritage speakers are typically second-generation immigrants whose home language is a minority language. They usually acquire the minority language as their first language (L1) at home during early years and the majority language as their second language (L2) to which they have increasing exposure after starting (pre)school (Montrul & Polinsky, 2011; Polinsky & Kagan, 2007).

This paper aims to contribute to the existing literature by exploring possible changes in gesture rate in general and also as a function of different types of gestures in a language contact context. It investigates gestures as produced by second-generation Turkish heritage speakers in the Netherlands (born and raised in Netherlands), studying bilingual speakers' gesture production in both Turkish and Dutch. Note that we expect Turkish to be a relatively higher gesture rate language than Dutch as Mediterranean cultures are usually found to relatively higher gesture cultures (Barzini, 1964; Cavicchio & Kita, 2013; Kendon, 1992; Scheflen, 1972). It compares bilingual gestures to monolingual baselines in each language. Note that throughout the paper, we use 'monolingual' as an operational term to refer to participants who were raised monolingually (i.e., in Turkey for Turkish and Netherlands for Dutch) and spoke only one of the languages that we study, Turkish or Dutch. All participants in this study, both bilingual and monolingual speakers, reported to have knowledge of English to some extent. However, none of the participants grew up with English as an early first language and they were all exposed to English after the age of 10 in a classroom context.

There is overall a high level of language attainment in the Turkish community in the Netherlands (Backus, 2012). Heritage speakers are usually exposed to mainly

Turkish at home and start to get exposed to Dutch as early as 4 years old when they start elementary school. Turkish community in the Netherlands, albeit integrated to the Dutch culture, is also highly connected among themselves and they also have close ties to culture in Turkey and to their acquaintances and relatives who are still living there (i.e., through watching Turkish TV at home and frequent visits to Turkey etc.). Hence, Turkish heritage speakers have frequent contact with both language communities throughout their lives. Bilingual speakers in this study have high proficiency in both Turkish and Dutch and use both languages regularly. Thus, gestures used by this population can reveal some insights about whether a) gestures of the minority language adapt to that of the majority language or b) bilingual speakers maintain the language specific gesture rates as they are proficient users in each language, and/or c) some cognitive factors such as the cognitive cost of inhibiting the task-irrelevant language can explain gesture use as bilinguals may exploit iconic and/or deictic gestures to help organize their speech and to reduce cognitive load (Nicoladis, 2006, 2007; Nicoladis, Pika & Marentette, 2009).

2. Background

2.1. Cross-linguistic differences in gesture

Gestures accompanying speech (i.e., co-speech gestures) can vary in form and function. For example, they may present images of physically present or absent concrete entities and/or actions (i.e., *iconic gestures*), locate physically non-present entities in gesture space (i.e., *abstract deictic gestures*), point at physically present objects (i.e., *concrete deictic gestures*) or be simple and rapid hand movements which direct attention to the rhythmical peak of speech (i.e., *beat gestures*) (McNeill, 1992, 2006). Irrespective of their form, gestures are tightly linked to speech (Kita & Özyürek, 2003; McNeill, 1992; So, Kita & Goldin-Meadow, 2009) and they convey relevant information to what is expressed in the parts of speech they overlap with (see Özyürek, 2017 for a review). Even though all types of gestures can be found in

different languages, there are also systematic cross-linguistic differences in patterns of gestures (cf. Gullberg, 2012; Kita, 2009).

One of the most studied domains in relation to cross-linguistic differences in gesture patterns is expression of motion events due to cross-linguistic variation in the linguistic encoding of path and manner of motion events (Talmy, 2000). For example, native speakers of English tend to conflate manner and path components of an event into a single clause in their speech (e.g., ‘The boy ran into the house’), while native speakers of Turkish tend to encode path information in verb in the main clause and optionally express manner outside the verb in another subordinate clause e.g., *Oğlan (koşarak) eve girdi* ‘The boy (by running) entered the house’ (cf. Özçalışkan, 2016). Following speech patterns, native speakers of English tend to conflate manner and path components into a single gesture (e.g., moving fingers in rapid movements while moving them forward as if running) while native speakers of Turkish tend to produce separate gestures for manner (i.e., ran) and path (i.e., entered) (Kita & Özyürek, 2003; Özçalışkan, 2016; Özçalışkan & Slobin, 1999). Therefore, speakers show cross-linguistic variation with regard to the shape and form of gestures that accompany speech (see for further evidence: Brown & Gullberg, 2008; Hickmann et al., 2011; Kita & Özyürek, 2003; McNeill & Duncan, 2000; Özçalışkan, 2016; Özyürek et al., 2008). Recently, similar gesture patterns have been found in a comparison of blind English and Turkish speakers’ motion event descriptions, showing that these gesture patterns are shaped by language specific ways of encoding and packing semantic information rather than seeing or adopting to others’ gesture patterns in the culture (Özçalışkan, Lucero, & Goldin-Meadow, 2016). These findings have been explained by the *Interface Hypothesis* (Kita & Özyürek, 2003) which postulates interactions between gesture and spoken language production where language-specific encoding and packaging of semantic information influence the form of gestures.

Cross-linguistic differences in gestures have been also found for spatial frames of reference, e.g., absolute frame of reference (e.g., north, south) versus relative frame of reference (e.g., right, left) (Kita & Özyürek, 2003; Levinson 2003), spatial expression of time (Kita, 2009) and time metaphors (Bostan et al., 2016; Casasanto & Jasmin, 2012; Gu, Mol, Hoetjes & Swerts, 2017; Núñez & Sweetser, 2006).

Frequent and recurrent speech and gesture pairings at different levels of semantic and syntactic encodings within and across languages, have been also used to argue for the existence of multimodal construction units. Such argument postulates the existence of language-specific lexical and syntactic multimodal constructions that are entrenched symbolic units in line with a usage-based approach to language. For example, in Turkish, expressions that encode manner and path would exist as separate symbolic units co-occurring with verbs and corresponding manner and path gestures whereas in English, both the manner and the path particle would constitute a symbolic unit together with conflated manner and path gestures (Zima, 2014).

Previous studies also point to differences in the *amount* of gestures per speech units across languages. For example, Italian culture has been suggested to be a high gesture culture (Efron, 1941; Kendon, 1992) while (British) English has been described as low gesture culture (Graham & Argyle, 1975). Direct comparisons of gesture rate, on the other hand, are rare in the literature. So (2010) for example showed that Mandarin speakers in mainland China gestured less than American English speakers, suggesting English is a relatively higher gesture culture than Mandarin-Chinese. In another study, Cavicchio and Kita (2013) found that Italian is a relatively higher gesture culture than British English.

Building upon previous research on this topic, here we focus on gesture rate as a measure to investigate to what extent gestures change as a result of language contact between speakers of two different languages, and whether contact can influence gesture rates in bilinguals. We should note that what gives rise to gesture

rate differences across languages is not well-understood as the differences might be linked to the specificity of the language at different levels (e.g., lexical, syntactic, information packaging, prosody or simply to the speech rate itself). It is beyond the scope and the ambition of this paper to account for the differences in gesture rate in the languages we study. We do, however, present some speculations in the discussion section about the link between gesture rate and type of languages we study based on our findings.

2.2. Gestures and bilingualism

Few studies have investigated what happens to different types of gestures when speakers regularly use more than one language, -especially when the two languages differ in their gesture rates. Even though such a question has not been asked for bilinguals growing up in language contact situations before, most of the earlier work on bilingual gestures focused on second language learning and the amount of gestures in relation to language proficiency and dominance in L2 speakers (e.g., Gullberg, 1998, 2006; Pika, Nicoladis & Marentette, 2007; Sherman & Nicoladis, 2004) and producing some mixed results.

Some of the previous studies investigated whether bilinguals used more gestures in their weaker second language (L2) than in their stronger first language (L1) as a possible learner's strategy, comparing gesture rate in the L1 to the gesture rate in the L2. It has been found that bilingual adults use abstract deictic gestures more often with their L2 than with their L1 (e.g., Gullberg, 1998; Marcos, 1979; Sherman & Nicoladis, 2004). As for iconic gestures, some studies found no difference across L1 and L2 with regard to gesture rate (Sherman & Nicoladis, 2004) while some found more iconic gestures in the L1 (Gullberg, 1998). In the light of those findings, it has been suggested that iconic and abstract deictic gestures (henceforth, we refer to abstract deictics when we mention deictics) might be related to speech in different ways (Gullberg, 2013; Nicoladis, Mayberry & Genesee, 1999; Sherman & Nicoladis, 2004). Deictic gestures have been suggested to co-occur with

grammatical or discourse organizational difficulties. Gullberg (1998) for example suggest that speakers may use deictic gestures when they have problems with expressing tense, using deictic gestures to help indicate the sequence of events by mapping them out spatially (Gullberg, 1998). Deictic gestures can also help with discourse organization by allocating a specific gesture space to referents, for example, and by referring back to those spaces the next time the same referent is mentioned (Gullberg, 1998; 2006; Yoshioka, 2008). Iconic gestures, on the other hand, may emerge when speakers are trying to be particularly detailed or imagistic (Alibali, Kita, & Young, 2000) and may be used to mediate difficult speech for the listener (Beattie & Shovelton, 2000; Sherman and Nicoladis, 2004).

Some other studies have focused on the effects of high vs. low rate of gesturing on bilingual gesture rate. Pika et al. (2006) found that English(L1) -Spanish and French(L1) -English bilinguals living in the English-speaking part of Canada produced more iconic gestures while speaking English compared to English monolingual speakers. Such difference was not present for deictic gestures. The authors interpreted findings as evidence for gesture rate transfer from higher-gesture language (Spanish and French) to lower-gesture language (English), assuming Spanish and French are both higher-gesture languages than English. Note, however, that the study did not have monolingual baselines for gesture rate in Spanish and French and the researchers could not compare bilingual gesture rate to monolingual gesture rate in these two languages. Therefore, it is also possible that bilinguals might have gestured more than monolinguals overall rather than transferring gesture rate. Such a trend was indeed shown by Nicoladis, Pika and Marentette (2009) who found no evidence for gesture rate transfer for English-French bilingual children in Canada even though bilingual children tended to use more iconic gestures than monolingual comparison groups while speaking in both English and French. The authors suggested that bilinguals have more “choices” for how to package verbal messages compared to monolinguals, and bilinguals may gesture more than monolinguals

which will help them hold information in memory while they search for how to package their message.

Smithson, Nicoladis and Marentette (2011) on the other hand did not find differences for iconic gestures in English between monolingual and bilingual children living in Canada (Chinese-English and French-English bilinguals) which they interpreted as “bilingualism alone does not lead to a higher gesture rate” (p. 342). The study, however, again did not have monolingual baselines either for French and Chinese which makes it difficult to evaluate whether the authors’ proposition is generalizable to the other language of bilinguals.

Collapsing iconic and deictic gestures into one category, *representational gestures*, So (2010) compared the gesture rate of Chinese-English bilingual speakers in Singapore, where English is taught in schools from early on, to the gesture rate in monolingual Mandarin-Chinese and in monolingual US English. So found higher gesture rate in monolingual English than in monolingual Chinese. Even though bilingual speakers’ gesture rate was not different from the monolingual baseline while speaking in English, they produced more gestures than the monolingual baseline while speaking in Chinese. Based on those findings, So argued that gesture rate for representational gestures was more likely to be transferred from the relatively higher gesture language to the relatively lower gesture language than the other way around. No transfer effect was found for non-representational gestures, i.e., gestures that do not bear semantic relations to their referent (for example *beat gestures* that direct attention to the rhythmical peak of speech, McNeill, 1992, 2006). So, therefore, concluded that representational gestures were more likely to be transferred than non-representational gestures.

In a more recent study, Cavicchio and Kita (2013) investigated the gesture rate of Italian-English bilinguals some of whom were living in Italy and some in the UK. They found higher gesture rate in monolingual Italian than in monolingual English. Unlike the findings from Pika et al. (2006) and So (2010), Cavicchio and

Kita did not find evidence for gesture rate transfer. Instead, bilingual speakers maintained the cross-cultural differences in gesture rate. Note that Cavicchio and Kita did not differentiate between different types of gestures (e.g., differentiating between iconic versus deictic gestures as in Pika et al. or representational versus non-representational gestures as in So). If representational gestures are indeed more likely to be transferred than non-representational gestures (So, 2010), the lack of gesture rate transfer in Cavicchio and Kita might have been conflated by collapsing all types of gestures together in the analysis.

Overall, there are not many data available with regard to gestures in bilingualism and the findings are mixed regarding whether gesture rate is transferred. Additionally, to a large extent studies so far have not compared the gestures of bilinguals and monolinguals in both languages (with the exception of Nicoladis, Pika & Merentette, 2009 for iconic gesture rate of bilingual children), but rather compared the L1 and the L2 of the same speakers or had monolingual baseline only for one of the languages. Therefore, the effects of proficiency and being bilingual in general have been hard to tease apart. These studies have not provided an explanation for a mechanism for adaptations of gesture rates from one language pattern to another, either (e.g., from high to low levels). Finally, while some studies report general gesture rate, others focus on the rates of different gesture types such as iconics and deictics, which makes the comparison of findings across different populations difficult.

Here, we explore gesture rate and type of gestures in a context where Turkish comes into contact with Dutch in the Netherlands. We study both Turkish and Dutch as used by second generation heritage speakers of Turkish in the Netherlands, comparing bilingual data to a monolingual baseline in each language. Turkish heritage speakers in the Netherlands are usually proficient both in Turkish and Dutch due to high language attainment of Turkish in the community (Backus, 2012; Extra & Yağmur, 2010) and for the reasons we explained above. We also test in this study

if Turkish is indeed a higher gesture language than Dutch as Mediterranean cultures are usually found to relatively higher gesture cultures (Barzini, 1964; Cavicchio & Kita, 2013; Kendon, 1992; Schefflen, 1972) even though the reason for this are not clear. As we noted above why Turkish might have higher gesture rate than Dutch is not a question we can answer within the limits of our study. We are interested in the adaptations in gesture patterns in language contact situations and having two languages with different gesture rates provides a good language-specific measure which we can use for investigating the influence of language contact on gesture.

3. Present Study

The purpose of this study is to explore what happens to gesture rate patterns when one relatively higher-gesture language (as minority language) comes into contact with a relatively lower-gesture language (as majority language) and whether gesture rate is more likely to be transferred for some gesture categories than others (i.e., iconic versus deictic). Note that at this point, it is still a prediction that Turkish is a higher gesture rate language than Dutch, which will be confirmed later in this chapter. To answer those questions, we study gestures of Turkish-Dutch bilingual speakers in the Netherlands as well as gestures of monolingually raised speakers of Turkish in Turkey and monolingually raised speakers of Dutch in the Netherlands. Bilingual participants in this study are second-generation heritage speakers of Turkish who were all born and raised in the Netherlands whose parents themselves emigrated to the Netherlands as teenagers or young adults.

We contribute to existing literature on bilingualism as well as multimodal language production in following ways. First, we provide gesture rate data from a novel language pair in the domain of bilingual gestures, i.e., Turkish and Dutch. Studies so far mainly focused on bilingual speakers of two Indo-European languages. Second, we study a different population of bilinguals from those studied earlier. Bilingual speakers in this study have had exposure to two languages from early on,

as the second-generation heritage speakers of a minority language i.e., Turkish and a majority language i.e., Dutch. They reported to have acquired Turkish as their first language at home and Dutch as their second language to which they have had increasing exposure after they started to attend school at age 4. They also had an early exposure to some Dutch from their parents, who were themselves late learners of Dutch. The speakers are highly proficient in both languages- within and beyond their home situations and use each language regularly on a daily basis. Therefore, they are different from previously studied speakers who started learning their L2 at a later stage and mostly had weaker proficiency in their L2 than in their L1. The advantage of studying such a population is that the gesture rate in each language is less likely to be modulated by language dominance. Furthermore, speakers growing up with both languages and cultures have had enough exposure to each culture to test whether some accommodation of gesture rate can take place from minority to majority languages or vice-versa.

Finally, we study each language of bilinguals to explore whether language contact has influence on both languages (Brown & Gullberg, 2011; Pavlenko, 2003) and we compare each language to monolingual baselines rather than exploring only bilingual data. Therefore, we present a first systematic comparison of the use of iconic and deictic gestures of adult bilingual speakers in comparison to monolingual speakers of *each* language.

Having such a controlled comparison of bilingual population with monolingual baselines, therefore, has the potential to disentangle factors involved in gesture use in language contact situations specifically and in bilinguals in general in ways. Also going beyond previous research on gesture rate transfer, we situate our predictions on cognitive and social mechanisms that might modulate speech and gesture production.

3.1. Predictions

As for the monolingual patterns, we expect Turkish monolinguals to produce more gestures than Dutch monolingual speakers as previous studies usually found gesture rate to be higher in Mediterranean area than that in North Europe (Barzini, 1964; Cavicchio & Kita, 2013; Kendon, 1992, Schefflen, 1972). However, we acknowledge that the reasons for cross-linguistic differences in gesture rate are not completely understood and therefore we do not have clear predictions about the status of iconic versus deictic gesture rate.

As for gesture rate in *bilingual data*, one possibility is that bilingual speakers will transfer gesture rate due to daily contact between the Turkish and Dutch speaking communities as speakers are known to adjust their gestures according to their interlocutors such as for example due to a mimicking strategy (Holler & Wilkin, 2011). Bilinguals may reduce gesture rate in the higher gesture language, Turkish, as an adaptation to lower gesture rate of the majority language, Dutch due to everyday contact with Dutch speakers. These predictions would derive from an account that considers social factors influencing gesture production.

Considering, however, that the speakers in this study have been frequently exposed to each language from very early on in their lives and are proficient in each language, it is possible that bilingual speakers may actually maintain language-specific gesture rates in each language and follow monolingual baseline patterns, which would be in line with usage-based approaches to language production. In that case, we will not find evidence for gesture rate transfer and accommodation to the gesture rate patterns in the dominant language in the society.

Finally, regardless of whether bilinguals transfer gesture rate or not, bilinguals may also produce overall more gestures than the monolingual baseline in each language. Previous literature on bilingual speech has suggested that bilinguals activate their two languages simultaneously (Broersma, Carter & Acheson, 2016; Grosjean, 2001) and inhibiting the task-irrelevant language induces cognitive cost

(Sorace & Serratrice, 2009). In that case, bilinguals may exploit iconic and/or deictic gestures to help organize their speech and to reduce cognitive load, a pattern that has been suggested to be at place for monolingual speakers (Alibali & DiRusso, 1999; Goldin-Meadow, 2001; Goldin-Meadow, Nusbaum, Kelly, & Wagner, 2001; Wagner, Nusbaum & Goldin-Meadow, 2004) (See Nicoladis, 2006, 2007; Nicoladis, Pika & Merentette, 2009 for a similar discussion about bilingual gestures).

4. Method

4.1. Participants

20 heritage speakers of Turkish studying in Nijmegen, the Netherlands (14 females; $M_{age} = 23.3$, $SD = 2.95$), 20 monolingually raised Turkish speakers studying in Istanbul, Turkey (17 females; $M_{age} = 22.2$, $SD = 1.75$) and 20 monolingually raised Dutch speakers studying in Nijmegen, the Netherlands (14 females; $M_{age} = 21.5$, $SD = 2.73$) participated in the study in return for payment or course credit. All heritage speakers were second-generation immigrants who were born and were raised in the Netherlands by first-generation parents, who themselves are first-generation immigrants who moved to the Netherlands from Turkey (Mean immigration age was $M_{age} = 15.9$, $SD = 5.12$ for the mothers and $M_{age} = 19$, $SD = 7.24$ for the fathers). When the participants in this study were born, the mothers on average had already lived in the Netherlands for 9.2 years ($SD = 6.66$) and fathers for 11.15 years ($SD = 7.46$).

Bilingual speakers have acquired Turkish as their first language (L1) at home during early years and Dutch as their second language (L2) to which they have had increasing exposure after the age of 4. On a 5-point Likert scale, bilinguals rated the frequency of their current language use in various environments and with various interlocutors (1 = never; 2 = rarely; 3 = sometimes; 4 = most of the time; 5 = all the time) as well as their proficiency in both Turkish and Dutch (1 = native; 2 = native-like; 3 = advanced; 4 = intermediate 5 = beginner). The analysis on the ratings

showed that bilinguals' self-rated frequency of language use for Turkish ($M = 2.43$, $SD = 0.92$) and Dutch ($M = 2.91$, $SD = 1.31$) was not significantly different, $\beta = -0.484$, $SE = 0.330$, $t\text{-value} = -1.465$. Bilinguals rated their overall proficiency in Turkish to be somewhere between native-like and advanced ($M = 2.40$), although the rating scores were even higher for Dutch ($M = 1.50$), $\beta = 0.900$, $SE = 0.15$, $t\text{-value} = 2.853$ (see Table 2.1. in *Appendix 2* at the end of this chapter for the random effect structure of the analyses). Bilinguals also reported to mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among Turkish speaking friends.

Using a Praat script (De Jong & Wempe, 2009), we also measured oral fluency in both Turkish and Dutch, based on speaker's articulation rate (number of syllables/ articulation time) in a 10-second sample deducted from the elicited narratives. The articulation rate of bilinguals in Dutch ($M = 4.42$, $SD = 0.57$) did not significantly differ from that of the monolingual baseline in Dutch ($M = 4.62$, $SD = 0.71$) ($\beta = 0.191$, $SE = 0.204$, $t\text{-value} = 0.934$). The comparison of articulation rate in Turkish did not show a significant difference between bilingual speakers ($M = 4.44$, $SD = 0.63$) and the monolingual baseline, either ($M = 4.81$, $SD = 0.55$) ($\beta = 0.375$, $SE = 0.188$, $t\text{-value} = 1.994$, $p^1 = .053$). We will later explore whether the language measures as presented here i.e., self-rated language use, self-rated language proficiency and oral proficiency correlate with bilingual gesture rate.

¹Linear mixed-effect models do not provide p values. With regard to t values, a rule of thumb is that the values greater than 2.00 can be considered significant. This method, however, is sensitive to sample size, being somewhat anti-conservative for smaller sample sizes (Luke, 2017). Since the t value for Turkish here was very close to 2.00, we calculated p values from the t values obtained in the linear mixed effect model output. We treated the t values as they were drawn from a normal distribution, using the *pnorm* function in R.

4.2. Stimuli

We used two short silent videos (Azar, Backus & Özyürek, 2016, 2017) to elicit narratives. In one video, three women engaged in cooking activities (kitchen video, Perniss & Özyürek, 2015) and in the other video two women and a man engaged in office activities (office video). Figure 1 illustrates stills depicting different segments from each video. See *Appendix D* at the end of the thesis for a detailed list of events taking place in each video stimulus.



Figure 1. Stills from the two video stimuli, kitchen video at the top and office video at the bottom.

4.3. Procedure

Prior to the data collection session, participants were informed that the study was about language production without any mention of gestures and then they signed consent forms. Participants watched the two stimulus videos one by one on a computer screen and narrated what they had watched to an addressee after each video. The computer screen turned white after each video and stayed white during the narrations. The addressees were not confederates, there was a different addressee in each session and they did not see the videos before or during the narrations. Addressees were instructed that they could ask clarification questions once the

narrative was complete and they were going to answer two short written questions about each narrative. Once the instructions were given, the experimenter left the room and came back after each narrative with questions for the addressee. Speakers repeated the task once in Turkish with a Turkish monolingual addressee and once in Dutch with a Dutch monolingual addressee, with at least two-week interval between the two sessions. Turkish monolingual addressees were recruited from exchange university students from Turkey who were visiting the Netherlands for a semester abroad. The order of the two videos and language was counterbalanced. All sessions were videotaped. Monolingual participants performed the task once.

4.4. Data coding

Data were transcribed and annotated using ELAN video annotation software (available online: <https://tla.mpi.nl/tools/tla-tools/elan/>) (Lausberg & Sloetjes, 2009). The data we present in this study were collected and annotated for a corpus of multimodal reference tracking by Turkish-Dutch bilinguals (in preparation). Meta-narratives such as commentaries about the characters were excluded from the corpus and the same exclusion criteria were used for all language and speaker groups.

First, the narratives were divided into clauses, units with a single subject argument and a single predicate (Berman & Slobin, 1994). Coordinated clauses were coded as separate clauses (e.g., ‘the man stood up and he walked to the bookshelf’ was coded as two clauses). Relative clauses that modified nouns (e.g., ‘the woman who was helping the man’) were not coded as separate clauses but as the modifier of the noun (in this case ‘who was helping the man was’ not coded as a separate clause). This was to make sure that the coding scheme was comparable across Turkish and Dutch (relative clauses are finite in Dutch but non-finite in Turkish).

Next, gesture strokes that co-occurred with any part of the speech clauses were identified. Stroke is the meaningful part of the gestural movement (Kendon, 2004; McNeill, 1992) as the expressive segments of the stream of manual production (Kita, van der Hulst & van Gijn, 1998). We categorized strokes into iconic, deictic

and non-representational gestures (gestures that do not depict information about their referent). However, we analyze only iconic and deictic gestures as these two types of gestures show up most frequently in adult storytelling (McNeill, 1992) and they are more likely to be transferred by bilingual speakers (So, 2010). In total 743 non-representational gestures were excluded from the analyses (185 in bilingual Turkish, 270 in monolingual Turkish, 155 in bilingual Dutch and 133 monolingual Dutch). The proportion of excluded gestures was similar across all speaker groups (15% for bilingual Turkish and monolingual Dutch and 16% for bilingual Dutch and monolingual Turkish).

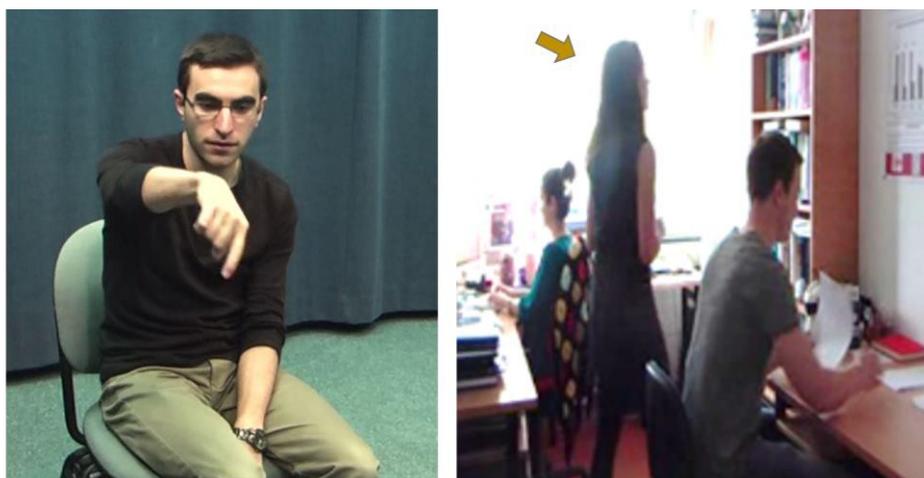
Iconic gestures are the gestures that represent images of actions and entities (McNeill, 1992). Figure 2 illustrates an example of an iconic gesture. *Deictic gestures* are pointing motions that use spatial location to indicate discourse entities (Sherman & Nicoladis, 2004). They can be executed with an extended index finger,



Die is aan het roeren.
 'That (she) is **stirring**.'

Figure 2. A bilingual speaker speaking in Dutch (left panel) is producing an iconic 'stirring' gesture, referring to the action performed by the woman who is standing in the stimulus video (right panel). Her gesture is temporally aligning with *roeren* 'stirring' in her speech.

thumb or with all fingers extended. Deictic gestures in our data set are abstract pointing gestures that co-occurred with referents that were physically absent in the environment and they could refer to persons or the objects in the narratives. Figure 3 illustrates an example of a deictic gesture. A second coder coded around 13% of the gestures for reliability. The two coders had a high initial agreement for the presence of a stroke (84% for bilingual Turkish, 85% for monolingual Turkish, 87% for bilingual Dutch and 91% for monolingual Dutch) and a high agreement also for the gesture type (iconic gestures, deictic gestures or other category of gestures). The two coders reached 100% agreement for the presence/ absence of a gesture stroke and the gesture type for each speaker group in a meeting where the initial discrepancies were discussed and resolved. Table 1 summarizes the initial agreement values for gesture type coding.



O bayan kitaplığın başına geliyo.
'That woman comes by the bookshelf.'

Figure 3. A bilingual speaker speaking in Turkish (left panel) is producing a deictic gesture referring to the woman who is walking in the stimulus video (right panel). His gesture is temporally aligning with *o bayan* 'that woman' in his speech.

Table 1. *Inter-rater reliability for gesture type coding*

	Turkish		Dutch	
	Cohen's kappa	p-value	Cohen's kappa	p-value
Bilingual	.930	< .001	.910	< .001
Monolingual	.902	< .001	.869	< .001

5. Analyses

Table 2 summarizes the total and mean number of speech clauses that were produced by each speaker group. To control for the differences in the number of speech clauses, we divided the number of gestures each speaker produced by the number of clauses they used to narrate the stimulus videos to calculate gesture rate.

Table 2. *Total and average number of speech clauses in Turkish and Dutch by speaker groups (Standard Deviation)*

	Turkish			Dutch		
	Total	Mean	(SD)	Total	Mean	(SD)
Bilingual	74	37.2	(10.5)	701	35.1	(9.3)
Monolingual	969	48.5	(11.0)	748	37.4	(10.3)

Gesture rate is usually calculated in relation to speech based on either the number of clauses (So, 2010, Gullberg, 1998) or the number of (100) words (Cavicchio & Kita, 2013; Pika et al., 2006; Sherman & Nicoladis, 2004). We calculated gesture rate in relation to the number of speech clauses as clause is considered to be an important processing unit for speech production process (Levelt, 1989, Kita, 2009). Additionally, we aimed to account for the structural differences between Turkish and Dutch, Turkish being an agglutinative language while Dutch is not. In most cases, the same event unit is expressed with fewer words in Turkish than in Dutch because Turkish uses suffixes to mark some information such as case

marking which is mostly expressed with separate words in Dutch. For example, the event unit showing a man walking towards the bookshelf can be expressed with three words in Turkish (e.g., *Adam kitaplığa yürüdü* ‘Man walked to the bookshelf’), but six words in Dutch (*De man liep naar de boekenkast* ‘The man walked towards the bookshelf’). The same event unit, however, is expressed with one clause in each language. Therefore, while gesture rate that is calculated based on the number of words in speech would yield a higher gesture rate for Turkish (0.33) than for Dutch (0.17), calculating gesture rate per speech clause yields the same rate for both speaker groups, accounting for the cross-linguistic differences in morpho-syntax. Finally, subject and/or object arguments are usually dropped in Turkish but not in Dutch, therefore a word-based rate count would disadvantage Dutch gesture rate.

We performed linear mixed-effect models on the mean number of gestures per clause using lmer function from the lme4 package (cf. Bates, Maechler, Bolker & Walker, 2015) in the software R, version 3.4.3. We simultaneously entered Language Type (Dutch versus Turkish) and Language Status (monolingual versus bilingual) as well as the interaction term of Language Type and Language Status as fixed effects in each analysis. Random intercepts for participants were also included (see Table 2.2. in *Appendix 2* at the end of this chapter for the random effects structure of the gesture analyses). We first examined the overall gesture rate collapsing two types of gestures as in Cavicchio & Kita (2013) and in So (2010) so that we can compare our findings to those studies. Later, we performed separate analyses on iconic and deictic gestures (following Sherman & Nicoladis, 2004; Gullberg, 1998; Pika et al., 2006). *Appendix 1* at the end of this chapter provides a detailed summary of the fixed effect structures and *Appendix 2* random effect structures of the statistical models.

6. Results

There were in total 4066 iconic and deictic gestures in the data set. Table 3 summarizes the total and mean number of gestures per gesture type).

Table 3. *Total and mean number gestures per gesture type in Turkish and Dutch per speaker group (Standard Deviation)*

	Turkish			Dutch		
	N	Mean	(SD)	N	Mean	(SD)
Bilingual						
total	1044	52.4	(23.6)	839	42.0	(21.6)
iconic	472	23.6	(13.3)	368	18.4	(11.4)
deictic	572	28.6	(12.3)	471	23.6	(12.3)
Monolingual						
total	1408	70.4	(21.8)	775	38.8	(22.9)
iconic	770	38.5	(15.0)	419	21.0	(14.7)
deictic	638	31.9	(10.6)	356	17.8	(10.5)

6.1. Overall gesture rate

The analysis on overall gesture rate i.e., the mean number of gestures per clause per participant only showed a significant main effect of Language Type ($\beta = 0.223$, $SE = 0.100$, $t\text{-value} = 2.227$) such that gesture rate was higher in Turkish than in Dutch. However, there was no significant main effect of Language Status ($\beta = -0.149$, $SE = 0.137$, $t\text{-value} = -1.090$) and no significant interaction between Language Type and Language Status ($\beta = 0.208$, $SE = 0.169$, $t\text{-value} = 1.228$). Figure 4 illustrates the overall gesture rate in Turkish and Dutch for monolingual and bilingual speakers.

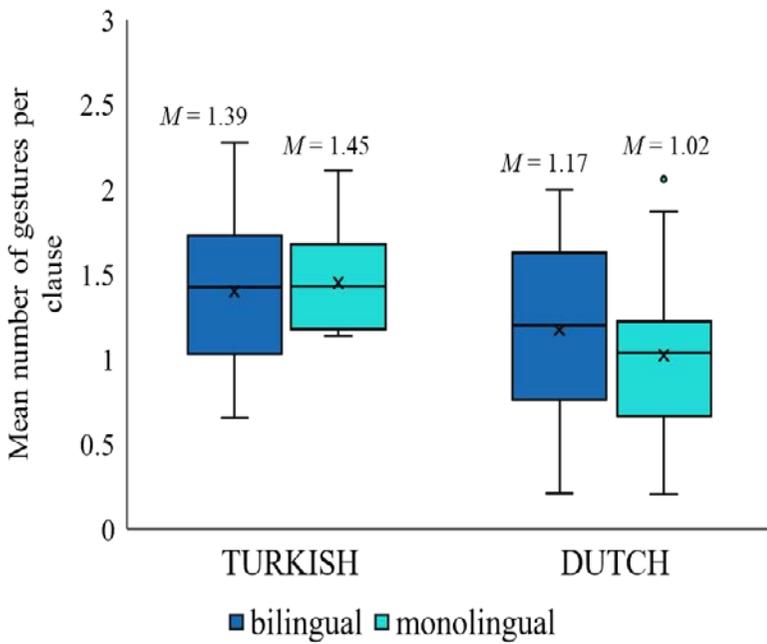


Figure 4. Mean number of gestures per clause in Turkish and Dutch in bilingual and monolingual narratives (the number of iconic and deictic gestures collapsed).

6.2. Iconic gesture rate

The analysis on iconic gesture rate calculated as the total number of iconic gestures divided by total number of speech clauses returned a significant main effect of Language Type ($\beta = 0.110$, $SE = 0.044$, $t\text{-value} = 2.515$) such that iconic gesture rate was higher in Turkish than in Dutch. However, there was no significant main effect of Language Status ($\beta = 0.032$, $SE = 0.078$, $t\text{-value} = 0.414$) and no significant interaction between Language Type and Language Status ($\beta = 0.135$, $SE = 0.090$, $t\text{-value} = 1.503$). Figure 5 illustrates iconic gesture rate in Turkish and Dutch for monolingual and bilingual speakers.

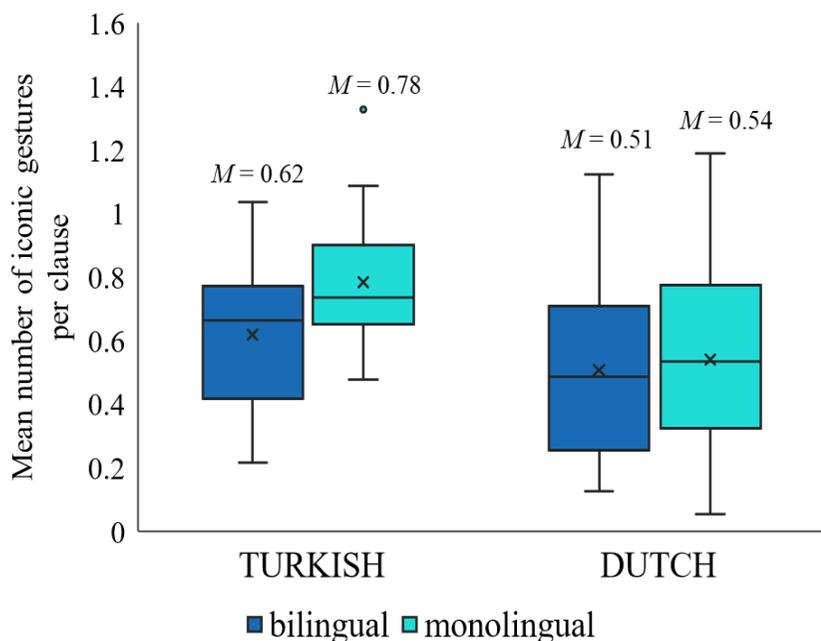


Figure 5. Mean number of iconic gestures per clause in Turkish and Dutch in bilingual and monolingual narratives.

6.3. Deictic gesture rate

The analysis on deictic gesture rate calculated as the total number of deictic gestures divided by total number of speech clauses did not return a significant main effect of Language Type ($\beta = 0.112$, $SE = 0.070$, $t\text{-value} = 1.608$) but a significant main effect of Language Status ($\beta = -0.181$, $SE = 0.085$, $t\text{-value} = -2.129$). There was, however, no significant interaction between Language Type and Language Status ($\beta = 0.073$, $SE = 0.110$, $t\text{-value} = 0.664$). Figure 6 illustrates the deictic gesture rate in Turkish and Dutch for monolingual and bilingual speakers. Unlike the analysis on overall gesture rate and iconic gesture rate, we did not find a higher deictic gesture rate in Turkish than in Dutch. We will discuss possible explanations later in the *Discussion* section.

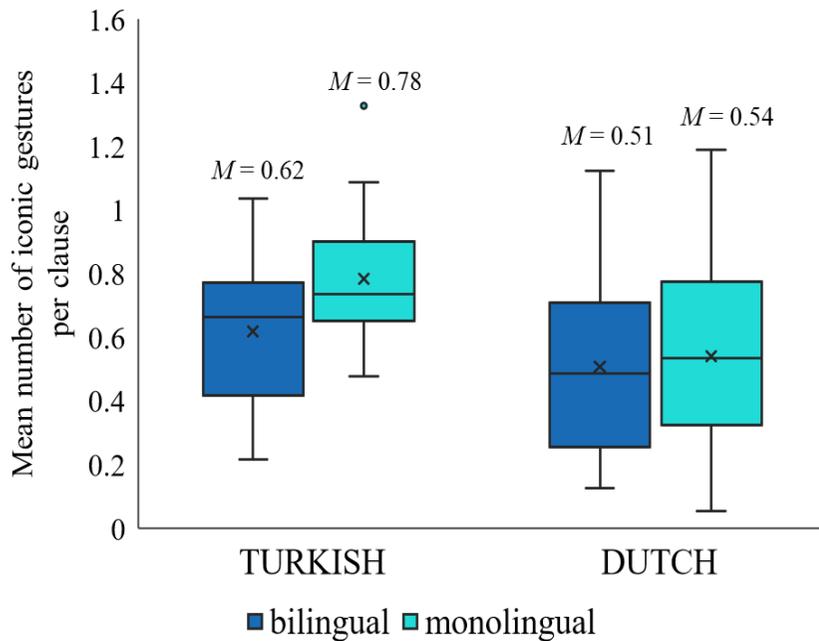


Figure 6. Mean number of deictic gestures per clause in Turkish and Dutch in bilingual and monolingual narratives.

6.4. Gesture rate and language measures

We also explored whether there were significant correlations between bilingual gesture rate and bilinguals' self-rated language use, self-rated language proficiency and oral fluency calculated as the articulation rate. Correlations between gesture rate on the one hand and language proficiency and language use on the other hand were measured with *Spearman* correlation. The correlation between gesture rate and oral fluency rate was measured with *Kendall's tau*. Table 4 summarizes the correlation coefficients for iconic and deictic gestures by language group. None of the correlations was significant, $p > .05$, suggesting that the amount of iconic and deictic gestures that bilingual speakers produced was not related to their self-rated language use, self-rated language proficiency or their oral fluency.

Table 4. *Relation between bilingual gesture rate and language measures*

	Turkish		Dutch	
	Iconic	Deictic	Iconic	deictic
proficiency	.122	.019	.223	.283
frequency of use	.293	-.178	.017	-.055
oral fluency	.105	.021	.021	-.137

7. Summary of the Findings and Discussion

The purpose of this study was to examine if there are changes in gesture rates when a relatively higher gesture rate language come into contact with speakers of a relatively lower gesture language, and whether some gesture types are more likely to be influenced by language contact than others. We analyzed narrative data from second-generation Turkish heritage speakers who were born and raised in the Netherlands, speaking Turkish as the minority language and Dutch as the majority language. The parents of the heritage speakers themselves emigrated to the Netherlands as teenagers or young adults. We also collected baseline data from monolingually raised speakers of Turkish in Turkey and monolingually raised speakers of Dutch in the Netherlands.

7.1. Overall gesture rate

We found that gesture rate was higher in Turkish than in Dutch and bilingual speakers overall did not differ from monolinguals in either language with regard to the number of gestures they produced per clause.

Findings for overall gesture rate suggest that bilingual speakers maintained the cross-linguistic differences in gesture rate and gestured more while speaking in Turkish than while speaking in Dutch as the monolinguals. Hence, we found no evidence for change in gesture rate in bilingual Turkish or Dutch compared to

monolingual baselines, in line with those from Cavicchio and Kita (2013) but not with those from So (2010). These results show that speakers do not necessarily adapt their gesture rate to the dominant language in the society as some social adaptation theories of gesture production such as mimicry would predict (e.g., Holler & Wilkin, 2011). There is a relative consistency in the gesture rate across monolingual and bilingual languages, both for Turkish and for Dutch. This suggests that gesture rate might be tied to the act of speaking in a particular language and gesture rate might be a convention that is possibly learned through socialization with each speaker community, especially with regard to the referential aspect of language as the gestures we analyzed for gesture rate were produced during mentions of third-person references and the actions they performed.

We suggest that the reason why bilinguals maintain language specific gesture rates might be related to frequency and proficiency level of using each language, Turkish and Dutch, in the respective language community. Bilingual speakers in this study reported to mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among friends. Cavicchio and Kita (2013) reports this also being the case for Italian-English bilinguals they studied who use one of their languages with mainly family and friends. We suggest that when the contexts in which each language is used are separated, as it is the case for the bilinguals in this study, the gesture rate in each language is likely to be maintained. Bilingual speakers in So (2010), on the other hand, grew up in Singapore where multilingualism is a prominent feature of the society. So (2010) reports that English is recognized as the “working language” in education and work in Singapore but does not seem to be the language of a particular social/cultural group.

Bilinguals in our study grew up speaking two languages and have had extensive exposure to both languages. They, therefore, have had the opportunity to acquire gesture patterns, including gesture rate that is associated with each of their languages. Furthermore, bilingual speakers are highly proficient in each language

without clear dominance in one and they use each language regularly on a daily basis. It is possible that due to high proficiency and frequent language use, bilinguals in this study are able to maintain gesture rate for each language. Such a proposal, i.e., that there is a relation between language proficiency and language use on the one hand and the maintenance of language-specific patterns on the other hand, is in line also with views of bilingual language production from a usage-based approach to language.

The usage-based approach proposes that the aspects of a language that are frequently used have strong and highly activated representation in the memory of an individual speaker, i.e., they are highly entrenched (Brooks & Tomasello, 1999; Bybee, 2006). Therefore, they are resistant to cross-linguistic influence (Backus, 2012). The possibility that gesture rate patterns might be entrenched would be in line with multimodal construction grammar approaches (Cienki, 2017; Steen & Turner, 2013; Zima, 2014). Based on those models, we speculate that certain speech-gesture constructions might be entrenched as a result of frequent multimodal use (Cienki, 2017; Steen & Turner, 2013; Zima, 2014), and if there are more entrenched multimodal units in one language than the other, this might result in gesture rate differences across languages. Proficient bilingual users who use each language frequently on a daily basis then would keep using multimodal constructions in each language and thus have similar gesture rates as the monolingual baseline. Note that these are at the moment speculations and further research is needed to reveal at what level gesture rate might be tied to language (e.g., lexical, syntactic, and prosodic levels).

The findings we present here also support previous research showing that language and gesture are tightly linked in the relation to semantic and grammatical packaging of information in speech and gesture (Kita & Özyürek, 2003; Özyürek, 2017). This study shows that the gesture rate may also be tied to language specific constraints and when both languages are proficiently experienced, the gesture

patterns are maintained in contact situations. Therefore, gesture rate in language contact situations does not seem necessarily to adapt either to the higher gesture rate language as suggested earlier (cf. So, 2010) or to the majority language as has been often found for speech patterns in language contact situations (e.g., Montrul, 2004).

Recently, Aziz and Nicoladis (published online 18 June 2018) provided gesture rate data from English-French bilinguals which support that daily language usage and linguistic environment might have an effect on bilinguals' gesture use. They argue that when bilinguals do not regularly use their L2, they may have weaker accesses to the language and have problems with for example lexical access. This in turn may lead them to produce more iconic gestures in their L2 to aid lexical access.

Even though we did not find an increase in iconic gestures in bilinguals and bilinguals in our study did not have trouble accessing words in either language (i.e., high oral fluency which is comparable to the monolingual baselines), these results support our proposal that actual language use as well as language proficiency may indeed modulate the gesture use of bilinguals.

7.2. Gesture type

Even though we found higher gesture rate for iconic gestures in Turkish than in Dutch, we did not find an effect of language type for deictic gestures. This suggests that the overall differences in gesture rate between Dutch and Turkish might be due to more frequent use of iconic gestures in Turkish than in Dutch. Even though very speculative at this point, we suggest that the gesture rate for iconic gestures (where we found Turkish and Dutch baselines to differ) might differ across languages because previous research has shown that their form is influenced by how information is packaged in speech (Brown & Gullberg, 2008; Gu et al, 2017; Kita & Özyürek, 2003; McNeill, 2000; Özçalışkan, 2016; Özyürek et al., 2008). For example, Turkish is a verb-framed and a pro-drop language which allows omission of both subject and object arguments (Azar, Backus & Özyürek, 2019; Enç, 1986; Küntay & Slobin, 1996) more than non-pro-drop Dutch which is also a satellite-

framed language. Therefore, the utterances where the focus is on verbs are common in Turkish (Furman, Küntay & Özyürek, 2014) and more so than in Dutch. It is then plausible that gestures tend to align with verbs (as opposed to other parts of speech) in Turkish more than they do in Dutch. Considering verbs describing the stimuli we used would mainly refer to actions, iconic gestures that represent those actions then might be more likely to occur in Turkish narratives than in Dutch narratives (see Furman et al., 2014 for a similar claim for early appearance of iconic gestures for Turkish speaking children). Further research should test whether this is a plausible explanation. Much richer corpus data would be needed to study whether in Turkish, verbs and iconic gestures co-occur more often than other parts of speech and whether such co-occurrence happens more often in Turkish and in other verb-framed languages compared to satellite-framed languages.

As we pointed out in the introduction, why speakers of one language gesture more than the other is beyond the scope of our study as we are interested mostly in adaptations on gesture rate patterns in language contact situation. However, it is plausible that for the reasons we explained above, iconic gestures might be tied to a particular language to a greater extent than deictic gestures, and iconic gestures might be more linked to verbs that show more variation across languages.

We also found that bilingual speakers produced higher number of deictic gestures, but not iconic gestures, per clause than monolingual speakers. This effect did not interact with language type. The majority of studies on bilingual gesture rate compared the L1 and the L2 of bilingual speakers and found that bilinguals usually produce more deictic gestures in their L2 than in their L1 (Gullberg, 1998, Marcos, 1979; Sherman & Nicoladis, 2004), which was suggested to be related to language dominance and be driven by grammatical difficulties in the L2. However, unlike previous research on L2 gestures, we did not find the increase in the deictic gestures to be modulated by the language status (L1 versus L2) but rather found an increase in both L1 Turkish and L2 Dutch.

Studies that compared iconic and deictic gestures of adult bilinguals in relation to monolingual baselines are very rare. Previously Pika et al. (2006) found that English-Spanish and French-English bilinguals gestured more than monolinguals while speaking in English, though the difference was present for iconic gestures and not for deictic gestures. Pika et al. interpreted their findings as evidence for gesture rate transfer from higher gesture languages (French and Spanish) to lower gesture language (English) and that iconic gestures are more likely to be transferred than deictic gestures. However, they also pointed out that the possibility that bilingualism itself may have affected gesture rate could not be ruled out on the basis of their results because they did not have monolingual baselines for French and Spanish. We suggest that our findings actually point in the direction of that possibility, that is higher gesture rate by bilingual speakers may point to a general effect of bilingualism.

In our case we did find that it was deictic rather than iconic gestures that increased in bilinguals compared to monolinguals. This might be related to the fact that narrative production is a complex task that requires planning at both sentential and discourse level and the overall coherence between different characters and events has to be observed and ensured continuously (Gullberg, 1998). Even though monolingual and bilingual speakers had the same task demands in this study, bilingual speakers needed to inhibit their task irrelevant language during data collection, which might have induced extra cognitive load for them (Sorace & Serratrice, 2009). It is possible that deictic gestures helped bilinguals organize discourse (Gullberg, 1998; 2006) and package their message more easily by means of locating characters, objects and action in gesture space (Nicoladis, 2006, 2007), therefore reducing the cognitive load by externalizing the characters on to gesture space.

Even though we found an increase in the deictic gesture rate in bilinguals, we did not find difference between bilingual and monolingual speakers with regard to

iconic gesture rate unlike some previous studies (Nicoladis, Pika & Marentette, 2009). It has been previously suggested that iconic gestures may emerge when speakers are trying to be particularly detailed or imagistic (Alibali et al., 2000) and may be used to mediate difficult speech for the listener (Beattie & Shovelton, 2000; Sherman & Nicoladis, 2004). Iconic gestures have been also suggested to help accessing conceptual or linguistic information that has a visuospatial component (Hadar & Butterworth, 1997; Krauss & Hadar, 1999; McNeill, 1992; Wesp, Hesse, Keutmann & Wheaton, 2001), therefore they are associated with difficulties in lexical retrieval more than other types of gestures. We suggest that we did not find an increase in bilinguals' iconic gestures compared to monolinguals because bilinguals were highly proficient in each language and their speech was as fluent as the monolingual speakers. Therefore, they probably did not need to exploit iconic gestures that might help them with the representations of events taking place in the stimulus videos.

8. Conclusion

We studied bilingual gesture use in a language contact situation and did not find evidence for gesture rate transfer between a high gesture and a low gesture language. We suggest factors such as frequent and daily use of each language within the relevant speech community, Turkish and Dutch, and high proficiency in each language contribute to the maintenance of language-specific gesture rate. However, we found a seemingly general effect of bilingualism on gesture rate in the form of higher deictic gestures by bilinguals compared to monolinguals. In the light of our findings, we suggest that bilinguals might have exploited gestures more than monolinguals as a mechanism to reduce cognitive load, suggesting bilingualism may influence gesture rate in other ways than gesture rate transfer.

Therefore, when a minority language comes into contact with majority language, gestures do not necessarily adapt to one of the languages. Rather,

proficiency, frequency of language use and cognitive factors related to being bilingual seem to drive gesture patterns in language contact situations. The findings we present here suggest that language and gesture go hand in hand not only across diverse languages but also in bilinguals where language use is frequent and the language is mastered with a high-level proficiency for each language- in line with usage-based approaches to language.

9. Acknowledgements

This research is funded by the Center for Language Studies, Radboud University Nijmegen, the Netherlands and partially by the Erasmus Staff Training grant granted to the first author by the International Office Radboud University. The Max Planck Institute for Psycholinguistics also provided technical support. We thank Dr. Ayşe Caner and Dr. Nihan Ketrez for providing the location and participants for the data collection in Istanbul, Turkey. We also thank Dr. Pamela Perniss for the kitchen stimulus video and Dr. Kazuki Sekine for the gesture reliability coding. We are also grateful to Dr. Susanne Brouwer for her help with the R script.

10. Appendices

Appendix 1. Fixed effect structures of the statistical models

Table 1. *Fixed effect structures of the statistical models for gesture rate*

Fixed Effect	Estimate	SE	<i>t</i> -value
<i>Results of the mixed-effect analysis for overall gesture rate</i>			
Intercept	1.169	0.097	12.099*
Language Type	0.223	0.100	2.227*
Language Status	-0.149	0.137	-1.090
Language Type*Language Status	0.208	0.169	1.228
<i>Results of the mixed-effect analysis for iconic gesture rate</i>			
Intercept	0.507	0.055	9.159*
Language Type	0.110	0.044	2.515*
Language Status	0.032	0.078	0.414
Language Type*Language Status	0.135	0.090	1.503
<i>Results of the mixed-effect analysis for deictic gesture rate</i>			
Intercept	0.662	0.060	10.988*
Language Type	0.112	0.070	1.608
Language Status	-0.181	0.085	-2.129*
Language Type*Language Status	0.073	0.110	0.664

SE: Standard Error, (*) significant *t*-value ($p < .05$)

Appendix 2. Random effect structures of the statistical models

Table 2.1. *Random effect structure for the statistical models for language use and proficiency*

Dependent variable	Random Effects			
	Group	Name	Variance	SD
Language use	Participant	Intercept	0.121	0.347
	Residual		1.092	1.045
Language proficiency	Participant	Intercept	0.050	0.224
	Residual		0.995	0.997

Bilingual gesture rate

Table 2.2. *Random effect structure for the statistical models for gesture rate*

Dependent variable	Random Effects			
	Group	Name	Variance	SD
Overall gesture rate	Participant	Intercept	0.086	0.294
	Residual		0.100	0.317
Iconic Gesture rate	Participant	Intercept	0.042	0.205
	Residual		0.019	0.139
Deictic Gesture rate	Participant	Intercept	0.024	0.154
	Residual		0.049	0.221

Chapter 5

Reference Tracking Strategies in Gesture Remain Language-Specific in Language Contact

This chapter is based on

Azar, Z., Backus, A., & Özyürek, A. (2017). Highly Proficient Bilinguals Maintain Language-Specific Pragmatic Constraints on Pronouns: Evidence from Speech and Gesture. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. Davelaar (Eds.), *Proceedings of the 39th Annual Conference of the Cognitive Science Society (CogSci 2017)* (pp. 81-86). Austin, TX: Cognitive Science Society.

Reference Tracking Strategies in Gesture Remain Language-Specific in Language Contact

This chapter investigated the relations between speech and gesture during reference tracking in a language contact situation. We asked whether gestures that accompanied subject referring expressions which are used to track referents (i.e. locating referents in gesture space) show language specificity. We found that the discourse status of referents (whether referents are maintained or re-introduced) influenced gesture production independent of language typology and speakers' status (bilingual versus monolingual). However, we found cross-linguistic differences with regard to the influence of referring expression type (NP versus pronoun) on gestures: In re-introduced referent contexts, overt pronouns were as likely to be accompanied by gestures as NPs in Turkish, while in Dutch NPs in all contexts were more likely to be accompanied by gestures than overt pronouns. These differences were present in both monolingual and bilingual data. These patterns possibly reflect the differences between the two languages with regard to the use of overt pronouns in speech. In Turkish, the use of overt pronouns is not modulated by the accessibility of referents, thus they are used in both re-introduction and maintenance contexts. Furthermore, gestures might have been used with pronouns (which are gender-neutral in Turkish) in re-introduction contexts to disambiguate the less accessible referents. The findings suggest that heritage speakers who maintain language specificity of reference tracking in their speech also do so in their gestures.

1. Introduction

Reference tracking strategies of bilinguals, in particular the use of subject referring expressions in narratives, has been extensively studied so far. Studies have often revealed some differences between the bilingual and the non-bilingual variety, in particular with regard to the use of subject pronouns. For example, bilingual speakers of a pro-drop and a non-pro-drop language, e.g., Spanish-English bilinguals in the US, tend to overuse overt pronouns (Albirini et al., 2011; Koban Koç, 2016) or used them in pragmatically unmarked contexts more than monolinguals do (Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalán, 1994). Some studies have also shown that in proficient bilinguals, it is also possible to maintain the language specific ways of tracking referents (Montrul, 2004; Travis, Torres Cacoullos & Kidd, 2017) and Chapter 2 of this thesis has showed that for the heritage speakers of Turkish, both in their Turkish (pro-drop) and Dutch (non-pro-drop). However, previous research has exclusively focused on speech patterns. Whether and in what ways language contact influences co-speech gestures used for reference tracking have not yet been addressed in the literature and this chapter aims to fill this gap.

There is growing evidence that gestures accompanying speech (i.e., co-speech gestures) are tightly linked to speech (see Özyürek, 2017 for a review). Gestures convey lexical, syntactic discursive and pragmatic information that is relevant to what is encoded in speech and can be specific to the type of language spoken (Alferink, 2015; Brown & Gullberg, 2008; Levy & McNeill, 1992; Kendon, 2004; Kita & Özyürek, 2003; Krahmer & Swerts, 2007; Özçalışkan, 2016; Azar et al (Chapter 3). Considering gestures are an internal part of communication and gesture and speech are closely related, studying gestures is highly relevant for a study of bilingualism (Gullberg, 2012) as it can offer new possibilities for examining how languages coexist and interact (Gullberg, 2009).

This paper aims to extend existing research on the use of subject referring expressions (REs) in extended discourse in language contact situations to a

multimodal context. It studies bilingual speakers of Turkish and Dutch who were born and raised in the Netherlands, comparing them to monolingual baselines in both Turkish and Dutch. Therefore, this chapter also provides baseline data for the multimodal reference tracking strategies of monolingually raised speakers of Turkish and Dutch. Hence, the main questions that this chapter addresses are i) whether there are cross-linguistic differences in multimodal reference tracking strategies between monolingual Turkish and Dutch speakers, given that there are differences in reference tracking strategies across the two languages (Chapter 2) and ii) whether language contact influences multimodal reference tracking strategies of bilinguals; i.e., whether bilingual speakers differ from the monolingual baselines with regard to the use of gestures that accompany subject referring expressions or not.

Previous research has shown that Turkish bears similarities as well as differences to non-pro-drop languages with regard to reference tracking patterns in speech (Azar, Özyürek & Backus, published online 5 April 2019 – Chapter 2) and in gesture (Azar, Backus & Özyürek, 2019 – Chapter 3; Gullberg, 2006; Yoshioka, 2008). However, a direct comparison of Turkish (pro-drop) and Dutch (non-pro-drop) baselines with regard to gestures that accompany subject referring expressions has not been conducted yet.

We have also shown that Turkish-Dutch bilinguals maintained the language-specific ways of tracking referents in speech (Azar et al., published online 5 April 2019- Chapter 2), which we attributed to high proficiency of bilinguals in both Turkish and Dutch as well the frequent use of each language, in line with a usage-based approaches to language (Tomasello, 2003; Bybee, 2006, 2010). The usage-based approach proposes that there is a link between the frequency of use of a pattern and how strong its representation is in the memory of an individual speaker, i.e., its degree of entrenchment (Brooks & Tomasello, 1999; Bybee, 2006). Constructions that are frequently used have strong representations in memory, thus they are strongly entrenched. Therefore, they will stay activated and accessible for the

speakers (de Bot and Clyne, 1989; Green, 2003; Paradis, 2007) and can easily be retrieved for further use (Bybee, 2010; Croft, 2000; Ellis, 2016; Langacker, 1987; MacWhinney, 2012). In this paper, we further address whether Turkish-Dutch bilinguals' gestures accompanying reference tracking in speech also follow language-specific patterns in contact situations- that is whether entrenchment of speech patterns extends to the use of gestures.

Before we provide more details about the present study, we will review previous literature on reference tracking as a multimodal phenomenon, crosslinguistic variation in multimodal reference tracking, and multimodal reference tracking strategies in bilingualism.

2. Background

2.1. Reference tracking as a multimodal phenomenon: General and language-specific patterns

Reference tracking is the phenomenon of introducing entities and then referring back to them throughout discourse to establish and maintain coherence, for example by tracking the novelty versus continuity of the entities that are mentioned. Speakers usually do so by varying between richer referring expressions (REs), for novel referents, and reduced ones for continued referents. For example, speakers tend to introduce new referents into the discourse with a noun phrase (e.g. *a young woman*) but maintain the same referent with an overt pronoun (e.g., *she*) in the next clause or omit the reference altogether (i.e., null pronoun).

There is growing evidence that reference tracking is a multimodal phenomenon and speakers may accompany the REs that they use in speech with a gesture that represents the entity they mention (Debreslioska & Gullberg, 2019; Kendon, 2004, McNeill, 1992). Those gestures may for example associate referents with a specific location in gesture space. Furthermore, speakers employ co-speech gestures in systematic ways during reference tracking by pointing back to these

locations. For example, it has been repeatedly found that speakers adapt their gestures to the discourse status of referents (i.e., whether referents are introduced or (re)introduced into discourse) as well as to the richness of the REs they use in speech (i.e., whether referents are expressed with noun phrases (NPs) versus pronouns). They are more likely to produce gestures with referents when they are introduced into discourse or re-introduced after some intervening discourse but less likely to do so when referents are maintained across consecutive clauses (Levy & Fowler, 2000; Levy & McNeill, 1992; Debreslioska, Özyürek, Gullberg, & Perniss, 2013; Perniss & Özyürek, 2015). Speakers also tend to gesture more with referents that are expressed with richer REs such as NPs than with reduced REs such as overt pronouns (Azar & Özyürek, 2015; Azar et al., 2019; Debreslioska & Gullberg, 2019; Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioka, 2008). These findings show that speech and gesture are closely related at the level of discourse production (Levy & McNeill, 1992).

Although the discourse status of referents seems to be a language-general factor that influences both the use of REs in speech and the gestures that accompany them, previous research has shown that languages may differ in terms of the relations between a certain discourse status and the use of REs. For example, in non-pro-drop languages such as English, German and Dutch, overt pronouns (e.g., he or she) are used to maintain referents (Aksu-Koç & Nicolopoulou, 2015; Arnold, 2000; Gullberg, 2006; Perniss & Özyürek, 2015; Yoshioka, 2008; Flecken, 2010). However, maintained subjects are dropped (i.e., null pronoun) in pro-drop languages such as Spanish, Greek and Turkish (Azar et al., 2018; Haznedar, 2010; Montrul, 2008; Silva-Corvalán, 1994; Tsimpli, Sorace, Heycock & Filliaci, 2004).

The use of overt pronouns (e.g., he, she, it) also shows variation across these two types of languages. Even though speakers of non-pro-drop languages strongly prefer to use overt pronouns for maintained referents as opposed to for re-introduced referents (Arnold, 2000; Flecken, 2010), speakers of pro-drop languages may not

share this preference. For example, as we showed in Chapter 3 (Azar et al, 2019), the discourse status of referents (i.e., maintained or re-introduced) did not have a strong effect on Turkish speakers' likelihood of using an overt pronoun as opposed to a null pronoun. The use of overt pronouns mainly served a pragmatic function and were preferred for referents that were marked for similarity, contrast or topic shift.

As for gestures that accompany subject referring expressions, the majority of previous research has focused on non-pro-drop languages and our understanding of multimodal reference tracking in pro-drop languages is limited. Chapter 3 found both language-general and language-specific patterns for gestures accompanying REs in monolingual Turkish (comparing Turkish patterns to already published findings on non-pro-drop languages). As a general pattern, speakers of Turkish were overall more likely to accompany subject referents with gestures when referents were re-introduced as opposed to maintained and were more likely to accompany NPs with gestures than pronouns. However, when pronouns were used in re-introduction contexts in Turkish, they were as likely to be accompanied by a gesture as NPs. That is, even though NPs were more likely to be accompanied by gestures than pronouns overall, this tendency was not present in re-introduction (low accessibility) contexts. We also found that overt pronouns were accompanied by a gesture (51%), more often than previously found in such contexts in non-pro drop languages (e.g., 15% for German in Perniss & Özyürek, 2015), possibly because they help disambiguate referents in low accessibility contexts.

Note that direct comparisons of multimodal reference tracking strategies across pro-drop and non-pro-drop languages are missing from the literature. Thus, the first aim of the current paper is to fill this gap by comparing Turkish (Chapter 2) to Dutch directly in monolingual and bilingual contexts to establish whether there are crosslinguistic differences in gesture that are produced during reference tracking. The second aim is to see if these language specific multimodal patterns are maintained in bilinguals.

2.2. Multimodal reference tracking strategies in bilingualism

Even though the use of subject referring expression in bilingual speech has been studied quite extensively (e.g., Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalan, 1994) as mentioned above, what happens to the gestures that accompany referring expressions in contact situations has not been previously addressed.

There are some previous studies of multimodal reference tracking in bilingualism, though these have focused on second language (L2) learners who mostly were speakers of two non-pro-drop languages (Gullberg, 2003; 2006). Those studies were mainly interested in how gestures relate to over-explicit speech which has been found to be a characteristic of L2 speech, such as the use of NPs in contexts in which L1 speakers would prefer pronouns, e.g. maintained referent contexts (Gullberg, 2003, 2006, Yoshioka, 2008). Those studies compared the amount of gesturing across the L1 and the L2 of bilingual speakers and found that over-explicitness in speech goes together with over-explicitness in gesture (Gullberg, 2003, 2006; Yoshioka, 2008). That is, when L2 speakers use the semantically richer NPs for maintained referents (for which L1 speakers would prefer the semantically reduced pronouns), they are also more likely to accompany those referents with gestures. Once speakers learn to use the pronominal system of the target language like native speakers do, however, over-explicitness in both modalities tends to disappear (Gullberg, 2003), suggesting over-explicitness in gesture might be a developmental step in L2 acquisition. It has also been suggested that bilingual speakers gesture more in their L2 during reference tracking than in their L1 because gestures might help learners plan and organize discourse in their weaker language and therefore reduce the cognitive load where processing and planning at both local and global levels is difficult for learners (Gullberg, 2006).

Gestures as used by bilinguals who are heritage speakers and grew up with two languages and who are proficient in both their languages, on the other hand, have not been much investigated so far. Studying multimodal reference tracking in a

language contact context for the first time, we contribute data that could fill this gap. Understanding whether gestures are influenced by language contact will contribute to our knowledge of language change, extending it to the visual modality of language as well as expanding our understanding of speech-gesture integration. The bilingual speakers in this study have had exposure to the two languages from early on, as second-generation heritage speakers of the minority language Turkish and the majority language Dutch. The speakers are highly proficient in both languages, and use each within and beyond their home situations on a daily basis. Therefore, they are different from the majority of previously studied heritage speakers who usually had low attainment of the heritage language, but also from previously studied second language speakers who started learning their L2 at a later stage and mostly had weaker proficiency in their L2 than in their L1.

3. Present Study

This chapter is a follow-up to Chapter 2 which investigated Turkish-Dutch bilingual speakers' reference tracking patterns in speech only, and showed that bilinguals maintained the language-specific reference tracking patterns of both Turkish and Dutch and that there were no significant differences between bilingual and monolingual patterns of use. Chapter 3 did investigate the use of gestures in multimodal reference tracking strategies, although only in the Turkish baseline, therefore lacking a direct cross-linguistic comparison between Turkish and Dutch. Furthermore, it is an open question whether language-specific patterns in gesture are maintained by bilingual speakers.

In Chapter 4 (Azar, Backus, & Özyürek, published online 30 April 2019), we found that bilinguals maintained a high gesture rate when they spoke Turkish and a low gesture rate when they spoke Dutch in narrative contexts. At the same time, we found that bilinguals overall used more deictic gestures (albeit not specific to reference tracking per se) than monolinguals, in both Turkish and Dutch. This

chapter investigates more specifically the use of reference tracking deictic gestures accompanying subject referring expressions. Therefore, it addresses i) whether there are cross-linguistic differences in multimodal reference tracking strategies between Turkish and Dutch and ii) whether language contact influences the multimodal reference tracking strategies of bilinguals. It investigates the influence of discourse status on the one hand (i.e., whether referents are re-introduced or maintained) and the richness of REs on the other hand (i.e., whether referents are expressed with an NP or a pronoun) on the presence or absence of gestures that accompany subject referents.

3.1. Predictions

We expect to find that gestures are used more often in re-introduction contexts than in maintenance context, regardless of language type and whether a speaker is monolingual or bilingual as the influence of discourse status on the use of gestures seems to be a language-general pattern.

As for the cross-linguistic differences, we expect to find them for gesture use with regard to the type of RE expressions they accompany. In re-introduced referent contexts, we may expect to find a higher frequency of pronouns accompanied by gestures in Turkish than in Dutch. This is because we showed in Chapter 3 that speakers of Turkish are more likely to gesture with pronouns in these contexts than speakers of German, a non-pro-drop language (as studied by Perniss & Özyürek, 2015). Additionally, pronouns might be more likely to be accompanied by gestures in Turkish than in Dutch. That is because pronouns are not strongly associated with high accessibility in Turkish and they are used in re-introduction contexts as well (because pronoun use in Turkish is more modulated by pragmatics than accessibility). In Dutch, on the other hand, pronouns usually occur in maintenance contexts, and referents in those contexts are not usually accompanied by gestures (cf. Gullberg, 2006; Yoshioka, 2008). As for gestures that accompany NPs, we would not necessarily expect any differences between the two languages given that in each

language, NPs are mainly used for reference re-introduction and their status with regard to reference tracking does not show variation across Turkish and Dutch. This will be also in line with *Interface Hypothesis* of speech and gesture production (Kita & Özyürek, 2003) that expects language specific encoding possibilities to influence gestural expressions.

As for bilingual patterns, we may expect to find no differences between bilingual and monolingual speakers with regard to the influence of RE type on gesturing during reference tracking, given that we did not find many differences between the two groups in speech patterns, either (Azar et al., published online 5 April 2019). Furthermore, we did not find differences between bilingual and monolingual speakers in gesture rate patterns in Chapter 4 (Azar et al., published online 30 April 2019), showing that speakers do not necessarily transfer gesture rate or adapt it to the dominant language in the society. We suggested that gesture rate might be tied to the act of speaking in a particular language and gesture rate might be a convention that is possibly learned through socialization with each speaker community. Given that the bilingual speakers in this thesis are highly proficient in each language and use them regularly, it is possible that gesture rate patterns are entrenched and therefore maintained – in line with the usage-based approaches to language production (Brooks & Tomasello, 1999; Bybee, 2006) as well as with multimodal construction grammar approaches (Cienki, 2017; Steen & Turner, 2013; Zima, 2014). Considering that gesture and speech patterns go hand-in-hand at the discourse level (Azar et al., 2019; Levy & Fowler, 2000; Levy & McNeill, 1992; Debreslioska, Özyürek, Gullberg, & Perniss, 2013; Perniss & Özyürek, 2015), also in L2 narratives where both modalities show over-explicit forms compared to L1 patterns (Gullberg, 2003; 2006), such entrenchment of gesture patterns might be the case also for gestures that accompany subject referring expressions. Therefore, we predict that the bilinguals will follow the monolingual patterns of each language.

It is also possible that bilinguals gesture more than monolinguals in both Turkish and Dutch as a general effect of bilingualism. In Chapter 4, we found that bilinguals tended to produce more deictic gestures overall than monolinguals in both Turkish and Dutch, possibly because they exploit gestures in organizing their discourse (Gullberg, 1998; 2006). Deictic gestures might help bilingual speakers package their message more easily by means of locating characters, objects and action in gesture space (Nicoladis, 2006, 2007), and therefore reducing the cognitive load associated with being bilingual (i.e., the need to inhibit the language not relevant for the task at hand). Externalizing the characters to gesture space may help here. Note, however, that in Chapter 4, we analyzed deictic gestures accompanying all parts of speech (thus not only the subject referents) while this current chapter focuses on subject referents only. It is possible that the higher frequency overall in bilinguals of deictic gestures may not be present when gestures are analyzed only in the domain of reference tracking, perhaps due to gestures accompanying subject referents being more tied to the language specific ways of tracking referents in discourse.

4. Method

4.1. Participants

20 heritage speakers of Turkish studying in Nijmegen, the Netherlands (14 females; $M_{age} = 23.3$, $SD = 2.95$), 20 monolingually raised Turkish speakers studying in Istanbul, Turkey (17 females; $M_{age} = 22.2$, $SD = 1.75$) and 20 monolingually raised Dutch speakers studying in Nijmegen, the Netherlands (14 females; $M_{age} = 21.5$, $SD = 2.73$) participated in the study. All heritage speakers were second-generation immigrants born and raised in the Netherlands by first-generation parents, who moved to the Netherlands from Turkey (mean immigration age was $M_{age} = 15.9$, $SD = 5.12$ for the mothers and $M_{age} = 19$, $SD = 7.24$ for the fathers). When the participants in this study were born, the mothers had lived in the Netherlands for an average of 9.2 years ($SD = 6.66$) and the fathers for 11.15 years ($SD = 7.46$).

Bilingual speakers acquired Turkish as their first language (L1) at home and Dutch as their second language (L2) to which they had increasing exposure after the age of 4. On a 5-point Likert scale, bilinguals rated the frequency of their current language use in various environments and with various interlocutors (1 = never; 2 = rarely; 3 = sometimes; 4 = most of the time; 5 = all the time) as well as their proficiency in both Turkish and Dutch (1 = native; 2 = native-like; 3 = advanced; 4 = intermediate 5 = beginner). The analysis on the ratings showed that bilinguals' self-rated frequency of language use for Turkish ($M = 2.43$, $SD = 0.92$) and Dutch ($M = 2.91$, $SD = 1.31$) was not significantly different, $\beta = -0.484$, $SE = 0.330$, $t\text{-value} = -1.465$. Bilinguals rated their overall proficiency in Turkish to be somewhere between native-like and advanced ($M = 2.40$), although the rating scores were even higher for Dutch ($M = 1.50$), $\beta = 0.900$, $SE = 0.15$, $t\text{-value} = 2.853$ (see Table 2.1. in *Appendix 2* for the random effect structure of the analyses). Bilinguals also reported to mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among Turkish speaking friends.

Using a Praat script (De Jong & Wempe, 2009), we also measured oral fluency in both Turkish and Dutch, based on each speaker's articulation rate (number of syllables/articulation time) in a 10-second sample from the elicited narratives. Bilingual speakers were not significantly faster or slower than the monolingual baseline in Dutch ($\beta = 0.191$, $SE = 0.204$, $t\text{-value} = 0.934$, $p = .356$) while the difference was marginally significant in Turkish ($\beta = 0.375$, $SE = 0.188$, $t\text{-value} = 1.994$, $p = .053$). Bilinguals tended to speak slower than monolinguals. Table 1 summarizes the mean articulation rates in monolingual and bilingual narratives.

Table 1. *Articulation rates in Turkish and Dutch by speaker groups (Standard Deviation)*

	Turkish		Dutch	
	Mean	(SD)	Mean	(SD)
Bilingual	4.44	(0.63)	4.42	(0.57)
Monolingual	4.81	(0.55)	4.62	(0.71)

4.2. Stimuli

We used two short silent videos (Azar et al., 2016, 2017, first published online) to elicit narratives. In one video, three women are engaged in cooking activities (kitchen video, Perniss & Özyürek, 2015) and in the other two women and a man are engaged in office activities (office video). Figure 1 contains stills depicting different segments from each video. See *Appendix D* at the end of the thesis for a detailed list of the events that take place in each video.



Figure 1. Stills from the stimulus videos that were used for narrative elicitation; kitchen scene on top and office video at the bottom.

4.3. Procedure

Participants watched the two stimulus videos one by one on a computer screen and narrated what they had watched to an addressee. The computer screen turned white after each video and stayed white during the narrations. The addressees were not confederates: there was a different addressee in each session and they did not see the videos before or during the narrations. Addressees were instructed that they could ask clarification questions once the narrative was complete and they were going to answer two short written questions about each narrative. Once the instructions were given, the experimenter left the room and came back after each narrative with questions for the addressee. Speakers repeated the task once in Turkish with a Turkish monolingual addressee and once in Dutch with a Dutch monolingual addressee, with at least a two-week interval between the two data collection sessions. The order of the two videos and language was counterbalanced. All sessions were videotaped. Monolingual participants performed the task once.

4.4. Data coding

We coded the subject argument of each clause that had an animate subject argument for the presence or absence of a gesture.

Chapters 2 and 3 provide detailed information about the coding of clauses. What is relevant for this chapter is that each subject referring expression had one value for discourse status (maintained versus re-introduced) and one value for RE type (NP versus overt pronoun). *Maintained* subject referents refer to the same entity as the subject of the immediately preceding clause. *Re-introduced* subject referents were mentioned in the discourse previously but not in the immediately preceding clause, either as the subject or object argument. As for the RE type, each overtly expressed subject referent was coded as either a *noun phrase* (e.g., bare noun, determiner plus noun or nouns modified by an adjective or relative clause) (see *Appendix E* at the end of the thesis for the detailed list of noun phrase constructions

that occurred in our dataset, but note these were all collapsed) or an *overt pronoun* (personal pronoun, demonstrative pronoun, indefinite pronoun as well as stressed and reduced personal pronoun for Dutch).

Following previous studies of multimodal reference tracking (Gullberg, 2006; Yoshioka, 2008; Perniss & Özyürek, 2015), we coded the presence or absence of a gesture with each subject referring expression in speech in a categorical manner. Each gesture had a single value with regard to discourse status (re-introduced or maintained) and the accompanying RE type (NP or overt pronoun). We only analyzed the gestures that anchored subject referents in gesture space by means of an *index-finger pointing* or a *whole-hand extended* gesture (see Figure 2 & Figure 4 for Turkish and Figure 3 for Dutch) because when gestures were located this way a link is expressed between the location of those gestures in gesture space and the location of the characters in the stimulus videos (Perniss & Özyürek, 2015). This made it easier to judge whether gestures were indeed associated with the subject referents. Both types of gestures occurred with roughly equal frequency in the data set (46% index-finger and 54% whole-hand gestures, $N = 729$).



O alyo. maintained/ pronoun
'**She** is taking (the jar).'

Figure 2. A bilingual speaker is producing (in Turkish) an index-finger pointing gesture (left panel) referring to the woman who is taking the jar in the stimulus video (right panel). His gesture is temporally aligning with the subject referent *o* 'she' in his speech.



Die dame achter de pc komt ook helpen. re-introduction/ NP
'**That woman behind the computer** helps, too.'

Figure 3. A bilingual speaker is producing (in Dutch) a whole-hand gesture (left panel) referring to the woman who is working behind the computer in the stimulus video (right panel). Her gesture is temporally aligning with the subject referent *die dame achter die pc* 'the woman behind the computer' in his speech.

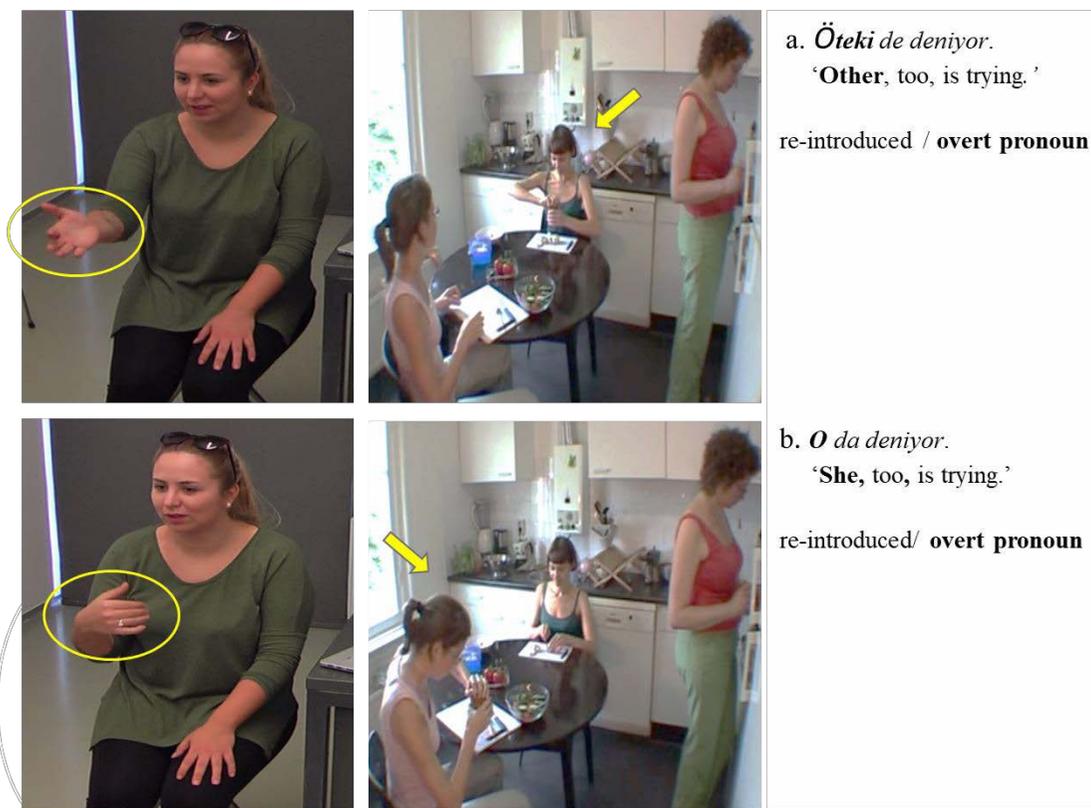


Figure 4. The speaker first mentions that the two women sitting at the table cannot open a jar. Then she re-introduces the character that is highlighted in still (a) with a pronominalized indefinite determiner and the character that is highlighted in still (b) with a third-person pronoun. Her whole-hand gestures temporally align with the subject pronouns **in bold** in both (a) and (b).

We excluded iconic and beat gestures, two types that we believed are unlikely to be associated with subject referents (Azar et al, 2019). Beat gestures do not depict information about the referent but rather direct attention to the rhythmic peak of speech (McNeill, 1992, 2006). Iconic gestures (e.g., a stirring gesture or a cutting gesture) we considered to be more about the predicate than specifically about the subject argument, as they were not localized in gesture space associated with subject referents and most of them overlapped not only with the subject REs (aslo see Perniss & Özyürek, 2015 for a similar pattern): Their production was temporally extended to the production of the predicates in these clauses. In total, we excluded 131 gestures

that temporally aligned with subject referring expressions; 76 of those were iconic gestures and 65 were beat gestures. To check for reliability, a second coder coded around 30% of all the gestures that accompanied REs ($N = 241$). The two coders had an initial agreement of around 95% for the presence of a stroke for each language group and high agreement for the gesture type (index finger or whole hand gestures versus any other category of gestures (see Table 2 for reliability scores).

Table 2. *Inter-rater reliability for the gesture type coding*

	Turkish		Dutch	
	<i>Bilingual</i>	<i>monolingual</i>	<i>bilingual</i>	<i>monolingual</i>
Cohen's kappa	.741	.884	.596	.647
p-value	<.001	<.001	<.001	<.001

5. Analyses

We analyzed the likelihood of referring expressions being accompanied with a gesture by using generalized logistic mixed effect regression using the *glmer* function from the *lme4* package in R software (cf. Bates, Maechler, Bolker & Walker, 2015), version 3.3.2 (see Baayen, Davidson & Bates, 2008 for more information on mixed-effects modelling in language research). *Appendix 1* (fixed effects) and *Appendix 2* (random effects) at the end of this chapter provide the model summary and output for each analysis we report here. All analyses made use of variants of the generalized linear model with binomial error structure because the dependent variable was binary, coded as 1 for presence and as 0 for absence of a gesture that accompanied each subject RE (following Azar et al., 2019 and Debreslioska & Gullberg, 2019). There were in total 2109 subject referring expressions (1187 NPs and 922 overt pronouns) in speech and 729 of those (596 NPs and 133 overt pronouns) were accompanied by a gesture. Although all analyses were run on presence or absence of gestures as the dependent variable, graphs show mean

proportions of subject REs that were accompanied by a deictic gesture (out of all REs in speech) for ease of illustration.

6. Results

We first tried to build a maximal model (cf. Barr, Levy, Scheepers & Tily, 2013) including all main effects, i.e., Discourse Status (maintained versus re-introduced), RE Type (NP versus overt pronoun), Language Type (Dutch versus Turkish) and Language Status (bilingual versus monolingual) as well as interaction terms and random effects (random intercepts for participants and random slopes for Discourse Status and RE Type by participants)¹. The maximal model did not converge, most likely because we do not have sufficient observations to estimate all the effects. Following the advice in Barr et al. (2013, p.276), we therefore pursued separate analyses for the influence of Discourse Status and RE Type on the use of gestures, including language type and language status as fixed effects as well as random effects in each analysis.

The analyses first focused on the effect of discourse status. Then the effect of RE type on gestures is explored separately for maintained and re-introduced referent contexts. We chose not to collapse the two contexts because for various languages it has repeatedly been shown that speakers differ in their gesture production in these two contexts. Analyzing the two discourse status contexts separately is therefore important if one wants to explore whether the cross-linguistic variation in the use of overt pronouns is reflected in the use of gestures.

¹ In each analysis we report in this paper, the category that started with the alphabetically earlier letter was the baseline category for comparison for each factor (i.e., *maintained* for Discourse Status, *NP* for RE Type, *Dutch* for Language Type and *bilingual* for Language Status).

6.1. Discourse status and gestures

Table 3 summarizes the total number of REs in the speech data and the number that were accompanied by gestures per discourse status in Turkish and Dutch by monolingual and bilingual speakers. The maximal model did not converge. We first forced the random intercepts and slopes not to be correlated, which did not converge, either. As the next step, we took out random intercepts from the model. This again returned a non-converging model. Therefore, we next took out the *interaction term for Language Type* from the model (and re-introduced random intercepts) as we did not have theoretical reasons to assume that the influence of discourse status on gestures will vary across Turkish and Dutch (i.e., that re-introduced referents will be more likely to be accompanied by gestures than maintained referents in one language but not in the other). This is because previous findings have robustly showed that discourse status influences the presence or absence of gestures accompanying referring expressions independent of language typology, as was mentioned in the *Introduction*.

Table 3. Total number of REs in speech and the number of REs that were accompanied by gesture per discourse status context (RI stands for re-introduced)

	REs in speech			REs with gesture		
	maintained	RI	total	maintained	RI	total
<i>Turkish</i>						
Bilingual	68	291	359	16	162	178
Monolingual	112	329	441	33	177	210
<i>Dutch</i>						
Bilingual	315	341	656	44	147	191
Monolingual	298	355	653	21	129	150

The analysis returned a significant main effect of Discourse Status ($\beta = 1.591$, $SE = 0.207$, z -value = 7.693, $p < .0001$), showing that re-introduced referents were more likely to be accompanied by gestures than maintained referents. There was no main effect of Language Status and no significant interaction of Discourse Status

and Language Status. There was, however, a main effect of Language Type ($\beta = 0.723$, $SE = 0.129$, z -value = 5.615, $p < .0001$) such that referents overall were more likely to be accompanied by a gesture in Turkish than in Dutch. Figure 5² illustrates the proportions of subject referents that were accompanied by a gesture in maintained and re-introduced referent contexts.

² In all the boxplots, the intermediate horizontal lines indicate the median (the mid-point of the data), the boxes represent the range of the middle 50% of the data, the whiskers represent the range of the upper and lower 25% of the data. The horizontal lines at the end of the whiskers indicate the maximum and the minimum values, excluding the outliers. Outliers are indicated by filled circles if there are any and mean values are indicated by the cross marks. Mean values are given as text on top of the plots as well.

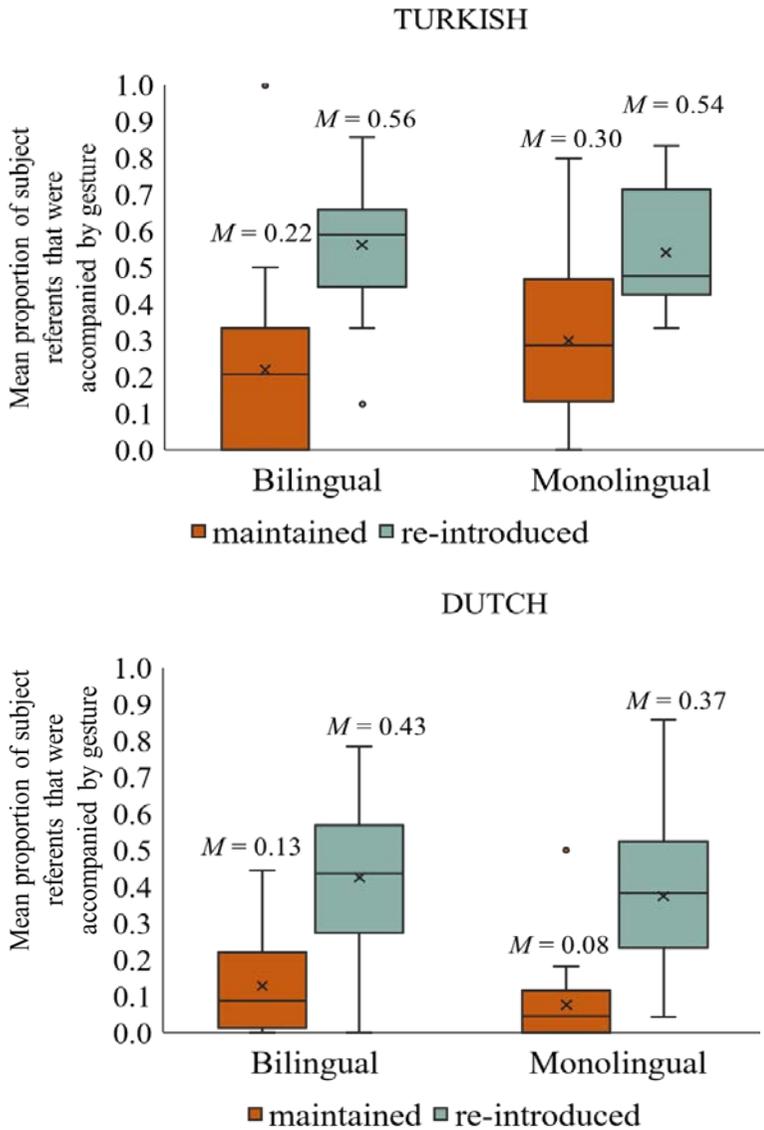


Figure 5. Mean proportions of subject REs that were accompanied by a gesture in maintained and re-introduced referent contexts by bilingual and monolingual speakers.

6.2. Referent expression type in speech and gestures

Next, we explored the influence of the richness of the expressions used in speech (i.e., RE Type - NP versus overt pronoun) on the gestures that accompany subject REs. We present the data in two sections; first for maintained referent contexts and

second for re-introduced referent contexts. For each analysis, we simultaneously entered RE Type, Language Type and Language Status as well as the interaction terms into the model. The analyses accounted for the random variation for participants by including random intercepts and random slopes for RE Type in the models.

6.2.1. Maintained referent contexts

Table 4 summarizes the total number of REs in speech (NP and overt pronouns) and how many of those REs were accompanied by a gesture in Turkish and Dutch by speaker groups. Figure 6 illustrates the mean proportions of REs in maintained referent contexts that were accompanied by a gesture.

Table 4. *Total number of REs in speech and the number of REs that were accompanied by gesture in maintained referent contexts*

	REs in speech			REs with gesture		
	NP	Pronoun	total	NP	pronoun	total
<i>Turkish</i>						
Bilingual	22	46	68	9	7	16
Monolingual	58	54	112	22	11	33
<i>Dutch</i>						
Bilingual	16	299	315	10	34	44
Monolingual	21	277	298	8	13	21

The maximal model with random intercepts for participants and random slopes for RE Type by participant did not converge. We first forced the random intercepts and slopes not to be correlated, which did not converge, either. As the next step, we took out random intercepts from the model. This again returned a non-converging model. We therefore performed separate analyses for Turkish and Dutch with RE Type and Language Status and the interaction term as fixed effects. The model for Turkish with random slopes for RE type returned a perfect correlation between the random effects (-1.00), suggesting the model may have been overfitted. We simplified the model to only random intercepts for participants, which then returned 0 variance for participants, suggesting a need to further simplify the

structure of the model (Debreslioska & Gullberg, 2019). We therefore took out random intercepts from the model and analyzed the data with *glm* as we did not enter any random effects into the model. The analysis for Turkish returned a significant main effect only for RE Type ($\beta = -0.257$, $SE = 0.113$, $t = -2.266$, $p = .025$), showing that NPs were more likely to be accompanied by gestures than overt pronouns. Note that the removal of the random intercepts did not affect the outcome for the fixed effects, i.e., the same fixed effects were (non)significant before and after the removal. The analysis for Dutch with random intercepts and random slopes also returned a significant main effect only for RE Type ($\beta = -3.184$, $SE = 0.808$, $z = -3.940$, $p < .0001$), again with NPs being more likely to be accompanied by gestures than overt pronouns (see Table 1.3. in *Appendix 1* for the full model summary).

6.2.2. Reintroduced referent contexts

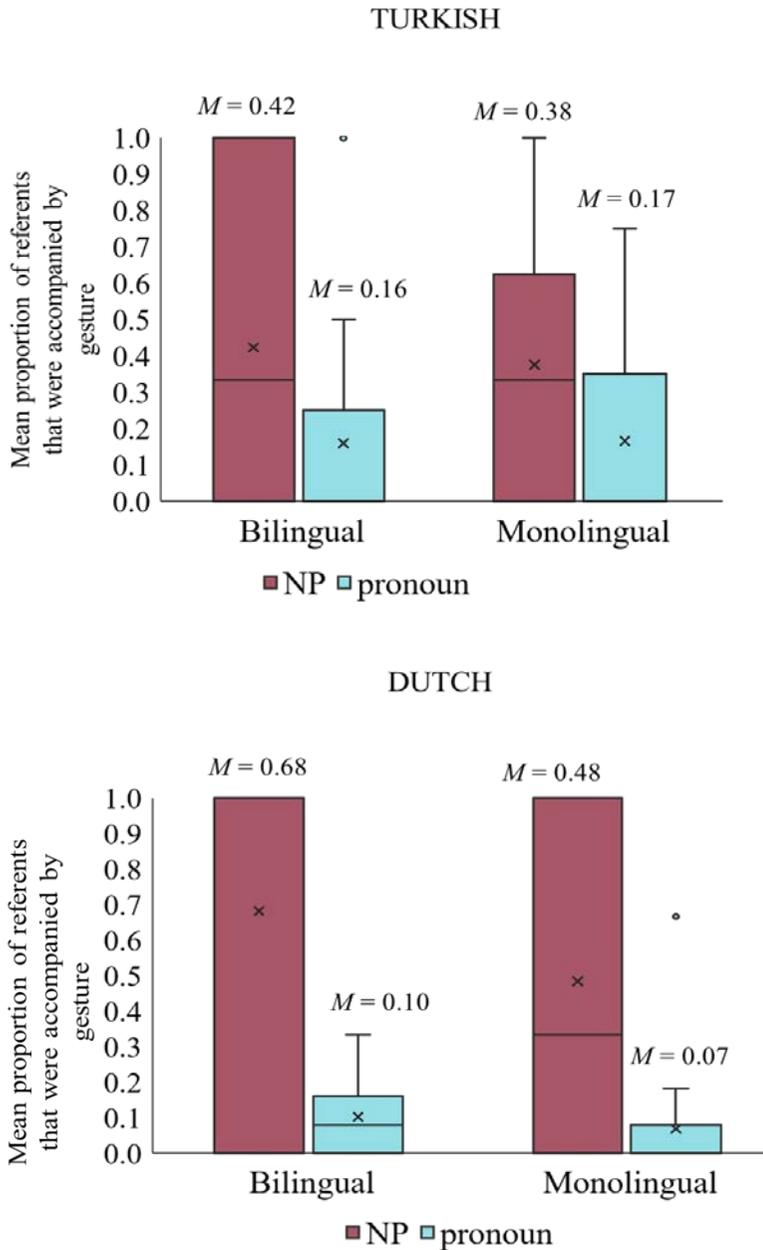


Figure 6. Mean proportions of NP and pronoun subject REs in maintained referent contexts that were accompanied by gesture.

Table 5 presents a summary of the number of re-introduced REs in speech and the number that was accompanied by a gesture in Turkish and Dutch by speaker groups. Figure 7 illustrates the mean proportions of REs in re-introduced referent contexts that were accompanied by gestures.

Table 5. Total number of REs in speech and the number of REs that were accompanied by gesture in re-introduced referent contexts

	REs in speech			REs with gesture		
	NP	pronoun	total	NP	pronoun	total
<i>Turkish</i>						
Bilingual	260	31	291	146	16	162
Monolingual	300	29	329	164	13	177
<i>Dutch</i>						
Bilingual	242	99	341	124	23	147
Monolingual	268	87	355	113	16	129

The maximal model showed a significant main effect of RE type ($\beta = -1.400$, $SE = 0.350$, z -value = -3.996 , $p < .0001$) and a significant interaction of Language Type and RE Type ($\beta = 1.136$, $SE = 0.506$, z -value = 2.246 , $p = .0247$). There was, however, no significant main effect of Language Status (see Table 1.4 in *Appendix 1* for the full model summary). We broke down the interaction per Language Type, that is we performed separate analyses for Turkish and for Dutch with RE Type and Language Status as fixed effects. The analysis for Turkish did not return a significant main effect of RE Type or Language Status, and it did not return a significant interaction of the two, either (see Table 1.5. in *Appendix 1* for the full model summary). The analysis for Dutch, on the other hand, returned a significant main effect only for RE Type ($\beta = -1.422$, $SE = 0.376$, z -value = -3.774 , $p = .00016$), with NPs being more likely to be accompanied by gestures than overt pronouns.

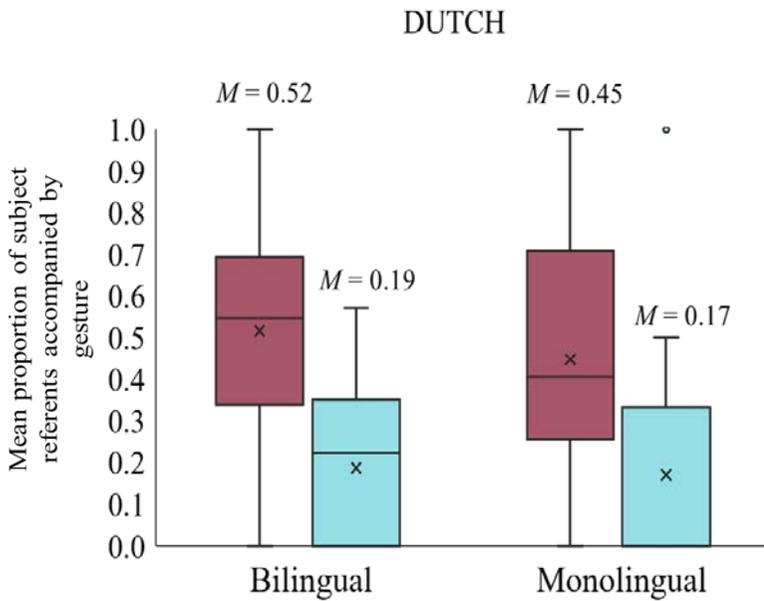
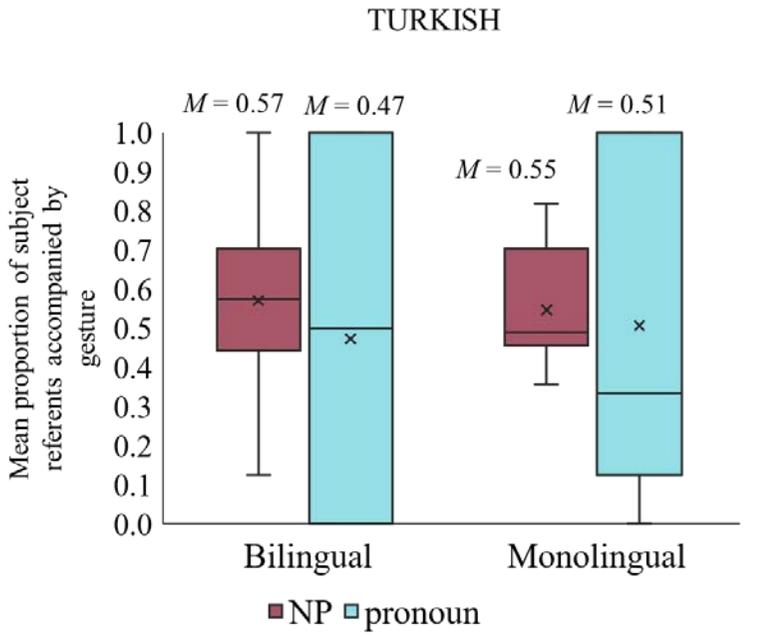


Figure 7. Mean proportions of NP and pronoun subject REs in re-introduced referent contexts that were accompanied by a gesture.

The difference between Turkish and Dutch with regard to the influence of RE type on gestures suggests that in Turkish overt pronouns are accompanied by gestures when they are used in low accessibility contexts relatively more frequently than in non-pro-drop Dutch. A direct comparison of gestures in Turkish and in Dutch indeed confirms that this is the case: there is a significant main effect of Language Type on the likelihood of overt pronouns being accompanied by gestures ($\beta = 1.336$, $SE = 0.468$, z -value = 2.856, $p = .004$) while there was no such effect for NPs ($\beta = 0.205$, $SE = 0.190$, z -value = 1.081, $p = .280$) (see Table 1.6. in *Appendix 1* for the full model summary).

7. Summary of the Findings and Discussion

We investigated, for the first time, the influence of language contact on multimodal reference tracking, in particular on the use of gestures that accompany subject referring expressions. We elicited narratives from second-generation heritage speakers of Turkish in the Netherlands, both in Turkish and in Dutch, as well as from monolingual baseline speakers. We asked i) whether there are cross-linguistic differences in multimodal reference tracking strategies between Turkish and Dutch and ii) whether language contact influences the multimodal reference tracking strategies of bilinguals, i.e., whether bilingual speakers differ from the baseline data with regard to the use of gestures that accompany subject referring expressions. Doing so, we focused on the discourse status of referents (maintained versus re-introduced) and the richness of expressions that are used for those referents in speech (NP versus overt pronoun) as factors that might influence the use of gestures in discourse.

In line with findings from previous studies (Azar & Özyürek, 2015; Debreslioska & Gullberg, 2019; Perniss & Özyürek, 2015; Yoshioka, 2008), we found that speakers overall modulated the presence or absence of gestures that accompany subject referents taking into account the discourse status of those

referents. Speakers of both Turkish and Dutch were more likely to accompany re-introduced referents with gestures than maintained referents.

Below, we will first discuss our findings with regard to cross-linguistic differences across the Turkish and Dutch baselines and then with regard to the data from the bilingual speakers whether bilinguals maintain language-specific patterns or whether there are effects of language contact on their gestures.

7.1. Cross-linguistic differences in gestures that accompany subject referring expressions

We found some cross-linguistic differences in gestures between Turkish and Dutch, in particular in re-introduced referent contexts. The richness of REs, that is whether a subject referent is expressed with an NP or with an overt pronoun, had an influence on gestures in Dutch but not in Turkish. While speakers of Dutch were more likely to accompany NPs with gestures than overt pronouns, both in re-introduced and maintained referent contexts, speakers of Turkish did not differentiate between the two types of referring expressions in re-introduced referent contexts. They were similar to speakers of Dutch only in maintained referent contexts, being more likely to accompany NPs with gestures than overt pronouns.

When we compared the Turkish and Dutch baseline data directly, we found that overt pronouns in re-introduced referent contexts were more likely to be accompanied by gestures in pro-drop Turkish ($M = 0.51$) than in non-pro-drop Dutch ($M = 0.17$). On the other hand, the two languages did not differ in the likelihood of accompanying NPs with gestures. These findings confirm our prediction that there may be cross-linguistic differences in gesturing with overt pronouns and also show that the differences between Turkish and Dutch are context-specific and are not driven by Turkish simply being a language with a higher gesture rate than Dutch.

We suggest that the difference between Turkish and Dutch with regard to the likelihood of accompanying overt pronouns with gestures in re-introduction contexts might be related to the differences between the pronominal systems of the two

languages. We also discussed this in Chapter 3 with regard to gestures in the monolingual Turkish baseline. In non-pro-drop languages such as Dutch and German, overt pronouns are the preferred forms for maintained referents. Therefore, they are highly entrenched as markers of high accessibility in the mental representations of speakers. It has been repeatedly found that highly accessible referents tend not to be accompanied by gestures (Debreslioska & Gullberg, 2019; Levy & McNeill, 1993; Yoshioka, 2008). It is possible that in non-pro-drop languages, overt pronouns are not often accompanied by gestures because they are unambiguously markers of high accessibility, therefore habitually associated with the absences of gestures. In Turkish, on the other hand, overt pronouns are not strongly associated with high accessibility and possibly not with the absence of gestures, either. Overt pronouns then seem more likely to be accompanied with gestures in Turkish than in Dutch. Although not much has been reported on gestures accompanying overt pronouns in contexts of re-introduced referents in other languages, Perniss and Özyürek (2015) found for German that only 15% of overt pronouns in re-introduced referent contexts were accompanied by gestures (the proportions are calculated from the numbers provided in Table 1 in Perniss & Özyürek, 2015). This is very similar to the 17% we found for our Dutch data. We would like to suggest that overt pronouns in Turkish may be more likely than their counterparts in Dutch to feature multimodal units (Zima, 2014) with an associated gesture that locates the referent in the gesture space.

If such multimodal units featuring overt pronouns are indeed more likely in Turkish, one mechanism behind this could be that speakers of Turkish often use gestures to disambiguate referents when they are underspecified in speech in low accessibility contexts (i.e., re-introduction). This would be in line with what Ateş and Küntay (2017) found for Turkish speaking children, who tended to accompany pronouns in low accessibility contexts with gestures to disambiguate their speech. From very early on, speakers of Turkish may develop a strategy of using gestures to

specify potentially ambiguous referents when they use reduced expressions in speech, which they then continue doing when they are adults. Note, however, that we did not systematically investigate the relationship between low specificity in speech and the use of gestures. Hence, the proposal outlined here would merit further research.

Finally, note that the Turkish third person pronoun *o* ‘he/she/it’ has the same form as the distal demonstrative, so it does not encode gender or animacy, and is not very informative semantically. It is possible that this pronoun has a very strong spatial association and the high frequency of third-person pronoun and gesture units in Turkish could be a byproduct of this spatial meaning. Overall, our findings for Turkish and Dutch monolingual baselines suggest that overt pronouns do not have the same status in pro-drop Turkish and non-pro-drop Dutch. The relations between the discourse status of referents and the use of overt pronouns across the two languages show variation and this variation is also present in the accompanying gestures. Even though there seems to be a link between the presence of gesture and third-person pronouns as linguistic expressions, it is beyond the scope of this study to comment on whether and to what extent the successful referent resolution, the understanding what the pronoun refers to, is dependent on the accompanying gesture. Hence, the proposals outlined here would merit further research that would lead to a better understanding of whether subject pronouns are more likely to construct multimodal units in pro-drop language than in non-pro-drop languages and the nature of such constructions.

7.2. Subject referent gestures in bilingualism

In none of our analyses did we find an effect of language status, that is of being either a monolingual or a bilingual speaker, on the gestures that accompanied subject referents. Given that the influence of discourse status on reference tracking, in both speech and gesture, has been a robust effect found for various languages, it is not surprising that the bilingual speakers are also sensitive to discourse status with regard

to the presence or absence of gestures with subject referents. Given the cross-linguistic differences we found in gestures accompanying overt pronouns in re-introduced referent contexts, however, one might have expected bilinguals to differ from the baseline speakers. Bilinguals could have had a higher frequency of gestures with pronouns in Dutch or a lower one in Turkish. However, they maintained the language-specific gesture patterns. Figure 8, for example illustrates a bilingual speaker who narrates a scene in Turkish. The speaker re-introduces referents with a pronoun and accompanies those pronouns with a gesture.

The language specificity of gestures with regard to reference tracking in bilinguals fits well with some of the findings in Chapter 4 where we analyzed all the gestures that occurred during elicited narratives and found that the difference in gesture rate between the Turkish and Dutch baselines was maintained in the data from the bilinguals. We also found that overall bilinguals used more deictic gestures (for subject as well as object referents) which we interpreted as part of a general strategy used especially by bilingual speakers to exploit gestures in organizing discourse (Gullberg, 1998; 2006) and to package information more easily, by means of locating characters, objects and action in gesture space (Nicoladis, 2006, 2007). However, the frequency of whole hand and pointing gestures that accompany subject referents in relation to the discourse status of those referents was not higher in bilingual narratives than it was in monolingual narratives. More research is needed to determine in which cases bilinguals produce this higher rate of locating gestures and what the various functions of those gestures are.

We suggest that if there are strong associations between the type of referring expression and gesture and if they show cross-linguistic variation across typologically different languages (depending on the relation between reference accessibility and type of REs in speech), those language-specific associations are probably learned by bilingual speakers as well through regular communication with speakers of Turkish and Dutch. The bilinguals we studied grew up speaking both

languages and have had extensive exposure to each. Therefore, they have had the opportunity to acquire gesture patterns as well, including the different gesture rates associated with their languages. Furthermore, they are highly proficient in each language and use their languages regularly. Therefore, it stands to reason that the bilinguals were able to maintain the patterns they acquired due to continuous interactions inside Turkish- and Dutch-speaking communities. This would be in line with how bilingualism is conceptualized in a usage-based approach to language, which proposes that aspects of language that are frequently used have strong and easily activated representations in individual speakers, i.e., they are highly entrenched (Brooks & Tomasello, 1999; Bybee, 2006). This may make them resistant to cross-linguistic influence (Backus, 2013). Further research should expand on the proposals we outline here by systematically including gestures in studies of bilingualism and in other linguistic domains.

Finally, the fact that gesture patterns remain language-specific in at least this language contact situation, and for these speakers, similar to speech patterns (as reported in Azar et al., published online 5 April 2019- Chapter 2), supports the hypothesis that speech and gesture form an integrated system (Kita & Özyürek, 2003; McNeill, 1992; So et al., 2009). Here, we have provided additional evidence from a novel context that supports the findings of previous research on multimodal language production.

8. Conclusion

We investigated the relations between speech and gesture during reference tracking in language contact between two typologically different languages. Studying a bilingual population with high attainment in each language, we provided findings which support that there is indeed a tight relation between gesture and speech at the discourse level.

Our findings for the effect of discourse status on the use of gestures suggest that this effect is most probably independent of language typology and also independent of the language status of speakers, i.e., whether they are bilingual or monolingual.

On the other hand, we also showed that the use of gestures in relation to the richness of expressions (RE types) may show cross-linguistic variation. In the case of Turkish and Dutch, this variation was present in the use of gestures that accompany pronouns but not NPs, possibly driven by the prominent differences in the functions and uses of overt pronouns across the two languages. We proposed a possible mechanism as to why such differences might occur cross-linguistically with regard to the association between overt pronouns and the presence or absence of gestures. We also found that bilinguals maintain such differences in their use of gestures; possibly this is due to the entrenchment of gesture use with language-specific referring expressions.

Future research should study typologically different languages to investigate whether this proposal can be extended to other languages as well, to better understand the mechanisms behind speech and gesture relations during reference tracking, and to see how bilinguals operate these forms in various types of contact situation.

9. Acknowledgements

This research is funded by the Center for Language Studies, Radboud University Nijmegen, the Netherlands and partially by the Erasmus Staff Training grant granted to the first author by the International Office Radboud University. The Max Planck Institute for Psycholinguistics also provided technical support. We thank Dr. Ayşe Caner and Dr. Nihan Ketrez for providing the location and participants for the data collection in Istanbul, Turkey. We also thank Dr. Pamela Perniss for the kitchen

stimulus video and Dr. Kazuki Sekine for the gesture reliability coding. We are also grateful to Dr. Susanne Brouwer for her advice on the statistical analyses.

10. Appendices

Appendix 1. Structure and output of fixed effects in all analyses

Table 1.1. *Results of the mixed-effect analysis for language use and proficiency*

Fixed Effect	Language use			Language proficiency		
	Estimate	SE	<i>t</i> -value	Estimate	SE	<i>t</i> -value
Intercept	2.910	0.246	11.817*	1.500	0.229	6.562*
Language Type	-0.484	0.330	-1.465	0.900	0.315	2.853*

SE: Standard Error, (*) significant *t*-value ($p < .05$)

Table 1.2. *Results of the regression analyses on gestures that accompany subject RE by discourse status*

Fixed Effect	Estimate	SE	<i>z</i> -value	<i>p</i>
Intercept	-1.972	0.210	-9.378	2e-16
Discourse Status	1.591	0.207	7.693	1.43e-14
Language Status	-0.249	0.272	-0.915	0.360
Language Type	0.723	0.129	5.615	1.96e-08
Discourse Status*Language Status	0.058	0.271	0.213	.832

SE: Standard Errors, (*) significant *z*-value ($p < .05$)

Table 1.3. *Results of the regression analyses on gestures that accompany maintained referents per language type*

Fixed Effect	Estimate	SE	z-value	<i>p</i>
Turkish				
Intercept	0.409	0.093	4.387	1.97e-05
RE Type	-0.257	0.113	-2.266	.025
Language Status	-0.030	0.109	-0.272	.786
RE Type*Language Status	0.081	0.140	0.579	.563
Dutch				
Intercept	0.789	0.797	0.991	.322
RE Type	-3.184	0.808	-3.940*	8.16e-05
Language Status	-1.275	1.003	-1.271	.204
RE Type*Language Status	0.343	1.030	0.333	.739

SE: Standard Error, (*) significant z-value ($p < .05$)

Table 1.4. *Results of the regression analyses on gestures that accompany re-introduced referents*

Fixed Effect	Estimate	SE	z-value	<i>p</i>
re-introduced referents				
RE Type	-1.400	0.350	3.996*	6.44e-05
Language Type	0.207	0.190	1.091	.275
Language Status	-0.380	0.294	-1.294	.196
RE Type*Language Type	1.136	0.506	2.246*	.0247
RE Type*Language Status	0.005	0.513	0.010	.992
Language Type*Language Status	0.300	0.344	0.871	.384
RE Type* Language Type*Language Status	-0.111	0.790	-0.141	.888

SE: Standard Error, (*) significant z-value ($p < .05$)

Table 1.5. *Results of the regression analyses on gestures that accompany re-introduced referents per language type*

Fixed Effect	Estimate	SE	z-value	<i>p</i>
Turkish				
Intercept	0.253	0.138	1.836	.066
RE Type	-0.350	0.590	-0.593	.553
Language Status	-0.062	0.189	-0.330	.742
RE Type*Language Status	0.086	0.829	0.104	.917
Dutch				
Intercept	0.080	0.270	0.294	.768
RE Type	-1.422	0.376	-3.774*	.00016
Language Status	-0.385	0.381	-1.012	.312
RE Type*Language Status	0.033	0.534	0.062	.951

SE: Standard Error, (*) significant z-value ($p < .05$)

Table 1.6. *Results of the regression analyses on gestures that accompany re-introduced referents per RE type*

Fixed Effect	Estimate	SE	z-value	<i>p</i>
NP				
Intercept	0.082	0.208	0.393	.694
Language Type	0.205	0.190	1.081	.280
Language Status	-0.379	0.293	-1.293	.196
Language Type*Language Status	0.298	0.344	0.866	.386
Pronoun				
Intercept	-1.310	0.294	-4.457*	.000083
Language Type	1.336	0.468	2.856*	.0043
Language Status	-0.371	0.437	-0.849	.396
Language Type*Language Status	0.162	0.718	0.224	.822

SE: Standard Error, (*) significant z-value ($p < .05$)

Appendix 2. Structure and output of random effects in all analyses

Table 2.1. *Specifications of the random effects in the mixed-effect analyses for language use and proficiency*

Dependent variable	Group	Random Effects		
		Name	Variance	SD
Language use	Participant	Intercept	0.121	0.347
	Residual		1.092	1.045
Language proficiency	Participant	Intercept	0.050	0.224
	Residual		0.995	0.997

Table 2.2. *Specifications of the random effects in the analyses for maintained referent contexts*

Dependent variable	Group	Random Effects			
		Name	Variance	SD	correlation
Main Dutch	Participant	Intercept	1.259	1.122	
		RE type	0.361	0.601	-0.66

Table 2.3. *Specifications of the random effects in the analyses for re-introduced referent contexts*

Dependent variable	Group	Random Effects			
		Name	Variance	SD	correlation
reintroduction	Participant	Intercept	0.487	0.698	
		RE type	0.663	0.814	-0.70
reintro TR	Participant	Intercept	0.057	0.240	
		RE type	1.283	1.133	0.35
reinto DT	Participant	Intercept	1.030	1.015	
		RE Type	0.850	0.923	-0.81

Chapter 6

Summary of the Findings and General Discussion

Summary of the Findings and General Discussion

The main aim of this thesis was to investigate the influence of language contact on the linguistic patterns used by second-generation Turkish heritage speakers in the Netherlands in the domain of discourse production, focusing on multimodal discourse strategies in general and more specially reference tracking strategies. Participants were born and raised in the Netherlands by first-generation parents, who themselves emigrated to the Netherlands from Turkey. There is overall a high level of language maintenance in the Turkish community in the Netherlands (Backus, 2012). Bilingual speakers in this study can be said to have high proficiency in both minority language Turkish and majority language Dutch, and they use both languages on a daily basis.

This thesis consists of four empirical chapters, each addressing a different aspect of either reference tracking in speech and/or gesture production in bilinguals, comparing them to monolingual baselines. All chapters were based on the same data set where participants were asked to talk about two short videos featuring activities of three people. The novel contribution of the thesis is to investigate the influences of language contact in both languages of the bilinguals as they are proficient in both languages, and examining for the first time whether and how co-speech gesture patterns are influenced by language contact.

This chapter first presents a summary of the research questions and the findings in Chapters 2 to 5. Afterwards, the theoretical implications for i) bilingualism and the influence of language contact on language production, ii) multimodal reference tracking in discourse and iii) the relations between speech and gesture production.

1. Outline of the Main Findings

1.1. Turkish-Dutch bilinguals maintain language-specific reference tracking strategies in speech in elicited narratives (Chapter 2)

The aim of Chapter 2 was to investigate whether bilingual speakers of Turkish and Dutch use language-specific ways of reference tracking in Turkish and Dutch in speech, or whether they show contact-induced change, including possible cross-linguistic (bidirectional) influences between the two languages. It focused on the use of 3rd person subject referring expressions (i.e., NPs, overt and null pronouns) in speech by taking into account both the discourse status of referents and the pragmatic contexts in which referring expressions were used.

For Turkish, the patterns found for the relative distribution of overt and null pronouns in different accessibility and pragmatic contexts did not suggest that bilinguals differed from the monolingual baseline. These findings are unlike what has been found for heritage speakers in the majority of studies which showed that heritage speakers of pro-drop languages overused overt pronouns (Albirini et al., 2011; Koban Koç, 2016) or used them in pragmatically unmarked contexts more than monolinguals did (Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalán, 1994). Turkish-Dutch bilinguals did not significantly differ from the baseline in Dutch with regard to their use of reduced versus stressed pronouns, in different pragmatic or accessibility contexts either.

These findings do not support the Interface Hypothesis (IH) (Sorace & Filliaçi, 2006) which would predict bilinguals to loosen the pragmatic constraints on overt pronouns, and use them in pragmatically unmarked contexts more often than non-bilinguals. Our findings are more in line with a usage-based approach to language which proposes that there is a link between the frequency of use of a pattern and how strong its representation is in the memory of an individual speaker, i.e., its degree of entrenchment (Brooks & Tomasello, 1999; Bybee, 2006). Constructions that are frequently used have strong representations in memory, thus they are

strongly entrenched and therefore resistant to cross-linguistic influence and change. It is possible that even though interface structures might be more vulnerable to cross-linguistic influence due to the processing costs associated with them (a proposal that this paper did not set out to test), these costs might be reduced if bilingual speakers have high proficiency in their pro-drop language and use it regularly. In those cases, bilingual speakers would have strong entrenchment of the routines associated with the integration of syntactic and pragmatic information which would lead to fairly automatized processing of overt pronouns as pragmatically marked forms. Therefore, from a usage-based approach, it is not surprising that overt pronouns are highly entrenched as pragmatically marked forms in Turkish in the memory of bilingual speakers, considering that the bilingual speakers in this study are highly proficient in both Turkish and Dutch and use both languages regularly.

Although bilingual speakers seemed to exhibit monolingual-like patterns overall, there were also some subtle differences between bilinguals and monolinguals. These were characterized by an increase in the use of overt pronouns for both languages, especially in maintained reference contexts. While maintaining referents, bilinguals used more overt pronouns and fewer NPs than monolingual speakers in Turkish although their use of null pronouns was not different from that of monolinguals, and they used more overt pronouns and fewer null pronouns than monolingual speakers in Dutch. These findings can again be explained by the degree of entrenchment of different RE types in relation to maintained referent contexts. Bilingual speakers used overt pronouns more often than the monolingual baselines in both languages, but only in relation to the forms that are used for reference maintenance infrequently, that is NPs in Turkish and null pronouns in Dutch. The strongly entrenched forms possibly compete with weakly entrenched ones in each language and therefore some of the null pronouns in maintained referent contexts get replaced with overt pronouns in bilingual Dutch while some of NPs in the same contexts get replaced by overt pronouns in bilingual Turkish.

Additionally, the weaker entrenchment of null pronouns as reference maintenance markers in bilingual Dutch compared to monolingual Dutch might be related to the variety of Dutch spoken in the Turkish immigrant community. Null pronouns may have been more infrequent in the input for our bilingual second-generation participants than for their monolingual Dutch peers, considering especially that their early input came from speakers who spoke Dutch as L2 (their parents). L2 reference tracking, especially in the intermediate proficiency range, has been characterized as being over-explicit (Frederiksen & Mayberry, 2018; Gullberg, 2006; Hendriks, 2003). If null subjects were used rarely in the input, this would have triggered a stronger association of the overt pronoun with reference maintenance than it may have in monolingual speakers, conditioning bilingual speakers to use overt pronouns without much variation, whenever a referent is maintained.

In sum, bilinguals did not differ from monolinguals significantly, especially in the use of overt versus null pronouns in the pro-drop language, which was previously found to show different patterns across the bilingual heritage language variety and the non-bilingual variety. Overall, no cross-linguistic influences between the two languages were attested. Nonetheless, there were some differences in both bilingual Turkish and bilingual Dutch compared to monolingual baselines, especially in maintained referent contexts. The usage-based approach to language, in particular its emphasis on the importance of the frequency of use of certain forms in maintained referent contexts, may account for these subtle differences.

1.2. General- and Language-Specific Factors Influence Reference Tracking in Speech and Gesture in Monolingual Turkish Discourse (Chapter 3)

Chapter 3 investigated how multimodal reference tracking is achieved in a pro-drop language, in particular whether monolingual speakers of Turkish use language-general and/ or language-specific strategies of using referring expressions in speech and gestures accompanying these expressions. This chapter first offered a detailed analysis of reference tracking patterns in speech in relation to the discourse status

(accessibility) of referents and their pragmatic marking in discourse contexts in speech, and then analyses the gestures that accompanied referring expressions in these contexts.

The analyses for speech patterns showed that the types of referring expressions used by speakers of Turkish were sensitive to discourse status of referents, in line with our prediction. They overall preferred null pronouns over overt pronouns for maintaining referents (high accessibility), and NPs over overt pronouns for re-introducing referents (low accessibility). Overt pronouns, however, were not strongly associated with the discourse status of referents in Turkish, in contrast to non-pro-drop languages in which overt pronouns are the main referring expression for maintained referents. They were, however, used for marking pragmatic information, in line with Turkish being a pro-drop language.

As for gestures, their presence was influenced by both the discourse status of referents (i.e., accessibility) and the richness of referring expressions that were used in speech, in line with the findings of previous studies that examined multimodal reference tracking in non-pro-drop languages (Debreslioska & Gullberg, 2019; Gullberg, 2006; Levy & McNeill, 1992; Perniss & Özyürek, 2015). Speakers of Turkish were more likely to accompany subject referents with gestures when referents were re-introduced as opposed to maintained. They also gestured with NPs in general more often than they did with pronouns. However, there was language-specific preference to frequently use gestures with pronouns in low-accessibility contexts (51%) - more often than was previously found for non-pro-drop languages in such contexts (e.g. 15% for German, Perniss & Özyürek, 2015, similar to what was found for gestures accompanying pronouns in Dutch in Chapter 5).

Speakers of non-pro-drop languages such as German may not frequently accompany overt pronouns with gestures because pronouns are habitually high accessibility markers in those languages, and expressions that mark high accessibility in speech are usually not accompanied by gestures. Thus, pronouns may

be associated with infrequent gestures in non-pro-drop languages as they consistently mark high accessibility. In Turkish, however, pronouns are not strongly associated with high accessibility and possibly not with infrequent gestures, either. Pronouns, then, may be more likely to be accompanied with gestures in Turkish compared to a non-pro-drop language like German. It is also possible that the speakers of Turkish use gestures to disambiguate referents when they are underspecified in speech in low-accessibility contexts, as it would be the case when pronouns are used for re-introduced referents, which is in line with the findings of Ateş and Küntay (2018) for Turkish speaking children.

Finally, the chapter examined whether pragmatic context influenced the speakers' likelihood of accompanying overt pronouns by gestures. It found that speakers of Turkish were not more likely to accompany overt pronouns with gestures when they mark similarity or contrast between referents in speech as opposed to when they do not mark such information in speech. Even though the use of overt pronouns as opposed to null pronouns in Turkish was modulated by whether referents are pragmatically marked for similarity or contrast, use of gestures was not sensitive to this kind of pragmatic information.

To summarize, the findings from Chapter 3 showed that both general and language-specific factors influence using gestures (presence/absence) during reference tracking. Findings supported those of previous research on multimodal reference tracking, which showed that the discourse status of referents and the richness of expression used in speech influence the presence of reference tracking gestures. It also showed that even though discourse status is a language-general factor that governs the choice between richer and reduced REs in general, the scope and the details of its effect may show cross-linguistic variation. As a possible language-specific finding, when pronouns were used in low-accessibility contexts (i.e., reintroduction) in Turkish, they were more often accompanied by gestures than has been found for non-pro drop languages in such contexts. Possibly, these

multimodal constructions of pronoun (in low accessibility contexts) and gesture had the function to disambiguate the referents they were expressing with pronouns in Turkish which are not marked for gender or animacy. These claims, however, would merit further research on pro-drop languages other than Turkish before they can be generalized.

1.3. Language contact does not drive transfer of gesture rate (Chapter 4)

Chapter 4 investigated whether and how language contact influences gesture rate. It asked how frequency of gestures is influenced when one relatively higher-gesture language (Turkish as minority language) comes into contact with a relatively lower-gesture language (Dutch as majority language), and whether gesture rate is more likely to be transferred for some gesture categories than others (i.e., iconic versus deictic). It focused on iconic and deictic gestures only because these were the most common gesture types in the narrative retellings, and these gestures are also the types that have been studied in the literature the most. The chapter presents a first systematic comparison of the use of these gestures by adult bilingual speakers of heritage languages in comparison to monolingual speakers of each language.

The findings showed that the overall gesture rate (iconic and deictics collapsed) was higher in monolingual Turkish than in monolingual Dutch, and that bilingual speakers did not differ from monolinguals in either language. Hence, no evidence was found for gesture rate transfer across Turkish and Dutch.

Bilingual speakers in this study reported that they mainly speak Dutch at school and Turkish at home with their parents while mostly mixing the two languages among friends. When the contexts in which each language are used are separated, as is the case for this study, the language-specific gesture rate in each language might be more likely to be maintained. Additionally, the bilingual participants grew up speaking two languages and have had extensive exposure to both languages throughout their lives. Presumably, this gave them ample opportunity to acquire the language-specific gesture rate patterns that are typical for each of their languages.

Furthermore, they are highly proficient in each language without a clear asymmetry between a strong and a weak language, and they use each language regularly on a daily basis. It is possible that due to high proficiency in and frequent use of each language, bilingual participants are able to maintain the gesture rate for each language. Gesture patterns of a language may be entrenched as part of the language production routines for highly proficient speakers. The strong entrenchment of gesture patterns then leads to gesture use similar to monolinguals. This explanation would be in line with a usage-based view on bilingualism, as was discussed in *Chapter 2* for bilingual reference tracking patterns in speech. Although this approach was not specifically developed to account for the multimodal use of language, I propose that it can be extended to gesture use patterns.

When the types of gesture were analyzed separately; however, it turned out that iconic versus deictic gestures showed different patterns in bilinguals. While bilinguals did not differ from the monolingual baselines with regard to iconic gesture rate, they did use deictic gestures with a higher frequency than the monolingual participants did, both in Turkish and in Dutch. It is possible that deictic gestures helped bilinguals reduce the cognitive load needed to organize discourse (Gullberg, 1998; 2006) and package their message more easily by means of locating characters, objects and action in gesture space (Nicoladis, 2006, 2007), thereby ‘externalizing’ them.

It is beyond the ambition of this thesis to account for the differences in gesture rate across the languages (both in monolinguals and bilinguals). However, it might be that the rate with which iconic gestures are used differs across languages because their form is influenced by how information is packaged in speech (Brown & Gullberg, 2008; Gu et al, 2017; Kita & Özyürek, 2003; McNeill & Duncan, 2000; Özçalışkan, 2016; Özyürek et al., 2008). For example, Turkish is a verb-framed and a pro-drop language which allows the omission of arguments, both subject and object, more than satellite-framed and non-pro-drop Dutch (Enç, 1986). Therefore,

utterances in which the focus is on the verb are more common in Turkish (Furman, Küntay & Özyürek, 2014) than in Dutch. If iconic gestures tend to align with verbs (as opposed to other parts of speech), this perhaps gives a plausible reason for why iconic gestures are more frequent in Turkish than they are in Dutch. Given that verbs describing the stimuli would mainly refer to actions (rather than states), iconic gestures that represent those actions might be more likely to occur in Turkish narratives than in Dutch narratives because clauses with omitted subject and object arguments would be more common in Turkish than in Dutch (see Furman et al., 2014 for a similar claim for the early appearance of iconic gestures in Turkish speaking children).

The findings in this chapter suggest that when a minority language comes into contact with a majority language with different gesture rate, it is not necessarily the case that there is transfer of patterns from one language to the other. Rather, our evidence suggests that high proficiency and frequent use of a language might help maintain language-specific patterns that is in the case of rate of iconic gestures. Some other factors related to being bilingual, such as the cognitive cost of inhibiting the task-irrelevant language, also seem to increase the use of deictic gestures. Interestingly, a pattern of adaption of high gesture rate in Turkish to the low gesture rate in Dutch was not attested even though there are more Dutch speakers in the community than Turkish speakers.

1.4. Reference tracking strategies in gesture remain language-specific in language contact (Chapter 5)

Chapter 5 zoomed in on a more specific context of gesture use, namely the gestures that are used during reference tracking. It explored i) whether there are cross-linguistic differences in multimodal reference tracking strategies between Turkish and Dutch and ii) whether language contact influences the multimodal reference tracking strategies of bilinguals.

Chapter 2 (Azar, Özyürek & Backus, published online 5 April 2019) showed that bilinguals maintain language-specific ways of references tracking in speech in both Turkish and Dutch. Chapter 5 further investigated whether gestures used with these language-specific speech patterns were also maintained in bilingual discourse. This chapter also extended the data discussed in Chapter 3 (Azar, Backus & Özyürek, 2019), which investigated the use of gestures in multimodal reference tracking only in the Turkish baseline, to monolingual Dutch and to the bilingual Dutch and Turkish reference tracking gestures.

Chapter 5 showed that the influence of discourse status (i.e. accessibility of referents) on presence and absence of gestures was similar across Turkish and Dutch monolingual baselines, and also across bilingual and monolingual speakers. All groups of speakers tended to accompany re-introduced referents with gestures more often than maintained referents, showing that this a language-general tendency that also extends to heritage speakers.

As for the influence of the richness of expression, the two languages' gesture patterns differed with regard to re-introduced referent contexts. For re-introduced referents (low accessibility context), the type of referring expression used in speech had influence on gestures in Dutch, but not in Turkish. In Dutch, pronouns were less likely to be accompanied by gestures than by NPs, a general pattern found for many other non-pro-drop languages (e.g., German in Perniss & Özyürek, 2015). In Turkish, however, NPs and pronouns were equally likely to be accompanied by gestures when used in re-introduced referent contexts (as was found in Chapter 3). Furthermore, in such contexts, pronouns were more likely to be accompanied by gestures in Turkish than in Dutch. Bilinguals showed the same differences between Turkish and Dutch with regard to gestures accompanying re-introduced referents.

Overall, the differences for Turkish and Dutch (for monolinguals and bilinguals) in re-introduction contexts suggest that overt pronouns do not have the same status in pro-drop Turkish and in non-pro-drop Dutch- neither for speech nor

for gesture. This is in line with the idea of multimodal constructions that might differ across languages and might be maintained in bilingual speakers who are proficient speakers of both languages.

Overall, this chapter showed that bilingual speakers maintained language-general (influence of discourse status) and language-specific patterns (influence of type of referring expression) of gestures during reference tracking as well as patterns in speech (Chapter 2). Bringing together these findings also regarding the differences in gesture rate in bilinguals (Chapter 4), this chapter also provides support for the idea that usage-based approaches to language can be extended to gesture production.

2. Theoretical Implications

This section discusses how the findings in the individual chapters contribute to our understanding of theoretical issues regarding i) bilingualism and the influence of language contact on language production, ii) multimodal reference tracking in discourse and iii) the relations between speech and gesture production.

2.1. Implications for bilingualism and the influence of language contact on language production

Previous research on language contact has on the one hand proposed that certain aspects of language are more prone to influence than others (e.g., syntax-pragmatic interface), such as the IH which was originally proposed for L2 speakers (Sorace & Filiaci, 2006; Tsimpli & Sorace, 2006) and later extended to heritage speakers (e.g., Montrul and Polinsky, 2011) On the other hand, some researchers have proposed that contact effects might also be determined by linguistic factors such as cross-linguistic differences between the heritage and majority language, typological distance between the two languages, and markedness of linguistic patterns in the minority language as well as social factors such as education level of the heritage speakers, prestige of the heritage language in relation to the majority language, language identity and group identity, and the degree to which the speaker is dominant in one

of the languages (Thomason, 2001). These might determine the borrowability or vulnerability of linguistic patterns, in relation to their frequency of use and entrenchment.

This thesis investigated reference tracking in discourse, a phenomenon at the syntax-pragmatic interface, asking whether there was (bidirectional) influence of language contact on reference tracking strategies of heritage speakers who are highly proficient in both heritage and majority languages and use them frequently and regularly in various contexts. Despite the previously suggested vulnerability of reference tracking strategies to cross-linguistic influence and change due to language contact, there were no differences between bilingual and monolingual speakers in the use of overt versus null pronouns in the heritage language, pro-drop Turkish. Note that previous studies with heritage speakers conducted in this domain have often used data from speakers who showed a strong asymmetry in their proficiency of the heritage and the majority language, being dominant in the majority language (Benmamoun et al., 2013). I argue that the frequent use of patterns in each language might modulate whether a phenomenon at the syntax pragmatics interface is influenced by language contact or not, in line with usage-based approach to language production.

A usage-based approach proposes that there is a link between the frequency of use of a pattern and how strong its representation is in the memory of an individual speaker, i.e., its degree of entrenchment (Brooks & Tomasello, 1999; Bybee, 2006). Constructions that are frequently used have strong representations in memory, i.e., they are strongly entrenched. This in turn means they are easily activated and accessible for speakers (de Bot and Clyne, 1989; Green, 2003; Paradis, 2007) and can easily be retrieved for further use (Bybee, 2010; Croft, 2000; Ellis, 2016; Langacker, 1987; MacWhinney, 2012). As bilingual speakers in this study reported to use both languages regularly and they also seem to have high proficiency in both languages, it is not surprising that they maintain what can be hypothesized to be

highly entrenched, very frequently employed patterns of subject reference production. In such circumstances, speakers seem not to transfer patterns from the majority language to the minority language. Additionally, the pragmatic markedness/salience of overt pronouns in Turkish, and stressed pronouns in Dutch, might have contributed to the maintenance of these patterns. As mentioned in the *Introduction*, marked patterns induce ease of perception and ease of production (Thomason, 2007), which in turn makes those patterns resistant to change. Further research is needed to investigate the psycholinguistic processes underlying these relations between markedness/saliency and entrenchment in bilingual language production.

Our findings have also shown that the use of third person subject pronouns, while superficially similar, do not have the same status in the Turkish and Dutch monolingual baselines. Overt pronouns are not sensitive to discourse status in Turkish but they are in Dutch. On the other hand, they are sensitive to pragmatic context in Turkish but not in Dutch. These cross-linguistic differences, however, did not induce bilingual speakers to significantly differ from the monolingual baseline in either language.

The use of pronouns also showed cross-linguistic differences with regard to the likelihood of being accompanied by gestures as speakers of Turkish were more likely to accompany pronouns with gestures than speakers of Dutch were, especially in low accessibility contexts. Hence, there is no evidence to suggest that bilingual speakers equate the status and use of pronouns in Turkish and Dutch in the context of third-person reference, either in speech or in gesture. Looking at gestures as an additional modality provided extra evidence that the bilinguals have maintained language-specific patterns of pronoun use.

Overall, the data presented in this thesis suggest that actual language use is a strong determinant of the maintenance of frequently used language-specific conventions. This highlights the importance of taking language proficiency and use into account while studying bilingualism and combining formal approaches to

language use (such as the IH) with usage-based approaches for a more complete understanding of bilingual language production.

Given that the maintenance of language specific patterns did not manifest itself only in speech but also in gesture (both the overall gesture rate and the gestures accompanying referring expressions in particular), the usage-based approach to language can be extended to gestures as well and provided evidence for entrenched multimodal constructions.

2.2. Implications for theories of (multimodal) reference tracking in discourse
Most studies of reference tracking that have focused on non-pro-drop languages have shown that the richness of referring expressions is determined by the accessibility of referents in discourse context as illustrated in Figure 1. In this model, referents that have low accessibility are expressed with richer expressions such as NPs while zero (null) pronouns mark the highest accessibility. (Overt) pronouns, on the other hand, are placed somewhere between NPs and zero pronouns.

Patterns of use in speech that have been found for both monolingual and bilingual Turkish in this thesis challenge the generalizability of this model in some ways. Even though the use of NPs in low accessibility contexts and null pronouns in high accessibility contexts in Turkish adhere to the principles of this accessibility model, the use of overt pronouns does not. Findings presented in this thesis showed that the use of overt pronouns was not determined by the accessibility of referents in Turkish.

They were not more or less preferred in one discourse context more or less than in the other. Speakers of Turkish, both monolingual and bilingual, did not use overt pronouns more often in maintained referent contexts than in re-introduced referent contexts as was the case for Dutch, a non-pro-drop language.

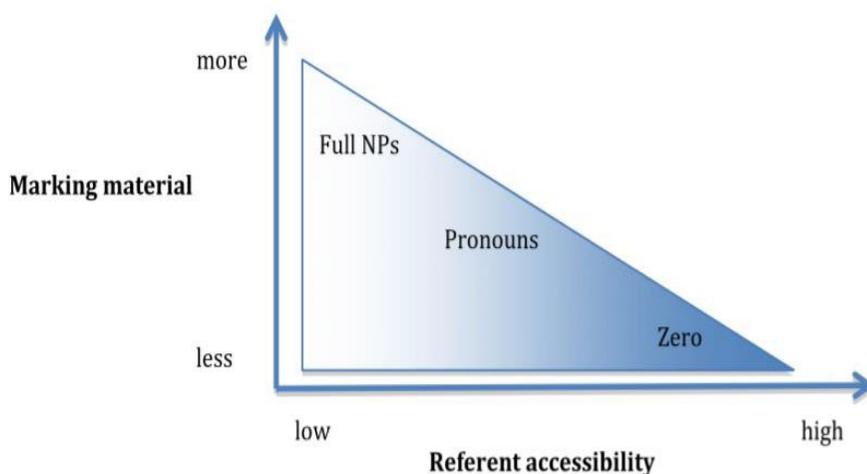


Figure 1. Schematic representation of relations between type of RE and accessibility of referents in discourse, figure taken from Perniss and Özyürek (2015).

The use of overt pronouns in Turkish was on the other hand governed by whether referents were pragmatically marked or not, i.e., for emphasis, contrast or topic. This relation between the use of overt pronouns and pragmatics in pro-drop languages has been repeatedly shown before, however the use of pronouns in relation to the discourse status of referents was a topic not much investigated before. The findings presented in this thesis showed that in pro-drop languages like Turkish, overt pronouns are governed by pragmatic contexts, regardless of the discourse status of referents. Hence, they contribute to theories of reference tracking showing that the correspondence between referential context, referent accessibility and the type of referring expression used in speech is not generalizable across non-pro-drop and pro-drop languages. Even though discourse status is seemingly a language-general factor that governs the choice between richer and reduced REs in general, the scope and the details of its effect may show cross-linguistic variation.

The findings presented here also went beyond previous studies of multimodal reference tracking strategies. Previous studies which were mostly conducted with

non-pro-drop languages have proposed that discourse status as well as richness of expressions correlate with the use of gesture as a general strategy. Findings from the use of reference tracking gestures in non-pro-drop Turkish showed that the presence of gesture is sensitive to discourse status and accessibility as was for non-pro-drop languages, thus this sensitivity seems to be a language-general phenomenon. The sensitivity to richness of expressions, on the other hand, was less prominent in Turkish. Even though speakers of Turkish in general gestured with NPs more than with pronouns, this sensitivity was context-dependent. That is, speakers were more likely to accompany NPs with gestures than pronouns in maintained referent (high accessibility) context, but they were equally likely to accompany NPs and pronouns with gestures in re-introduced referent (low accessibility) contexts.

Frequent use of gestures with pronouns in Turkish, especially in low-accessibility contexts, is probably a strategy to disambiguate referents in low accessibility contexts. Whether this is a language-specific phenomenon for Turkish (also because the pronoun is not marked for animacy or gender) or a general feature of non-pro-drop languages due to the status of overt pronouns in such languages needs further research.

Finally, with regard to bilingual patterns of use, findings go beyond what was found by a few studies of L2 reference tracking strategies. Previous research had shown that both speech and gestures are over-explicit in L2 reference tracking, a pattern that starts to disappear once the learners become more proficient in their L2 (e.g., Gullberg, 2006). Heritage speakers who were proficient in both languages did not show such an effect, but rather maintained language-specific patterns of multimodal reference tracking.

2.3. Implications for theories of relations between speech and gesture production

As mentioned in Chapter 1, most of the speech and gesture production models are based on findings from iconic gestures only. The findings in the current thesis

contribute to these models bringing new data on cross-linguistic variation as well as bilingualism, and not only for iconic gestures but also for abstract deictic gestures. I will discuss some implications of each finding for current models of speech and gesture production.

2.3.1. Cross-linguistic differences in gesture rate and gestures that accompany overt pronouns

Chapters 4 and 5 found that both the gesture rate (iconic gestures) and the use of gesture with pronouns showed cross-linguistic variation across Turkish and Dutch baselines, and those differences were maintained by bilingual speakers. These findings are overall in line with the *Interface Hypothesis* of speech and gesture production (Kita & Özyürek, 2003) as well as with the suggestion that there are multimodal construction units in speaker's mental representations of language (Langacker, 2008; Zima, 2014; Kok and Cienki, 2016).

Cross-linguistic differences in iconic gesture rate

Chapter 4 found that Turkish speakers overall gestured more often than speakers of Dutch. Further analyses of the data revealed that the differences were present in the production of iconic gestures, but not in the use of abstract deictic gestures. The differences in information packaging strategies across Turkish and Dutch might be driving these differences in iconic gestures.

Turkish is a verb-framed and a pro-drop language, allowing the omission of both subject and object arguments while Dutch is a satellite-framed and non-pro-drop language (Enç, 1986; Küntay & Slobin, 1996). Therefore, utterances in which the focus is on verbs are more common in Turkish (Furman, Küntay & Özyürek, 2014) than in Dutch. It is plausible that iconic gestures tend to align with verbs (as opposed to other parts of speech) in Turkish more than they do in Dutch. Considering that verbs describing the stimuli that were used for data collection are more likely to refer to actions in Turkish than in Dutch (due to the verb-only clauses being more common in Turkish than in Dutch), iconic gestures that represent those actions might

be more likely to occur in Turkish narratives than in Dutch narratives (see Furman et al., 2014 for a similar claim regarding the early appearance of iconic gestures in the language acquisition of Turkish-speaking children compared to English-speaking children). This suggestion is supported by what has been found for motion event gestures, that those gestures vary in accordance with cross-linguistic differences in the syntactic packing of semantic elements, as predicted by the *Interface Hypothesis* of speech and gesture production (Brown & Gullberg, 2008; Gu et al, 2017; Kita & Özyürek, 2003; McNeill, 2000; Özçalışkan, 2016; Özyürek et al., 2008).

Although speculative at this point, if gestures do indeed tend to align with verbs in Turkish more than in Dutch, this would also suggest that multimodal constructions combining verbs and iconic gestures might be more prevalent in Turkish than in Dutch. In turn, certain speech-gesture constructions might become entrenched as a result of frequent multimodal use (Cienki, 2017; Steen & Turner, 2013; Zima, 2014).

The idea that certain speech units and certain types of gestures together might form multimodal constructions is not new; it has been offered before within the traditions of *Construction Grammar* (Goldberg 1995; Schoonjans 2014; Turner & Steen 2012; Zima 2014) and *Cognitive Grammar* (Cienki 2012; Kok & Cienki 2016; Langacker, 2008; For example, Schoonjans (2014) proposes that in German, the particle *einfach* ‘just, simply’ co-occurs quite often with ‘pragmatic headshakes’ that have similar functions.

What exactly makes a construction multimodal? Langacker (2013) proposes that “units emerge via the progressive entrenchment of configurations that recur in a sufficient number of events to be established as cognitive routines” (p. 220). This could well apply to conventional co-occurrences of verbs and gestures, just as it applies to purely verbal units. Ningelgen and Auer (2017) offer that the “verbal and gestural components [of a multimodal construction] each have to play an essential, not only accidental role; unless special contextual conditions hold, leaving out either

of them would lead to the construction becoming unrecognizable or meaningless” (p. 1). The case of the action verbs and the iconic gestures that accompany them in Turkish would not meet the criterion as proposed by Ningelgen and Auer, as leaving out the gesture would not lead to the action verb becoming unrecognizable or meaningless, while the intended meaning of the gesture alone, without the verbal expression co-occurring, might not always be clear. They would suffice Langacker’s (2013) criterion, although the data collected for this thesis do not allow more than speculation at this point. It is possible that the typology of Turkish could induce such cognitive routines. Being a pro-drop language in which clauses with only predicates are common, Turkish might provide more opportunities for actions verbs to be accompanied by iconic gestures than a non-pro-drop language like Dutch does. This would suggest that units consisting of an action verb and an iconic gesture are more often stored as multimodal constructions in the memory of speakers of Turkish than in that of speakers of Dutch. If so, such constructions would be an intrinsic part of the linguistic knowledge speakers of Turkish have. On the other hand, without independent evidence of their storage, higher co-occurrence rates in Turkish than in Dutch might be observed, without this necessarily leading to the establishment of different cognitive routines. Unfortunately, investigating these issues was beyond the scope of this thesis, and would be difficult with the data at hand. Given some intriguing results, however, future research should investigate multimodal constructions and the role language typology plays in triggering them.

Cross-linguistic differences in gestures that accompany overt pronouns

Findings in Chapter 4 and Chapter 5 showed that not only iconic gesture rate but also abstract deictic gestures that accompany pronouns showed variation across Turkish and Dutch. This is the first study that has found differences across languages in line with typological differences in the use of pronouns in speech. The findings presented in this thesis therefore extends theories that explain cross-linguistic differences between languages in the use of ionic gestures (mostly in the domain of motion event

descriptions) to the use of abstract deictic gestures in the context of reference tracking.

In contexts in which subject referents were re-introduced after some intervening clause(s), speakers of Turkish and Dutch differed in whether they modulated the frequency of gestures they produced along with subject referents as a function of the richness of the referring expressions (i.e., NP versus overt pronoun). Only in Dutch, speakers showed sensitivity to lexical richness; in they were more likely to gesture with an NP than with a pronoun. Speakers of Turkish, on the other hand did not differentiate between these two types of referring expressions, and were equally likely to accompany an NP with a gesture as a pronoun. As a result, there was a higher frequency of gestures with overt pronouns in re-introduced referent contexts in pro-drop Turkish than in non-pro-drop Dutch.

This suggests that the use of gestures with subject referents may show cross-linguistic variation and that this variation is possibly driven by the differences in the functions and uses of overt pronouns across these two languages. Since overt pronouns are mostly used in high accessibility contexts in Dutch, there may be a strong association between pronouns and the absence of gestures (given that highly accessible referents are not likely to be accompanied by gestures). In Turkish, on the other hand, there is not a strong association between high accessibility and overt pronouns, and therefore perhaps also not between overt pronouns and low gesture rate. Thus, gestures might more easily accompany pronouns in Turkish. Differences with regard to pronoun-accompanying gestures are in line with typological differences, showing again a strong link between speech and gesture. The relations between the discourse status of referents and the use of overt pronouns show variation across the two languages, and this variation is also present in co-speech gestures.

These results point to the possibility that language-specific strategies of discourse organization and the use of reference tracking expressions influence

gestures in different ways. They also suggest that there is cross-talk between deictic gesture production and the choice of referring expressions – the communicative intent of which is determined at the level of discourse organization. Thus, the *Interface Hypothesis* of speech and gesture production (Kita & Özyürek, 2003) can also be generalized to deictic gestures. As speech and gesture patterns of reference tracking vary in similar ways in relation to marking of discourse status and accessibility of referents, it also shows similar communicative intent underlies both the speech and gestures and (De Ruiter, 2017).

Also going back to the discussion of multimodal constructions (Langacker, 2008; Zima, 2014; Kok and Cienki, 2016), these findings suggest that overt pronouns in Turkish might be more likely to become part of multimodal units with a gesture that locates the referent in the gesture space than overt pronouns in Dutch. One mechanism behind this could be that speakers of Turkish might use gestures to disambiguate referents when they are underspecified in speech, as they often are in low accessibility contexts (i.e., when a referent is re-introduced). Some evidence was cited from language acquisition studies that speakers of Turkish develop a strategy early on of using gestures to specify potentially ambiguous referents when they use reduced expressions in speech. Note, however, that the relationship between low specificity in speech and the use of gestures was not systematically investigated. Hence, the proposal outlined here would merit further research.

2.3.2. Gestures in bilingualism

This thesis is the first to study the influence of language contact on the gestures of bilingual speakers who are highly proficient in both languages. As previously mentioned, iconic gesture rate as well as the abstract deictic gestures that accompany pronouns showed variation across Turkish and Dutch baselines, and bilingual speakers maintained those differences and used gestures in language-specific ways in each language. In previous studies, bilinguals were mainly L2 speakers and had a relatively low proficiency in their L2. Studies of L2 multimodal reference strategies

in found over-explicitness in both speech and gesture in L2, while studies of motion event descriptions found the use of L1 iconic gesture patterns in the L2 even though there was no L1 influence on speech patterns. Bilingual speakers in a language-contact context who have high proficiency in each language and who use both languages frequently and regularly, on the other hand, seem to maintain language-specific patterns of gesture use with regard to both the abstract deictic gestures during reference tracking, and the overall rate of iconic gestures. These findings inform the current speech and gesture production models.

The gesture rate does not necessarily adapt either to the higher gesture rate language as has been suggested earlier (cf. So, 2010) or to the majority language as has often been found for speech patterns (e.g., Montrul, 2004). Rather, gesture rate seems to be entrenched as part of the linguistic repertoire. The fact that gesture patterns remain language-specific in language contact situations, similar to speech patterns (as reported in Azar et al., published online 5 April 2019 - Chapter 2), is in line with the hypothesis that speech and gesture form an integrated system (Kita & Özyürek, 2003; McNeill, 1992; So et al., 2009). This thesis has provided additional evidence from a novel context, the contact of two typologically different languages, and supports the findings of previous research on multimodal language production.

Going beyond the previous literature, the findings in this thesis suggest that the communicative knowledge of bilingual speakers in each language is not only made up of the speech patterns that are preferred in a language, but that gestures are part of that knowledge as well. Having grown up with two languages that differ in certain aspects of gesture production, the bilingual speakers in this study did not adapt their gesture patterns to one of the languages, as some social adaptation theories of gesture production, such as mimicry, would predict (e.g., Holler & Wilkin, 2011). Accommodation of the gesture patterns to those of the dominant language in society, i.e., Dutch, could have been an outcome of the contact between Turkish and Dutch considering that speech patterns in a minority language often

undergo influence of the majority language in contact situations. Findings in this thesis, however, showed a relative consistency in the gesture production both in Turkish and in Dutch. These findings call for increased attention to the visual mode of language production, i.e., gestures that accompany speech, especially in bilingualism research. They also highlight the urgency of developing theories of language use that account for not only the verbal but also the gestural skills that equip speakers with the resources needed to navigate social interactions.

Bilinguals in this thesis also showed some gesture use patterns that might be attributed to being bilingual in general. Even though bilinguals followed the monolingual patterns overall, they produced more deictic gestures than monolinguals, in both Turkish and Dutch. Deictic gesture rate was not modulated by the language status (L1 Turkish versus L2 Dutch), and this is in contrast with findings from research on L2 gestures which has usually found that learners use more deictic gestures in their L2 than in their L1 (Gullberg, 1998, Marcos, 1979; Sherman & Nicoladis, 2004). An explanation offered for those findings was that deictic gestures co-occur with grammatical or discourse organizational difficulties. Gullberg (1998), for example, suggests that speakers might use deictic gestures when they have problems with expressing tense as using deictic gestures to help indicate the sequence of events by mapping them out spatially (Gullberg, 1998). Higher use of deictic gestures by the bilinguals in this thesis seems to be independent of L1 or L2 status and also of dominance.

It might be the sheer fact of being bilingual that increases the deictic gestures, at least in a task like was used in this study. Narrative production is a complex task that requires planning at both sentential and discourse levels, and the overall coherence between different characters and events has to be observed and ensured continuously (Gullberg, 1998). Even though monolingual and bilingual speakers confronted the same task demands in this study, bilingual speakers needed to inhibit their task-irrelevant language during data collection, which might have induced extra

cognitive load for them (Sorace & Serratrice, 2009). Possibly, deictic gestures help bilinguals organize their discourse contributions (Gullberg, 1998; 2006) and package their message. Locating characters, objects and action in gesture space (Nicoladis, 2006, 2007) may help reduce the cognitive load by externalizing the characters on to gesture space.

Interestingly, while the general deictic gesture rate was higher in bilingual narratives than in monolingual narratives (Chapter 4), this was not the case for gestures that accompany subject referents (Chapter 5). Even if higher use of deictic gestures is a bilingual strategy, this did not exhibit itself in gestures that accompany subjects referring expressions. An example of such gestures is given in Figure 2. Even though producing a narrative and organizing the overall discourse might have been challenging and therefore bilingual speakers might have used higher number of deictic gestures compared to the baselines, keeping track of the discourse status of subject referents and the production of subject referring expressions may not have been challenging. The overall increase in deictic gestures, therefore, may be visible on the whole narrative level, coming from other parts of speech, but not when only gestures with subject referring expressions are analyzed.

Overall, the findings presented in this thesis provide additional evidence for the tight relations between speech and gesture, to the point that the two form an integrated system (Kita & Özyürek, 2003; McNeill, 1992; So et al., 2009) as well as for the fact that cognitive load might increase gesture rate for particular types of gestures.

Having mentioned the need for theories that integrate spoken and visual modalities, it is also clear that many more studies on gesture production are needed for a more grounded discussion of (bilingual) language production as a multimodal act. Although the use of gestures seems to be fairly universal and there are some robust differences across language communities in the frequency and type of gestures, it is far from clear to what extent gestural expressions are language-specific.

To what extent are the form and function or meaning mappings of gestures conventionalized within a language community? To what extent does gesture use vary across different speakers within the same language community? Research from a wider variety of languages and speakers and from much larger samples is needed to be able to answer these questions.

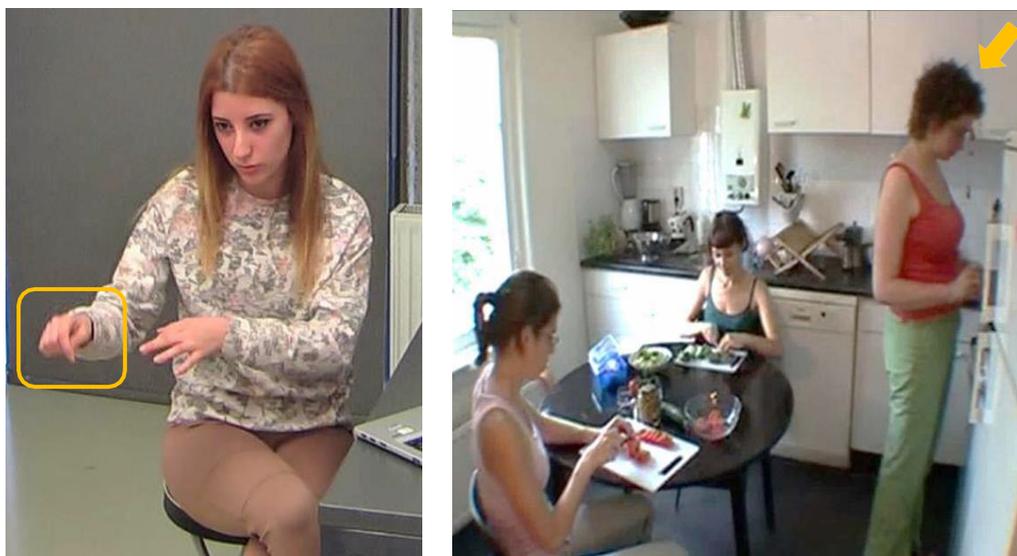


Figure 2. The speaker is locating the woman who is standing in the stimulus video in the gesture space with an abstract deictic gesture. In her speech, she first introduces the woman with an NP, *anne* ‘mother’ and then maintains reference with a pronoun, *o* ‘she’:

Bir de yan tarafta anne var.-introduction ‘There is mum at the side.’

O da bir şeyler doğruyor. maintenance ‘**She**, too, is chopping something.’

3. Future Directions

To attain a more complete understanding of the influence of language contact on language production, a number of important issues remain to be addressed. First, the bilingual population in this thesis was highly educated and had the opportunity to practice both the minority and majority languages on a daily basis, which may not be representative for the whole community. Studying speakers with more diverse

educational backgrounds and social networks is needed to test the generalizability of the findings presented here. Future studies should compare speaker groups with different language choice profiles, frequency of language use and language proficiency levels to gain more insight into how actual language use and the proficiency profiles contribute to the maintenance or change of language-specific speech and gesture patterns.

Second, more information about the language input of bilingual speakers during their early years should be included in studies of bilingualism when possible. The knowledge of the type and frequency of input bilingual speakers were exposed to as children might enable a better understanding of the mechanisms that drive language change. For example, the frequency of overt and null pronouns in the Dutch input, which was mostly provided by the parents and relatives who themselves were L2 speakers of Dutch could have provided valuable insights into why bilingual speakers produced relatively fewer null pronouns in Dutch than monolingual speakers of Dutch. As was discussed in Chapter 2, L2 reference tracking, especially in the intermediate proficiency range, has been characterized as being over-explicit (Frederiksen & Mayberry, 2018; Gullberg, 2006; Hendriks, 2003). If null subjects were or are used rarely in the input to bilingual speakers, this could have triggered a stronger association of the overt pronoun with reference maintenance than it may have in monolingual speakers, conditioning bilingual speakers to use overt pronouns without much variation, using it whenever a referent is maintained.

This thesis has presented data that were collected in a monolingual mode: bilinguals carried out the tasks in Turkish and in Dutch, but not in a mode in which they could freely use either language, or mix them (e.g., talking to another Turkish-Dutch bilingual speaker). Studies that include data from both monolingual and bilingual mode sometimes show higher rates of cross-linguistic influence in bilingual mode contexts, but this effect is not always found (cf. Onar Valk, 2015). Including the language mode as a factor in the research design (i.e., comparing bilingual

speakers in the monolingual mode and bilingual mode) would allow for a better understanding of the degree to which speech and gesture relations are deeply entrenched or subject to momentary influence from the other language when that language is strongly activated. The data were collected in the monolingual mode for this thesis, yet it would be interesting to see what happens in a bilingual mode. It is possible that speakers have a ‘bilingual’ repertoire of gestures, or speech and gesture combinations that could not be captured here because they interacted with speakers who could speak only one of their languages.

Finally, a usage-based approach to language production seems to be useful for the study of both speech and gestures. Note, however, that in the case of the data presented here, it is not possible to determine independently how deeply entrenched a construction is, including the “multimodal units” of speech and gesture combinations. Suggestions provided here, therefore, would merit further research that combines corpus analysis of spontaneously produced data with controlled experiments. Such corpus analysis would provide the circumstantial evidence of frequency (widely assumed to be one of the major determinants of entrenchment) while experimental data (e.g. reaction times in lexical decision tasks) would provide evidence about ease of activation (widely assumed to reflect degree of entrenchment; cf. Verhagen et al., 2018). Further research could expand on the proposals outlined here by systematically including gestures in studies of bilingualism and in different linguistic domains.

4. Conclusion

Bilingual speakers who use their languages frequently and have high proficiency in both their minority and majority language maintain monolingual-like patterns of reference tracking as language contact does not influence their language production to a great extent - at least in the domain of interest of this thesis - and this is the case for both speech and gesture patterns, that is for both the spoken and the visual

modality of language. This seems to be the case also for a phenomenon at the discourse and syntax interface, which has been previously shown to be vulnerable to cross-linguistic influences, also in language contact contexts. I argued that these bimodal patterns of language specificity are compatible with usage-based theories of language production, and such theories are extendable to multimodal uses. Results presented here are also in line with previous theories of speech and gesture production that assume interactions between speech and gesture production in language specific ways. Studying gestures in addition to speech, especially in domains that show cross-linguistic influence in speech, will contribute to more complete theories of bilingualism. A better understanding of whether spoken and visual modalities undergo the same processes, will provide valuable insight into the scope of cross-linguistic influence and language change beyond what we can learn from studies of speech alone.

References

A

- Aarssen, J. (1996). *Relating two events in two languages: Acquisition of cohesive devices by Turkish-Dutch bilingual children at school age*. Ph.D. Dissertation, Tilburg University, Tilburg University Press.
- Aksu-Koç, A. & Nicolopoulou, A. (2015). Character reference in young children's narratives: Crosslinguistic comparison of English, Greek, and Turkish. *Lingua*, 155, 62-84, doi.org/10.1016/j.lingua.2014.04.006.
- Albirini, A., Benmamoun, E. & Saadah, E. (2011). Grammatical features of Egyptian and Palestinian Arabic heritage speakers' oral production. *Studies in Second Language Acquisition*, 45, 273–303, doi.org/10.1017/S0272263110000768.
- Albirini, A. (2014). Toward understanding the variability in the language proficiencies of Arabic heritage speakers. *International Journal of Bilingualism*, 18(6), 730–765, doi.org/10.1177/1367006912472404.
- Alferink, I. (2015). *Dimensions of convergence in bilingual speech and gesture*. Unpublished Doctoral Dissertation. Radboud University Nijmegen, Netherlands. Utrecht: LOT. URL: http://www.lotpublications.nl/Documents/391_fulltext.pdf
- Alibali, M.W., & DiRusso A.A. (1999) The function of gesture in learning to count: more than keeping track. *Cognitive Development*, 14(1), 37–56. doi.org/10.1016/S0885-2014(99)80017-3.
- Allen, S. E. M., Hughes, M.E., & Skarabela, B. (2015). The role of cognitive accessibility in children's referential choice, In L. Serratrice and S. E. M. Allen (Eds.) *The Acquisition of Reference* (pp. 123 – 153), Amsterdam: John Benjamins. DOI: 10.1075/tilar.15.

- Argyri, E. & Sorace, A. (2007). Crosslinguistic influence and language dominance in older bilingual children. *Bilingualism: Language and Cognition*, 10(1), 77-99.
- Ariel, M. (1990). *Assessing noun-phrase antecedents*. London: Routledge.
- Arnold J. E. (1998). *Reference form and discourse patterns*, Ph.D. Dissertation, Stanford University.
- Arnold, J. E. (2010). How Speakers Refer: The Role of Accessibility. *Language and Linguistics Compass* 4(4), 187–203, doi: 10.1111/j.1749-818x.2010.00193.x
- Ateş, B. Ş., & Küntay, A. C. (2018). Referential interactions of Turkish-learning children with their caregivers about non-absent objects: integration of non-verbal devices and prior discourse. *Journal of Child Languages*, 45(1), 148-173, doi.org/10.1017/S0305000917000150.
- Azar, Z., & Özyürek, A. (2015). Discourse management: Reference tracking in speech and gesture in Turkish narratives. *Dutch Journal of Applied Linguistics*, 4(2), 222-240, doi.org/10.1075/dujal.4.2.06aza.
- Azar, Z., Backus, A., & Özyürek, A. (2016). Pragmatic relativity: Gender and context affect the use of personal pronouns in discourse differentially across languages. In A. Papafragou, D. Grodner, D. Mirman, & J. Trueswell (Eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society (CogSci 2016)* (pp. 1295-1300). Austin, TX: Cognitive Science Society.
- Azar, Z., Backus, A., & Özyürek, A. (2017). Highly proficient bilinguals maintain language-specific pragmatic constraints on pronouns: Evidence from speech and gesture. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. Davelaar (Eds.), *Proceedings of the 39th Annual Conference of the Cognitive Science Society (CogSci 2017)* (pp. 81-86). Austin, TX: Cognitive Science Society.
- Azar, Z., Backus, A., & Özyürek, A. (2019). General and Language-Specific Factors Influence Reference Tracking in Speech and Gesture in Discourse. *Discourse Processes*, 56(7), 553-574, DOI: 10.1080/0163853X.2018.1519368.

References

- Azar, Z., Özyürek, A., & Backus, A. (published online 5 April 2019). Turkish-Dutch bilinguals maintain language-specific reference tracking strategies in elicited narratives. *International Journal of Bilingualism*, <https://doi.org/10.1177/1367006919838375>. Open access
- Azar, Z., Backus, A., & Özyürek, A. (published online 30 April 2019). Language contact does not drive gesture transfer: Heritage speakers maintain language specific gesture patterns in each language. *Bilingualism: Language and Cognition*, <https://doi.org/10.1017/S136672891900018X>. Open Access
- Aziz, J. R., & Nicoladis, E. (published online 18 June 2018) “My French is rusty”: Proficiency and bilingual gesture use in a majority English community. *Bilingualism: Language and Cognition*, doi.org/10.1017/S1366728918000639.

B

- Baayen, R. H., Davidson, & D. J., Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*, 59, 390-412.
- Backus, A. (2005). Codeswitching and language change: One thing leads to another? *International Journal of Bilingualism*, 9 (3 & 4), 307– 340, doi.org/10.1177/13670069050090030101.
- Backus, A. (2013). Turkish as an immigrant language in Europe. In T. K. Bhatia and W. C. Ritchie (Eds.), *The handbook of bilingualism and multilingualism, 2nd edition*, (pp. 770-790). Oxford: Blackwell.
- Backus, A., Demirçay, D. & Sevinç, Y. (2013). Converging evidence on contact effects on second and third generation immigrant Turkish. In J. Blommaert, P. Varis, S. Lehtonen, S. and M. Spotti (Eds.), *Tilburg Papers in Culture Studies, Vol. 51*. Tilburg: Babylon.

- Backus, A., & Dorleijn, M. (2009). Loan translations versus code-switching. In *The Cambridge handbook of linguistic code-switching*, B. E. Bullock & A. J. Toribio (Eds.), (pp. 75-94). Cambridge: Cambridge University Press.
- Backus, A. & van der Heijden, H. (2002). Language mixing by young Turkish children in the Netherlands. *Psychology of Language and Communication*, 6 (1), 55-74.
- Backus, A. & Yağmur, K. (published online 6 May 2017). Differences in pragmatic skills between bilingual Turkish immigrant children in the Netherlands and monolingual peers. *International Journal of Bilingualism*, DOI: 10.1177/1367006917703455.
- Barr, D. J., Levy, R., Scheepers, C. & Tilly, H. J. (2013). Random effects structure for confirmatory hypothesis testing: Keep it maximal. *Journal of Memory and Language*, 68, 255-278, doi.org/10.1016/j.jml.2007.12.005.
- Barzini, L. (1964). *The Italians*. New York: Atheneum.
- Bates, D., Maechler, B., Bolker, B., Walker, S. (2015). Fitting Linear Mixed-Effects Models Using lme4. *Journal of Statistical Software*, 67(1), doi: 10.18637/jss.v067.i01.
- Beattie, G., & Shovelton, H. (2000) Iconic hand gestures and the predictability of words in context in spontaneous speech. *British Journal of Psychology*, 91, 473–491.
- Belletti, A., Bennati, E. & Sorace, A. (2007). Theoretical and developmental issues in the syntax of subjects: Evidence from near-native Italian. *Natural Language and Linguistic Theory*, 25, 657–689.
- Benmamoun, E., Montrul, S. & Polinsky, M. (2013). Heritage languages and their speakers: Opportunities and challenges for linguistics. *Theoretical Linguistics*, 39(3–4), 129 – 181, doi.org/10.1515/tl-2013-0009.
- Berman, R. A., & Slobin, D. I. (1994). *Relating events in narrative: A crosslinguistic developmental study*. Hillsdale, NJ: Lawrence Erlbaum Associates.

References

- Bican, F. Y. (2000). A computational analysis of information structure in Turkish. In A. S. Özsoy, D. Akar, M. Nakipoğlu-Demiralp, E. Erguvanlı-Taylan and A. Aksu-Koç (Eds.), *Studies in Turkish linguistics* (pp. 151-163). Istanbul, Turkey: Boğaziçi University Press.
- Blom, E., Küntay, A. C., Messer, M., Verhagen, J. & Leseman, P. (2014). The benefits of being bilingual: Working memory in bilingual Turkish–Dutch children. *Journal of Experimental Child Psychology*, 128, 105-119, doi.org/10.1016/j.jecp.2014.06.007.
- Boersma, P. (2001) Praat, a system for doing phonetics by computer. *Glott International*, 5(9-10), 341–345.
- Boeschoten, H. & Verhoeven, L. (1987). Language-mixing in children’s speech: Dutch language use in Turkish discourse. *Language Learning*, 37, 191-215.
- Bolonyai, A (2007). (In)vulnerable agreement in incomplete bilingual L1 learners. *The International Journal of Bilingualism*, 11, 3–21.
- Bostan, İ., Börütecene, A., Özcan, O., & Göksun, T., (2016). Temporal expressions in speech and gesture. In A. Papafragou, D. Grodner, D. Mirman, & J. Trueswell (Eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society (CogSci 2016)* (pp. 1871-1876). Austin, TX: Cognitive Science Society.
- Brauer, M., & Curtin, J.J. (published online 27 November, 2017). Linear mixed-effects models and the analysis of nonindependent data: A unified framework to analyze categorical and continuous independent variables that vary within-subjects and/or within items. *Psychological Methods*, <http://dx.doi.org/10.1037/met0000159>
- Broersma, M., Carter, D., & Acheson, D. J. (2016). Cognate costs in bilingual speech production: Evidence from language switching. *Frontiers in Psychology*, 7, 1461. doi:10.3389/fpsyg.2016.01461.

- Brooks, P., & Tomasello, M. (1999). How children constrain their argument structure constructions. *Language*, 75, 720–738, doi: 10.2307/417731.
- Brown, A., & Gullberg, M. (2008). Bidirectional crosslinguistic influence in L1-L2 encoding of manner in speech and gesture. *Studies in Second Language Acquisition*, 30, 225-251.
- Brown, A., & Gullberg, M. (2011). Bidirectional cross-linguistic influence in event conceptualization? Expressions of Path among Japanese learners of English. *Bilingualism: Language and Cognition*, 14, 79 -94, doi.org/10.1017/S1366728910000064.
- Bybee, J. (2006). From usage to grammar: The mind's response to repetition. *Language*, 82(4), 711-733.
- Bybee, J. (2010). *Language, usage and cognition*, Cambridge: Cambridge University Press.

C

- Carminati, M. N. (2002). *The processing of Italian subject pronouns*. Doctoral Dissertation, University of Massachusetts Amherst, United States.
- Casasanto, D., & Jasmin, K. (2012). The hands of time: Temporal gestures in English speakers. *Cognitive Linguistics*, 23(4), 643–674. doi:10.1515/cog-2012-0020.
- Cavicchio, F., & Kita, S. (2013). English/Italian bilinguals switch gesture parameters when they switch languages. *Proceedings of TiGeR* (pp. 305-309).
- Chamorro, G., Sorace, A. & Sturt, P. (2016). What is the source of L1 attrition? The effects of recent re-exposure on Spanish speakers under L1 attrition. *Bilingualism: Language and Cognition* 19(3), 2016, 520–532, doi.org/10.1017/S1366728915000152.
- Choi, S., & Lantolf, J. P. (2008). Representation and embodiment of meaning in L2 communication. Motion events in the speech and gesture of L2 Korean and L2 English speakers. *Studies in Second Language Acquisition*, 30, 225–251.

References

- Cienki, A. (2017). Utterance Construction Grammar (UCxG) and the variable multimodality of constructions. *Linguistics Vanguard*, 3(1), [20160048]. DOI: 10.1515/lingvan- 2016-0048.
- Clark, E. V., & Estigarribia, B. (2011). Using speech and gesture to inform young children about unfamiliar word meanings. *Gesture*, 11, 1–23.
- Contemori, C., & Dussias, P. E. (2016). Referential choice in a second language: evidence for a listener-oriented approach. *Language, Cognition and Neuroscience*, 31(10), 1257-1272, doi: 10.1080/23273798.2016.1220604.
- Croft, W. (2000). *Explaining Language Change: An Evolutionary Approach*. Harlow, Essex: Longman.

D

- Daller, M. H., Treffers-Daller, J., & Furman, R. (2011) Transfer of conceptualisation patterns in bilinguals: the construal of motion events in Turkish and German. *Bilingualism: Language and Cognition*, 14 (1), 95-119. doi: <https://doi.org/10.1017/S1366728910000106>.
- De Bot, K. & Clyne, M. (1994). A 16-year longitudinal study of language attrition in Dutch immigrants in Australia. *Journal of Multilingual and Multicultural Development*, 15(1), 17–28.
- De Groot, C. (2005). The grammars of Hungarian outside Hungary from a linguistictypological perspective. In A. Fenyevesi (Ed.), *Hungarian language contact outside Hungary*, 351–370. Amsterdam: John Benjamins.
- De Jong, N.H., & Wempe, T. (2009). Praat script to detect syllable nuclei and measure speech rate automatically. *Behavior Research Methods & Instrumentation*, 41 (2), 385-390, doi: 10.3758/BRM.41.2.385.
- De Ruiter, J.P. (2017). The asymmetric redundancy of gesture and speech. Function and processing of gesture in the context of language. In R. B. Church, M. W. Alibali and S. D. Kelly (Eds.), *Why gesture? How the hands function in*

- speaking, thinking and communicating* (pp. 59-75). Amsterdam: John Benjamins Publishing.
- Debreslioska, S., Özyürek, A., Gullberg, M., & Perniss, P. (2013). Gestural viewpoint signals referent accessibility. *Discourse Processes*, 50, 431–456, doi:10.1080/0163853X.2013.824286.
- Debreslioska, S., & Gullberg, M. (2019). Discourse reference is bimodal: How information status in speech interacts with presence and viewpoint of gestures. *Discourse Processes*, 56, 41-60. Routledge, doi.org/10.1080/0163853X.2017.1351909.
- De Jong, N.H., & Wempe, T. (2009). Praat script to detect syllable nuclei and measure speech rate automatically. *Behavior Research Methods & Instrumentation*, 41 (2), 385-390, doi: 10.3758/BRM.41.2.385.
- De Prada Pérez, A. & Pascual y Cabo, D. (2012). Interface heritage speech across proficiencies: unaccusativity, focus, and subject position in Spanish. In K. Geeslin, and M. Díaz-Campos (Eds.), *Selected Proceedings of the 14th Hispanic Linguistics Symposium* (pp. 308-318). Somerville, MA: Cascadilla Proceedings Project.
- Demir, O. E., So, W. C, Özyürek, A. & Goldin-Meadow, S. (2012). Turkish- and English-speaking children display sensitivity to perceptual context in the referring expressions they produce in speech and gesture. *Language and Cognitive Processes*, 27 (6), 844-67, doi: 10.1080/01690965.2011.589273. Demirçay, D. (2017). *Connected languages: Effects of intensifying contact between Turkish and Dutch*. Unpublished Doctoral Dissertation. Tilburg University.
- Doğruöz, A. S. (2007). *Synchronic variation and diachronic change in Dutch Turkish: A corpus-based analysis*. Doctoral Dissertation, Tilburg University, the Netherlands.
- Doğruöz, A. S. & Backus, A. (2007). Postverbal elements in immigrant Turkish: Evidence of change? *International Journal of Bilingualism*, 11 (2), 185–221.

Doğruöz, A. S. & Backus, A. (2009). Innovative constructions in Dutch Turkish: An assessment of on-going contact-induced change. *Bilingualism: Language & Cognition*, 12 (1), 41-63, doi.org/10.1017/S1366728908003441.

E

Edmondson, W. and House, J. (1991). Do learners talk too much? In Phillipson, R., Kellerman, E. Phillipson, R., Kellerman, E., Selinker, L., Sharwood Smith, M., & Swain. M. (Eds.), *Foreign/Second Language Pedagogy Research* (pp. 273-86), Clevedon: Multilingual Matters.

Efron, D. (1941). *Gesture and environment*. New York: Kings Crown Press

Ellis, N. C. (2016). Salience, cognition, language complexity, and complex adaptive systems. *Studies in Second Language Acquisition*, 38(2), 341–351. doi: 10.1017/S027226311600005X.

Elma, B., Küntay, A. C., Messer, M., Verhagen, J., & Leseman, P. (2014). The benefits of being bilingual: Working memory in bilingual Turkish–Dutch children. *Journal of Experimental Child Psychology*, 128, 105–119. DOI: 10.1016/j.jecp.2014.06.007

Enç, M. (1986). Topic switching and pronominal subjects in Turkish. In D.I. Slobin and K. Zimmer (Eds.), *Studies in Turkish linguistics* (pp. 195-209). Amsterdam: John Benjamins.

Erguvanlı-Taylan (1986). Pronominal versus zero representations of anaphora in Turkish. In D. I. Slobin and K. Zimmer (Eds.), *Studies in Turkish linguistics: proceedings of the third conference on Turkish linguistics* (pp. 209-31). Philadelphia: John Benjamins Publishing Company.

Extra, G. & Yağmur, K. (2010) Language proficiency and socio-cultural orientation of Turkish and Moroccan youngsters in the Netherlands. *Language and Education*, 24(2), 117-132.

Extra, G., Yagmur, K. & van der Avoird, T. (2004). Methodological considerations. In G. Extra and K. Yagmur (Eds.), *Urban Multilingualism in Europe:*

Immigrant Minority Languages at Home and School (pp. 109-132).

Clevedon: Multilingual Matters.

F

Flecken, M. (2011). Event conceptualization by early Dutch-German bilinguals: Insights from linguistic and eye-tracking data. *Bilingualism: Language and Cognition*, 14(1), 61-77. doi:10.1017/S1366728910000027.

Flores-Ferrán, N. (2004). Spanish subject personal pronoun use in New York city Puerto Ricans: Can we rest the case of English contact? *Language Variation and Change*, 16, 49-73, doi.org/10.1017/S0954394504161048.

Foraker, S. & McElree, B. (2007). The role of prominence in pronoun resolution: Active versus passive representations. *Journal of Memory and Language*, 56, 357-383, doi.org/10.1016/j.jml.2006.07.004.

Frederiksen, A. T. & Mayberry, R. I. (2018). Reference tracking in early stages of different modality L2 acquisition: Limited overexplicitness in novice ASL signers' referring expressions. *Second Language Research*, published online January 29, 2018, <https://doi.org/10.1177/0267658317750220>.

Fukumura, K., Van Gompel, R. P. G. & Pickering, M. J. (2010). The use of visual context during the production of referring expressions. *Quarterly Journal of Experimental Psychology*, 63, 1700–1715, doi: 10.1080/17470210903490969.

Furman, R., Küntay, A., & Özyürek, A. (2014). Early language-specificity of children's event encoding in speech and gesture: Evidence from caused motion in Turkish. *Language, Cognition and Neuroscience*, 29, 620-634, doi.org/10.1080/01690965.2013.824993.

G

Givón, T. (1976). Topic, pronoun and grammatical agreement. In C. N. Li (Ed.), *Subject and Topic* (pp. 148-88). New York, NY: Academic Press.

References

- Givón, T. (1984). Topic continuity in discourse: An introduction. In T. Givón (Ed.), *Topic continuity in discourse: A quantitative cross-language study* (pp. 1–42). Amsterdam: John Benjamins Publishing.
- Godson, L. (2004). Vowel production in the speech of Western Armenian heritage speakers. *Heritage Language Journal* 2. <https://international.ucla.edu/africa/article/14648> (accessed 3 February 2019).
- Goldberg, A. E. (1995). *Constructions: A Construction Grammar Approach to Argument Structure*. Chicago: Chicago University Press.
- Goldin-Meadow, S. (2001). Giving the mind a hand: The role of gesture in cognitive change. In J McClelland and RS Siegler (Eds.), *Mechanisms of cognitive development: Behavioral and neural perspectives* (pp. 5–31). Mahwah, NJ: Earlbaum Associates
- Goldin-Meadow, S. (2003). *The resilience of language: What gesture creation in deaf children can tell us about how all children learn language*. New York: Psychology Press.
- Goldin-Meadow, S. (2013). How our gestures help us learn. In C Müller, A Cienki, E Fricke, SH Ladewig, D McNeill and S Teßendorf (Eds.), *Body-language-communication: An international handbook on multimodality in human interaction* (pp. 792–803). Berlin: De Gruyter Mouton.
- Goldin-Meadow, S., Nusbaum, H., Kelly S. D., Wagner S. (2001). Explaining math: Gesturing lightens the load. *Psychological Science*, 12(6), 516–522.
- Gómez Rendón, J. A. (2008). Typological and social constraints on language contact: Amerindian languages in contact with Spanish. Ph.D. Dissertation, University of Amsterdam.
- Göksel., A., & Kerslake, C. (2005). *Turkish: A comprehensive grammar*. Oxfordshire, England: Routledge.

- Graham JA and Argyle M (1975) A cross-cultural study of the communication of extraverbal meaning by gestures. *International Journal of Psychology*, 10, 57–67.
- Green, D. W. (2003). The neural basis of the lexicon and the grammar in L2 acquisition: The convergence hypothesis. In R. van Hout, A. Hulk, F. Huiken & R. Towell (Eds.), *The interface between syntax and the lexicon in second language acquisition* (pp. 197–218). Amsterdam, the Netherlands: John Benjamins.
- Grosjean, F. (2001). The bilingual's language modes. In J. L. Nicol (Ed.), *One mind, two languages: Bilingual language processing* (pp. 1–22). Oxford: Blackwell.
- Gu, Y., Mol, L., Hoetjes, M., & Swerts, M. (2017). Conceptual and lexical effects on gestures: the case of vertical spatial metaphors for time in Chinese. *Language, Cognition and Neuroscience*, doi: 10.1080/23273798.2017.1283425.
- Gullberg, M. (1998). *Gesture as a communication strategy in second language discourse: A study of learners of French and Swedish*. Lund: Lund University Press.
- Gullberg, M. (2003). Gestures, referents, and anaphoric linkage in learner varieties. In C. Dimroth & M. Starren (Eds.), *Information structure and the dynamics of language acquisition* (pp. 311–328). Amsterdam: John Benjamins.
- Gullberg, M. (2006). Handling discourse: Gestures, reference tracking, and communication strategies in early L2. *Language Learning*, 56(1), 155-96.
- Gullberg, M. (2009). Why gestures are relevant to the bilingual mental lexicon. In Pavlenko, A. (Ed.), *The bilingual mental lexicon: Interdisciplinary approaches* (pp. 161-184). Clevedon: Multilingual Matters.

Gullberg, M. (2012). Bilingualism and gesture. In Bhatia, T. K. & Ritchie, W. C. (Eds.) *The handbook of bilingualism and multilingualism*, 2nd rev. edition (pp. 417-437). Wiley-Blackwell.

Gullberg, M., & Indefrey, P. (2003). Language Background Questionnaire. Developed in *The Dynamics of Multilingual Processing*. Nijmegen: Max Planck Institute for Psycholinguistics. <https://www.mpi.nl/departments/other-research/research-projects/the-dynamics-of-multilingual-processing/tools/Lang-Hist-Quest-Engl.pdf>

Gürel, A. (2004). Selectivity in L2-induced attrition: A psycholinguistic account. *Journal of Neurolinguistics*, 17 (1), 53–78, doi.org/10.1016/S0911-6044(03)00054-X.

Gürel, A. & Yılmaz, G. (2011). Restructuring in the L1 Turkish grammar Effects of L2 English and L2 Dutch. *Language, Interaction and Acquisition* 2(2), 221–250. doi: 10.1075/lia.2.2.03gur.

H

Hada, U., & Butterworth, B. (1997) Iconic gestures, imagery, and word retrieval in speech. *Semiotica*, 115, 147–172.

Harrington, S. & Pérez-Leroux, A. T. (2016). Subjunctive and subject pronoun realization: a study of "no creo que". *Borealis – An International Journal of Hispanic Linguistics*, 5(1), p. 87-106, doi.org/10.7557/1.5.1.3726.

Haznedar, B. (2010). Transfer at the syntax–pragmatics interface: Pronominal subjects in bilingual Turkish. *Second Language Research*, 26(3), 355–378, doi.org/10.1177/0267658310365780.

Heine, B., & Kuteva, T. (2005). *Language contact and grammatical change*. Cambridge: Cambridge University Press.

Hendriks, H. (2003). Using nouns for reference maintenance: A seeming contradiction in L2 discourse. In A. G. Ramat (Ed.), *Typology and second language acquisition* (pp. 291–326). Berlin: Mouton.

- Hendriks, P., Koster, C., & Hoeks, J. C. J. (2014). Referential choice across the lifespan: Why children and elderly adults produce ambiguous pronouns. *Language, Cognition and Neuroscience*, 29(4), 391-407, doi: 10.1080/01690965.2013.766356.
- Hickmann, M., & Hendriks, H. (1999). Cohesion and form in children's narratives: a comparison of English, French, German, and Mandarin Chinese. *Journal of Child Language*, 26, 419-452.
- Heine, B. & Kuteva, T. (2005). *Language contact and grammatical change*. Cambridge: Cambridge University Press.
- Holler, J., & Wilkin, K. (2011) An experimental investigation of how addressee feedback affects co-speech gestures accompanying speakers' responses. *Journal of Pragmatics*, 43, 3522–3536. doi:10.1016/j.pragma.2011.08.002.

I

- Indefrey, Şahin, H., & Gullberg, M. (2017). The expression of spatial relationships in Turkish–Dutch bilinguals. *Bilingualism: Language and Cognition*, 20(3), 473–493, doi:10.1017/S1366728915000875.
- Iverson J. M., & Goldin-Meadow, S. (1997). What's communication got to do with it? Gesture in children blind from birth. *Developmental Psychology*, 33, 453–467.

K

- Kaiser, E. (2010). Effects of contrast on referential form: Investigating the distinction between strong and weak pronouns. *Discourse Processes*, 47, 480-509, doi.org/10.1080/01638530903347643
- Kaiser, E. (2011). Salience and contrast effects in reference resolution: The interpretation of Dutch pronouns and demonstratives, *Language and Cognitive Processes*, 26, 1587-1624, doi.org/10.1080/01690965.2010.522915.
- Kaiser, E., & Trueswell, J. C. (2004). The referential properties of Dutch pronouns and demonstratives: Is salience enough? In C. Meier & M. Weisgerber (Eds.),

References

- Proceedings of the conference sub8 Sinn und Bedeutung* (Working paper No. 177, pp. 137-149). Constance: FB Sprachwissenschaft, University of Constance.
- Keating, G. D., VanPatten, B., & Jegerski, J. (2011). Who was walking on the beach? Anaphora resolution in Spanish heritage speakers and adult second language learners. *Studies in Second Language Acquisition*, 33, 193–221, doi:10.1017/S0272263110000732.
- Kendon, A. (1992). Some recent work from Italy on quotable gestures ('emblems'). *Journal of Linguistic Anthropology*, 21, 72–93.
- Kendon, A. (2004). *Gesture: Visible action as utterance*. Cambridge University Press. doi:10.1017/cbo9780511807572
- Kerslake, C. (1987). Noun Phrase Deletion and Pronominalization in Turkish. In H. E. Boeschoten and L. T. Verhoeven (Eds.), *Studies on modern Turkish: Proceedings of the third conference on Turkish linguistics* (pp. 91-104). Tilburg: Tilburg University Press.
- Kibrik, A. A. (2011). *Reference in discourse*. Oxford, England: Oxford University Press.
- Kita, S. (2009). Cross-cultural variation of speech accompanying gesture: a review. *Language and Cognitive Processes*, 24 (2), 145-1671, doi.org/10.1080/01690960802586188.
- Kita, S., van der Hulst, H., & van Gijn, I. (1998). Movement phases in signs and co-speech gestures, and their transcription by human coders. In I. Wachsmuth & M. Fröhlich (Eds.), *Gesture and sign language in human-computer interaction* (pp. 23–35). Berlin: Springer.
- Kita, S., & Özyürek, A. (2003). What does crosslinguistic variation in semantic coordination of speech and gesture reveal? Evidence for an interface representation of spatial thinking and speaking. *Journal of Memory and Language*, 48(1), 16–32, doi: 10.1016/S0749-596X(02)00505-3.

- Koban Koç, D. (2016). Social variables and Turkish subject pronoun use in New York City: The effect of language contact. *Poznań Studies in Contemporary Linguistics* 52(3), 431–453, doi: 10.1515/psicl-2016-0018.
- Kok., K. I., & Cienki, A. (2016). Cognitive Grammar and gesture: Points of convergence, advances and challenges. *Cognitive Linguistics*, 27, 67-100. 10.1515/cog-2015-0087.
- Krahmer, E. J., & Swerts, M. G. J. (2007). The effects of visual beats on prosodic prominence: Acoustic analyses, auditory perception and visual perception. *Journal of Memory and Language*, 57 (3), 396-414.
- Krauss, R. M., Dushay, R., Chen, Y., & Rauscher, F. (1995). The communicative value of conversational hand gestures. *Journal of Experimental Social Psychology*, 31, 533-552.
- Krauss R. M., & Hadar, U. (1999) The role of speech-related arm/hand gestures in word retrieval. In R Campbell and L Messing (Eds.), *Gesture, speech, and sign* (pp. 93–116). Oxford: Oxford University Press.
- Krauss, R. M., Chen, Y., & Gottesman, R.F. (2000). Lexical Gestures and Lexical Access: A Process Model. In D. McNeill (Ed.), *Language and gesture* (pp. 261-283). New York: Cambridge University Press.
- Krauss, D., & Jasmin, K. (2012). The hands of time: Temporal gestures in English speakers. *Cognitive Linguistics*, 23(4), 643–674. doi:10.1515/cog-2012-0020.
- Küntay, A. (2002). Development of the Expression of Indefiniteness: Presenting New referents in Turkish Picture-series Stories. *Discourse Processes*, 33, 77-101, doi.org/10.1207/S15326950DP3301_04.

L

- Langacker, R. W. (1987). *Foundations of Cognitive Grammar: Theoretical Prerequisites*. Stanford, CA: Stanford University Press.

References

- Langacker, R. W. (2008). Metaphoric gesture and cognitive linguistics. In Alan Cienki & Cordula Müller (Eds.), *Metaphor and gesture* (pp. 249–251). Amsterdam: John Benjamins.
- Langacker, R. W. (2013). *Essentials of Cognitive Grammar*. Oxford University Press.
- Lausberg, H., & Sloetjes, H. (2009). Coding gestural behavior with the NEUROGES-ELAN system. *Behavior Research Methods, Instruments, & Computers*, 41(3), 841-849, doi: 10.3758/BRM.41.3.591.
- Levelt, W. J. M. (1989). *Speaking: from intention of articulation*. Cambridge, MA: The MIT Press.
- Levinson, S.C. (2003). *Space in language and cognition: Exploration in cognitive diversity*. Cambridge: Cambridge University Press.
- Levy, E., & Fowler, C. (2000). Grounding references in perception. In McNeill, D. (Ed.), *Language and Gesture* (pp. 215-234). New York: Cambridge University Press.
- Levy, E. T. & McNeill, D. (1992). Speech, gesture, and discourse. *Discourse Processes*, 15, 277–301, doi.org/10.1080/01638539209544813.
- Lim, V. P. C., Rickard Liow, S. J. Lincoln, M., Chan, Y. K., & Onslow, M. (2008). Determining language dominance in English-Mandarin bilinguals: Development of a self-report classification tool for clinical use. *Applied Psycholinguistics*, 29, 389-412.
- Luke, S.G. (2017). Evaluating significance in linear mixed-effects models in R. *Behavior Research Methods*, 49(4), 1494–1502, doi.org/10.3758/s13428-016-0809-y.

M

- Mahajan, G. (2009). Ongoing deficits in heritage Hindi. Paper presented at the *Third Annual Heritage Language Institute*, Urbana Champaign, June 2009.

- Marcos, L. R. (1979). Nonverbal behavior and thought processing. *Archives of General Psychiatry*, 36, 940–943.
- Marslen-Wilson, W., Levy, E., & Tyler, L. K. (1982). Producing interpretable discourse: The establishment and maintenance of reference. In R. Jarvella (Ed.), *Speech, Place, and Action* (pp. 339–378). Hoboken, NJ: John Wiley & Sons Ltd.
- Matras, Y. (2009). *Language Contact*. Cambridge Textbooks in Linguistics. Cambridge: Cambridge University Press.
- MacWhinney, B. (2012). The logic of the unified model. In S. M. Gass and A. Mackey (Eds.), *The Routledge handbook of second language acquisition* (pp. 211–227). New York: Routledge.
- McNeill, D. (1992). *Hand and mind: What gestures reveal about thought*. Chicago, IL: Chicago University Press.
- McNeill, D. (2006). Gesture and Communication. In K. Brown (Ed.), *Encyclopedia of Language & Linguistics* (pp. 58-66). Oxford: Elsevier.
- McNeill, D. & Duncan, S.D. (2000). Growth points in thinking-for-speaking. In D. McNeill (Ed.), *Language and Gesture* (pp. 141-161). Cambridge: Cambridge University Press.
- Messer, M.H., Leseman, P.P.M., Boom, J. & Mayo, A.Y. (2010). Phonotactic probability effects in nonword recall and its relationship with vocabulary in monolingual and bilingual preschoolers. *Journal of Experimental Child Psychology*, 105, 306-323.
- Michael, L. (2014). Social dimensions of language change. In C. Bowern and B. Evans (Eds), *The Routledge Handbook of Historical Linguistics* (pp. 484-502), Abingdon: Routledge.
- Montrul, S. (2002). Incomplete acquisition and attrition of Spanish tense/aspect distinctions in adult bilinguals. *Bilingualism: Language and Cognition*, 5, 39–68.

References

- Montrul, S. (2004). Subject and object expression in Spanish heritage speakers: A case of morpho-syntactic convergence. *Bilingualism: Language and Cognition*, 7, 1–18.
- Montrul, S. (2009). Incomplete acquisition of tense-aspect and mood in Spanish heritage speakers. *International Journal of Bilingualism*, 13(2), 239–269.
- Montrul, S. (2010). How similar are L2 learners and heritage speakers? Spanish clitics and word order. *Applied Psycholinguistics*, 31, 167–207, doi: 10.1017/S014271640999021X.
- Montrul, S., Foote, R., & Perpiñán, S. (2008). Gender agreement in adult second language learners and Spanish heritage speakers: The effects of age and context of acquisition. *Language Learning*, 58, 503–53, doi: 10.1111/j.1467-9922.2008.00449.x.
- Montrul, S., & Ionin, T. (2010). Transfer effects in the interpretation of definite articles by Spanish heritage speakers. *Bilingualism: Language and Cognition*, 13(4), 449–473.
- Montrul, S., & Polinsky, M. (2011). Why not heritage speakers? *Linguistic Approaches to Bilingualism*, 1(1), 58–62, doi.org/10.1075/lab.1.1.07mon.
- Muysken, P. (2000). *Bilingual speech: a typology of code-mixing*. Cambridge: Cambridge University Press.
- Müller, N., & Hulk, A. (2001). Crosslinguistic influence in bilingual language acquisition: Italian and French as recipient languages. *Bilingualism: Language and Cognition*, 4, 1–22, doi.org/10.1017/S1366728901000116.
- Myers-Scotton, C. M. (2002). *Contact linguistics: Bilingual encounters and grammatical outcomes*. Oxford: Oxford University Press.

N

- Nicoladis, E. (2006). Cross-linguistic transfer in adjective-noun strings by preschool bilingual children. *Bilingualism: Language and Cognition*, 9, 15–32.

- Nicoladis, E. (2007). The effect of bilingualism on the use of manual gestures. *Applied Psycholinguistics*, 28, 441-454.
- Nicoladis, E., Mayberry, R., & Genesee, F. (1999). Gesture and early bilingual development. *Developmental Psychology*, 35, 514–526.
- Nicoladis, E., Pika, S., & Marentette, P. (2009). Do French-English bilingual children gesture more than monolingual children? *Journal of Psycholinguistic Research*, 38, 573–585, doi: 10.1007/s10936-009-9121-7
- Núñez, R. E., & Sweetser, E. (2006). With the future behind them: Convergent evidence from Aymara language and gesture in the crosslinguistic comparison of spatial construal of time. *Cognitive Science*, 30, 401–450.
- O**
- Onar Valk, P. (2015). *Transformation in Dutch Turkish subordination?* Doctoral Dissertation, Tilburg University, the Netherlands.
- Orozco, R. (2016). Subject pronoun expression in Mexican Spanish: ¿Qué pasa en Xalapa?. In P. Farrell (Ed.). *Proceedings of the Annual Meeting of the Linguistic Society of America* (article 7, pp. 1-15), doi.org/10.3765/plsa.v1i0.3703.
- Özcan, F. H., Keçik, I, Topbaş, S., & Konrat, A. (2000). A comparative study in pronominal use in the discourse of monolingual Turkish-speaking and bilingual Turkish- Danish speaking children. In: A. Holmen & N. Jorgensen (Eds.), *Det er conversation 801 degil mi? Perspectives on the bilingualism of Turkish speaking children and adolescents* (pp. 121-136). Copenhagen: LÆrerhøjskoles.
- Özçalışkan, Ş. (2016). Do gestures follow speech in bilinguals' description of motion? *Bilingualism: Language and Cognition*, 19(3), 644-653, doi.org/10.1017/S1366728915000796.
- Özçalışkan, S., Lucero, C., & Goldin-Meadow, S. (2016). Does language shape silent gesture? *Cognition*, 148, 10-18, 10.1016/j.cognition.2015.12.001.

References

- Özçalışkan, Ş., Lucero C., & Goldin-Meadow, S. (2016). Is Seeing Gesture Necessary to Gesture Like a Native Speaker? *Psychological Science*, 27(5), 737-47.
- Özçalışkan, S., & Slobin, D. I. (1999). Learning 'how to search for the frog': Expression of manner of motion in English, Spanish and Turkish. In A. Greenhill, H. Littlefield & C. Tano (Eds.), *Proceedings of the 23rd Boston University Conference on Language Development* (pp. 541-552). Somerville, MA: Cascadilla Press
- Özçalışkan Ş, Lucero, C., & Goldin-Meadow, S. (2016). Is Seeing Gesture Necessary to Gesture Like a Native Speaker? *Psychological Science*, 27(5), 737-47.
- Özsoy, A. S. (1987). Null Subject Parameter and Turkish. In H. E. Boeschoten and L. T. Verhoeven (Eds.), *Studies on modern Turkish: Proceedings of the third conference on Turkish linguistics* (pp. 82-90). Tilburg: Tilburg University Press.
- Özyürek, A. (2002). Speech-language relationship across languages and in second language learners: Implications for spatial thinking and speaking. In B. Skarabella (Ed.), *Proceedings of the 26th Boston University Conference on Language Development* (pp. 500-509). Somerville, MA: Cascadilla Press.
- Özyürek, A. (2017). Function and processing of gesture in the context of language. In R. B. Church, M. W. Alibali and S. D. Kelly (Eds.), *Why gesture? How the hands function in speaking, thinking and communicating* (pp. 39-58). Amsterdam: John Benjamins Publishing.
- Özyürek, A., Kita, S., Allen, S., Brown, A., Furman, R. & Ishizuka, T. (2008). Development of cross-linguistic variation in speech and gesture: motion events in English and Turkish. *Developmental Psychology*, 44(4), 1040-1054.

P

- Paradis, M. (2007). L1 attrition features predicted by a neurolinguistic theory of bilingualism. In B. Köpcke, M. S. Schmid, M. Keijzer & S. Dostert (Eds.), *Language attrition. Theoretical perspectives* (pp. 121–133). Amsterdam: John Benjamins.
- Paradis, J. & Navarro, S. (2003). Subject realization and crosslinguistic interference in the bilingual acquisition of Spanish and English. *Journal of Child Language*, 30, 1–23, doi.org/10.1017/S0305000903005609.
- Pavlenko, A. (2003). “I feel clumsy speaking Russian”: L2 Influence on L1 in narratives of Russian L2 users of English. In V. Cook (Ed), *Effects of the second language on the first* (pp. 32–61). Clevedon: Multilingual Matters.
- Perniss, P. M., & Özyürek, A. (2015). Visible cohesion: A comparison of reference tracking in sign, speech, and co-speech gesture. *Topics in Cognitive Science*, 7(1), 36-60, 36-60, doi: 10.1111/tops.12122.
- Pika, S., Nicoladis, E., & Marentette, P. (2006). A cross-cultural study on the use of gestures: Evidence for cross-linguistic transfer? *Bilingualism: Language and Cognition*, 9, 319–327.
- Pinto, M. (2006). Subject pronouns in bilinguals: Interference or maturation. In L. Escobar & V. Torrens (Eds.), *The acquisition of syntax in Romance languages* (pp. 331–352). Amsterdam: John Benjamins.
- Polinsky, M. (1995). Cross-linguistic parallels in language loss. *Southwest Journal of Linguistics*, 14(1–2), 87–123.
- Polinsky, M. (2008). Gender under incomplete acquisition: Heritage speakers’ knowledge of noun categorization. *The Heritage Language Journal*, 6, 40–71.
- Polinsky, M. (2011). Reanalysis in adult heritage language: New evidence in support of attrition. *Studies in Second Language Acquisition*, 33(2), 305–328.

References

- Polinsky, M., & Kagan, O. (2007). Heritage languages: In the 'wild' and in the classroom. *Language and Linguistics Compass*, 1(5), 368–395.
- Polio, C. (1995). Acquiring nothing? The use of zero pronouns by nonnative speakers of Chinese and the implications for the acquisition of nominal reference. *Studies in Second Language Acquisition*, 17, 353–77, doi.org/10.1017/S0272263100014248.
- Poplack, S., & Sankoff, D. (1984). Borrowing: The synchrony of integration. *Linguistics*, 22, 99-135, <http://dx.doi.org/10.1515/ling.1984.22.1.99>
- Rinke, E., & Flores, C. (2014). Morphosyntactic knowledge of clitics by Portuguese heritage bilinguals. *Bilingualism: Language and Cognition*, 17(04), 681-699, doi.org/10.1017/S136672891300076X.
- Rohde, H., & Kehler, A. (2014). Grammatical and information-structural influences on pronoun production. *Language, Cognition and Neuroscience*, 29(8), 912-927, doi.org/10.1080/01690965.2013.854918.

S

- Sánchez, L. (2004). Functional convergence in the tense, evidentiality and aspectual systems of Quechua Spanish bilinguals. *Bilingualism: Language and Cognition*, 7 (2), 147–162.
- Schaufeli., A. (1991). *Turkish in an immigrant setting: A comparative study of the first language of monolingual and bilingual Turkish children*. Dissertation. University of Amsterdam.
- Scheele, A.F. (2010). *Home language and mono- and bilingual children's emergent academic language: a longitudinal study of Dutch, Moroccan-Dutch, and Turkish-Dutch 3- to 6-year-old children*. Dissertation. Utrecht University
- Scheflen, A. E. (1972). *Body language and the social order: Communication as behavioral control*. Englewood Cliffs, NJ: Prentice Hall.
- Sherman, J., & Nicoladis, E. (2004). Gestures by advanced Spanish–English second-language learners. *Gesture*, 4, 143–156. doi.org/10.1075/gest.4.2.03she

- Schmitt, E. (2000). Overt and covert codeswitching in immigrant children from Russia. *International Journal of Bilingualism*, 4, 9-28, doi.org/10.1177/13670069000040010201.
- Schoonjans, S. (2014). *Modalpartikeln als multimodale Konstruktionen. Eine korpusbasierte Kookkurrenzanalyse von Modalpartikeln und Gestik im Deutschen* [Modal particles as multimodal constructions. A corpus-based co-occurrence analysis of modal particles and gesture in German]. Dissertation. University of Leuven, Leuven, Belgium.
- Serratrice., L. (2008). The role of discourse and perceptual cues in the choice of referential expressions in English preschoolers, school-age children, and adults. *Language Learning and Development*, 4(4), 309-332, doi.org/10.1080/15475440802333619.
- Serratrice., L. (2013). Cross-linguistic influence in bilingual development: Determinants and mechanisms *Linguistic Approaches to Bilingualism* 3(1), 3–25, doi.org/10.1075/lab.3.1.01ser.
- Serratrice, L., Sorace, A., & Paoli, S. (2004). Transfer at the syntax-pragmatics interface: Subjects and objects in Italian-English bilingual and monolingual acquisition. *Bilingualism: Language and Cognition*, 7, 183–206, doi.org/10.1177/0267658310365780.
- Sherman, J., & Nicoladis, E. (2004). Gestures by advanced Spanish–English second-language learners. *Gesture*, 4, 143–156, doi.org/10.1075/gest.4.2.03she.
- Silva-Corvalán, C. (1994). *Language Contact and Change: Spanish in Los Angeles*. Oxford: Clarendon Press.
- Smithson, L., Nicoladis, E., & Marentette, P. (2011) Bilingual children’s gesture rate. *Gesture*, 11(3), 330–347. doi:10.1075/gest.11.3.04smi
- So, W. C. (2010). Cross-cultural transfer in gesture frequency in Chinese–English bilinguals. *Language and Cognitive Processes*, 25, 10, 1335-1353.

References

- So, W. C., Kita, S., & Goldin-Meadow, S. (2009). Using the hands to identify who does what to whom: Gesture and speech go hand-in-hand. *Cognitive Science*, 35(1), 115–125, doi: 10.1111/j.1551-6709.2008.01006.x.
- So, W. C., & Lim, J. Y. (2012). Point to a referent, and say, ‘what is this?’ Gesture as a potential cue to identify referents in a discourse. *Applied Psycholinguistics*, 33, 329-42, doi.org/10.1017/S0142716411000373.
- So, W. C., Lim, J. Y. & Tan (2014). Sensitivity to information status in discourse: gesture precedes speech in unbalanced bilinguals. *Applied Psycholinguistics*, 35, 71–95, doi.org/10.1017/S0142716412000355.
- Sorace, A., & Filiaci, F. (2006). Anaphora resolution in near-native speakers of Italian. *Second Language Research*, 22, 339–368, doi.org/10.1191/0267658306sr271oa.
- Sorace, A., & Serratrice, L. (2009). Internal and external interfaces in bilingual language development: revisiting the processing vs. representation distinction. *The International Journal of Bilingualism*, 13 (2), 195–210, doi: 10.1177/1367006909339810.
- Sorace, A., (2011). Pinning down the concept of “interface” in bilingualism. *Linguistic Approaches to Bilingualism*, 1, 1–33. doi: 10.1075/lab.1.1.01sor.
- Sorace, A. (2016). Referring expressions and executive functions in bilingualism. *Linguistic Approaches to Bilingualism* 6(5), 669–684. doi:10.1075/lab.15055.sor.
- Stam, G. (2006). Thinking for speaking about motion: L1 and L2 speech and gesture. *International Review of Applied Linguistics in Language Teaching*, 44, 145–171.
- Steen, F., & Turner, M. (2013). Multimodal construction grammar. In M. Borkent, B. Dancygier and J. Hinnell (Eds.), *Language and the creative mind* (pp. 255–274). Stanford, CA: CSLI Publications.

Şahin, H. (2015). *Cross-linguistic influences: Dutch in contact with Papiamentu and Turkish*. Doctoral Dissertation. Radboud University Nijmegen.

T

Talmy, L. (1985). Lexicalization patterns: Semantic structure in lexical forms. In T. Shopen (Ed.), *Language typology and semantic description. Vol. III: Grammatical categories and the lexicon* (pp. 36–149). Cambridge: Cambridge University Press.

Talmy, L. (2000). *Toward a cognitive semantics*. Cambridge, MIT Press.

Thomason, S. G. (2001). *Language contact. An introduction*. Washington: Georgetown UP.

Thomason, S. G. (2007). Language Contact and Deliberate Change. *Journal of Language Contact*, 1(1), 41-62, doi.org/10.1163/000000007792548387.

Tomasello, M. (2003). *Constructing a language: A usage-based theory of language acquisition*. Cambridge, MA: Harvard University Press.

Tomasello, M. (2006). Acquiring linguistic constructions. In D. Kuhn & R. Siegler (Eds.), *Handbook of Child Psychology*. New York: Wiley, retrieved from https://www.eva.mpg.de/psycho/staff/tomas/pdf/tomasello_HoCP2005.pdf

Torres Cacoullos, R. & Travis, C. E. (2010). Testing convergence via code-switching: priming and the structure of variable subject expression. *International Journal of Bilingualism*, 15(3), 241-267, doi.org/10.1177/1367006910371025.

Travis, C., Torres Cacoullos, R., & Kidd, E. (2017). Cross-language priming: A view from bilingual speech. *Bilingualism: Language and Cognition*, 20(2), 283-298, doi.org/10.1017/S1366728915000127.

Tsimpli, I., Sorace, A., Heycock, C., & Filiaci, F. (2004) First language attrition and syntactic subjects: A study of Greek and Italian near-native speakers of English, *International Journal of Bilingualism*, 8(3), 257-277, doi.org/10.1177/13670069040080030601.

References

- Tsimpli, I., & Sorace, A. (2006). Differentiating interfaces: L2 performance in syntax-semantics and syntax-discourse phenomena. *Proceedings of the 30th Annual Boston University Conference on Language Development* (pp. 653–664). Somerville, MA: Cascadilla Press.
- Turan, D. (1995). *Null vs. overt subjects in Turkish discourse: A centering analysis*. Dissertation. University of Pennsylvania. Dissertation available from ProQuest. Paper AAI9532298. <http://repository.upenn.edu/dissertations/AAI9532298>.
- V
- Valdés, G. (2000). *Introduction. Spanish for Native Speakers*, Volume I. AATSP Professional Development Series Handbook for teachers K-16, 1–29. New York, NY: Harcourt College.
- Vancluysen, K., Van Craen, M. & Ackaert, J. (2009). *Gekleurde steden. Autochtonen en allochtonen over samenleven*. Brugge: Vanden Broele.
- Van Osch, B. A., & Sleeman, A. P. (2016). Spanish heritage speakers in the Netherlands: Linguistic patterns in the judgment and production of mood. *International Journal of Bilingualism*. Published July 21, 2016, doi: 0.1177/1367006916654365.
- Van Rijswijk, R., Muntendma, A., & Dijkstra, T. (2017). Focus marking in Dutch by heritage speakers of Turkish and Dutch L1 speakers. *Journal of Phonetics*, 61, 48-70, <http://dx.doi.org/10.1016/j.wocn.2017.01.003>.
- Van Suchtelen, P. I. (2016). *Spanish as a heritage language in the Netherlands: A cognitive linguistic exploration*. Dissertation. Radboud University Nijmegen, the Netherlands.
- Verhagen, V., Backus, A., Mos, M., & Schilperoord, J. (2018). Predictive language processing revealing usage-based variation. *Language & Cognition*, 10 (2), 329-373. <https://doi.org/10.1017/langcog.2018.4>.

Vogels, J., Maes, A., & Krahmer, E. (2014) Choosing referring expressions in Belgian and Netherlandic Dutch: Effects of animacy. *Lingua*, 145, 104-121, doi.org/10.1016/j.lingua.2014.03.007.

W

Wagner, S. M., Nusbaum, H., & Goldin-Meadow, S. (2004). Probing the mental representation of gesture: Is handwaving spatial? *Journal of Memory and Language*, 50, 395–407.

Wiley, T. G. (2001). On defining heritage languages and their speakers. In J. K. Peyton, D. A. Ranard, & S. McGinnis (Eds.), *Heritage languages in America: Preserving a national resource* (pp. 29-36). Washington, DC & McHenry, IL: Center for Applied Linguistics & Delta Systems.

Y

Yoshioka, K. (2008). Gesture and information structure in first and second language. *Gesture*, 8(2), 236-255, doi.org/10.1075/gest.8.2.07yos.

Z

Zima, E. (2014). English multimodal motion constructions. A construction grammar perspective. *Studies van de BKL - Travaux du CBL - Papers of the LSB*, Volume 8. <http://uahost.uantwerpen.be/linguist/SBKL/sbkl2013/Zim2013.pdf>

Appendices

Appendix A. Abbreviations used in examples

1	First person
3	Third person
ACC	Accusative
EV	Evidential
DAT	Dative
DIM	Diminutive
FTR	Future
INF	Infinitival
LOC	Locative
PL	Plural
PROG	Progressive
PRS	Present
PAST	Past
POSS	Possessive
REL	Relative
SG	Singular

Appendix B. Bilingual questionnaire that was used for background data collection

Bilingual participants filled in a detailed survey about their language history and language use as well as the demographics of their care-givers. The survey was filled after the Turkish data collection session.

B1. Turkish version

A. Genel Bilgiler

Lütfen aşağıda istenen bilgileri **KENDİNİZ** hakkında bilgileri doldurunuz.

1) **Posta kodu:**

2) **E-mail adresi:**

3)

Yaş	Cinsiyet		Doğum yeri		Meslek	En son mezun olduğunuz okul				
	K	E	şehir	ülke		Yok	İlköğretim	Lise	Meslek yüksek okulu	Üniversite

4) Okula Hollanda'da mı başladınız? **EVET** **HAYIR**

HAYIR ise, Nerede başladınız?:

Başadığınız ülkede ne kadar süre devam ettiniz?:

Eğitiminizi ağırlıklı olarak hangi dilde yaptınız/ yapıyorsunuz?

5) Hollanda'dan başka bir ülkede 6 aydan uzun bir süre yaşadınız mı?

EVET **HAYIR**

EVET ise, nerede?: ne kadar süre? ne sebeple?:

6) Hollanda'da kiminle yaşıyorsunuz?

7) Eğer anne bananız ya da sizi büyütenlerle birlikte yaşamıyorsanız onları ne sıklıkta ziyaret ediyorsunuz?

Lütfen aşağıda istenen bilgileri **SİZİ BÜYÜTENLER** hakkında bilgileri doldurunuz.

	Yaş	Doğum yeri		Hollanda'ya yerleşim yılı	Meslek	En son mezun olduğu okul			
		şehir	ülke			Yok	İlköğretim	Lise	Yüksek okul
Anne									
Baba									
Başka (belirtin)									

B- Dil Kullanımı

- 1) Lütfen aşağıdaki zaman dilimlerinde hangi dili en çok kullandığınızı belirtiniz. Her zaman dilimi için sadece bir kutuya işaret koyunuz.

SİZ	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)
0-5 yaşındayken				
6-12 yaşındayken				
13-18 yaşındayken				
18+ yaşındayken				

- 2) Çocukken, büyüdüğünüz evde kimlerle yaşıyordunuz?

- 3) Lütfen aşağıdaki zaman dilimlerinde **SİZİ YETİŞTİRENLERİN** sizinle konuşurken hangi dili en çok kullandığını belirtiniz. Her zaman dilimi için sadece bir kutuya işaret koyunuz.

SİZ	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)
0-5 yaşındayken				
6-12 yaşındayken				
13-18 yaşındayken				
18+ yaşındayken				

- 4) Lütfen aşağıdaki zaman dilimlerinde **SİZDEN BÜYÜK KARDEŞLERİNİZİN** sizinle **konuşurken** hangi dili en çok kullandığını belirtiniz. Her zaman dilimi için sadece bir kutuya işaret koyunuz.

	1. abla/abinizin şu anki yaşı:				2. abla/abinizin şu anki yaşı:			
Sizin yaşıınız	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)
0-5								
6-12								
13-18								
18+								
	1. abla/abinizin şu anki yaşı:				2. abla/abinizin şu anki yaşı:			
Sizin yaşıınız	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)
0-5								
6-12								
13-18								
18+								

- 5) Lütfen aşağıdaki zaman dilimlerinde **SİZDEN KÜÇÜK KARDEŞLERİNİZİN sizinle konuşurken** hangi dili en çok kullandığını belirtiniz. Her zaman dilimi için sadece bir kutuya işaret koyunuz.

	Türkçe	Hollandaca	Türkçe ve Hollandaca eşit	Başka bir dil (belirtiniz)
1. kardeşinizin yaşı:				
2. kardeşinizin yaşı:				
3. kardeşinizin yaşı:				

- 6) Lütfen aşağıda listelenen yerlerde hangi dili ne sıklıkta kullandığınızı belirtecek rakamı işaretleyiniz. Her dil için sadece bir rakam seçiniz.

(1) Hiçbir zaman (2) Nadiren (3) Bazen (4) Sıklıkla (5) Her zaman

	Sadece Türkçe	Sadece Hollandaca	Türkçe ve Hollandaca karışık	Başka bir dil (belirtiniz)
evde	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
okulda	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
iş yerinde	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
mahallede	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
camide	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

- 7) Türkçe konuşmakta zorlandığınız durumlar var mı? **EVET HAYIR**

EVET ise, hangi durumlarda ve sebebi sizce ne?

- 8) Hiç Hollandaca kelime kullanmadan sadece Türkçe konuşmak zorunda kaldığınız durumlar var mı? **EVET HAYIR**

EVET ise, hangi durumlarda ve kimlerle?

9) Lütfen aşağıda listelenen kişilerle konuşurken hangi dili ne sıklıkta kullandığınızı belirtecek rakamı işaretleyiniz. Her dil için sadece bir rakam seçiniz.

s(1) Hiçbir zaman (2) Nadiren (3) Bazen (4) Sıklıkla (5) Her zaman

	Sadece Türkçe	Sadece Hollandaca	Türkçe ve Hollandaca karışık	Başka bir dil (belirtiniz)
annenizle	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
babanızla	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
sizden büyük kardeşlerinizle	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
sizden küçük kardeşlerinizle	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
partnerinizle (sevdiğiniz, eşiniz, vs.)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
çocuklarınızla	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Hollanda'daki akrabalarınızla (amcanız, kuzeniniz, vs.)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Hollandada'da yaşıyorsa eğer dede ve büyükannenizle	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Hollanda'daki Türkiye kökenli arkadaşlarınızla	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Hollanda'daki komşularınızla	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

10) Hollanda'da genel olarak daha çok Türk mü Hollandalı mı arkadaşınız var?

a) sadece Türk b) daha çok Türk c) eşit sayıda d) daha çok Hollandalı e) sadece Hollandalı

11) Lütfen aşağıda listelenen aktiviteleri yaparken hangi dili ne sıklıkta kullandığınızı belirtecek rakamı işaretleyiniz. Her dil için sadece bir rakam seçiniz.

(1) Hiçbir zaman (2) Nadiren (3) Bazen (4) Sıklıkla (5) Her zaman

	Sadece Türkçe	Sadece Hollandaca	Türkçe ve Hollandaca karışık	Başka bir dil (belirtiniz)
e-mail yazarken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Facebook/messenger	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
blog ya da forumlara yazarken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
whatsapp	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
günlük yazarken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
mektup yazarken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

	Türkçe	Hollandaca	Başka bir dil (belirtiniz)
gazete okurken (basılı ya da online)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
kitap okurken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
TV izlerken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
radyo dinlerken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
müzik dinlerken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
internette gezinirken	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

12) Konuşurken Türkçe ve Hollandaca arasında geçiş yapıyor musunuz?: **EVET HAYIR**

EVET ise ne sıklıkla?

kimlerle konuşurken?

neden? (mesela otomatik mi yoksa bir sebebi var mı?)

Aşağıdaki hangi örneklere benzer kullanımlarda bulunuyorsunuz?

para wisselen, aafsprak yapmak

Bugün Leyla'yla buluşacağız. We gaan naar de bioscoop.

C- Dil Yeterliliği

- 1) Lütfen aşağıdaki dillerdeki **GENEL** seviyenizi belirtecek rakamı işaretleyiniz. Her dil için sadece bir rakam seçiniz.

(1) anadil (2) anadil gibi (3) ileri düzeyde (4) orta düzeyde (5) başlangıç düzeyinde

Türkçe	1	2	3	4	5
Hollandaca	1	2	3	4	5
Başka bir dil (belirtiniz)	1	2	3	4	5

- 2) Lütfen aşağıdaki tablodan **EN İYİ ANLADIĞINIZ** dili seçiniz. Sadece bir tane dil seçiniz.

Türkçe	
Hollandaca	
Başka bir dil (belirtiniz)	

- 3) Lütfen aşağıdaki tablodaki diller konuşulduğunda her birini hangi seviyede **ANLADIĞINIZI** belirtecek rakamı işaret-leyiniz. Her dil için sadece bir rakam seçiniz.

(1) her şeyi (2) nerdeyse her şeyi (3) çoğu şeyi (4) bir kısmını (5) çok az kısmını

Türkçe	1	2	3	4	5
Hollandaca	1	2	3	4	5
Başka bir dil (belirtiniz)	1	2	3	4	5

- 4) Lütfen aşağıdaki tabloda **EN İYİ KONUŞTUĞUNUZ** dili seçiniz. Sadece bir tane dil seçiniz.

Türkçe	
Hollandaca	
Başka bir dil (belirtiniz)	

- 5) Lütfen aşağıdaki tablodaki dillerinden her birini hangi seviyede **KONUŞTUĞUNUZU** belirtecek rakamı işaret- leyiniz. Her dil için sadece bir rakam seçiniz.

(1) anadil (2) anadil gibi (3) ileri düzeyde (4) orta düzeyde (5) başlangıç düzeyinde

Türkçe	1	2	3	4	5
Hollandaca	1	2	3	4	5
Başka bir dil (belirtiniz)	1	2	3	4	5

- 6) Kendinizi konuşurken **EN** rahat hissettiğiniz dili seçiniz.

a) Türkçe b) Hollandaca c) Türkçe ve Hollandaca eşit derecede d)Başka bir dil (belirtiniz):

- 7) Aşağıdaki dil(ler)deki seviyenizden ne kadar memnun olduğunuzu belirtecek rakamı seçiniz.

(1) oldukça çok (2) çok (3) orta (4) az (5) hiç

Türkçe	1	2	3	4	5
Hollandaca	1	2	3	4	5
Başka bir dil (belirtiniz)	1	2	3	4	5

Herhangi bir dildeki seviyenizden memnun değilseniz lütfen sebebini belirtiniz.

D-Türkiye ile İletişim

- 1) Türkiye'yi ziyaret ediyor musunuz? **EVET HAYIR**

EVET ise, aşağı yukarı ne sıklıkla ziyaret ediyorsunuz? :

aşağı yukarı her gidişinizde ne kadar kılıyorsunuz? :

- 2) Lütfen aşağıdaki iletişim kanallarını kullanarak Türkiye'deki akrabalarınız/ arkadaşlarınızla ne sıklıkla iletişim kurduğunuzu belirtecek bir rakam işaretleyiniz.

(1) hiç bir zaman (2) birkaç ayda bir (3) ayda bir (4) haftada bir (5) neredeyse her gün

telefonda	1	2	3	4	5
video chat ile	1	2	3	4	5
e-mail ile	1	2	3	4	5
Facebook, msn messenger, Gtalk, etc.	1	2	3	4	5

- 3) **Türkiye'deki** akrabalarınız/ arkadaşlarınızla konuşurken ne derece rahat hissediyorsunuz?

(1) oldukça çok (2) çok (3) orta (4) az (5) hiç

- 4) Dil kullanımınızla ilgili eklemek istediğiniz herhangi bir şey var mı?

E - Çalışma Hakkında

Lütfen aşağıdaki soruları yanıtlayınız

- 1) Sizce çalışma ne hakkındaydı?

- 2) Zor bulduğunuz bir görev/ görevler var mı? **EVET** **HAYIR**

EVET ise hangisi seçiniz. Birden fazla seçenek işaretleyebilirsiniz.

- yeni öğrenciler için pratik bilgiler hazırlamak
- video anlatmak/ video hakkındaki sorulara cevap vermek
- ikilem hikayeleri ile ilgili konuşmak
- kitap/film/parti/gezi hakkında konuşmak

- 3) Zor bulduğunuz görev(ler) varsa lütfen nedenini belirtiniz.

- 4) Çalışmayı birlikte yaptığınız konuşma partnerinizi çalışma öncesinde tanıyor muydunuz?

EVET **HAYIR**

EVET ise ne kadar iyi tanıyordunuz?

F– Dominant El Kullanımı

Lütfen aşağıdaki aktiviteleri yaparken ağırlıklı olarak hangi elinizi kullandığınızı belirtiniz. Yalnızca bir kutuyu işaretleyiniz.

	sağ	sol	iki el eşit ağırlıkta
kalem ile yazı yazarken			
yemek yerken			
çatalı bıçakla birlikte kullanırken			
makas kullanırken			
mouse kullanırken			
bir şey fırlatırken			
resim çizerken			

B2. English Version

A - General Background

Please fill in the required information about **YOURSELF**.

- 1) Postal code:
- 2) E-mail:
- 3)

Age	Sex		Country of Birth	City of birth	Occupation	Highest level of schooling				
	F	M				None	Primary	Secondary	Vocational	University

4) Did you start school in the Netherlands? **YES** **NO**

If **NO**, where did you start schooling?

For how long did you continue your education in that country?

5) In which language did you follow/ are your following your studies?
 Have you ever lived abroad for more than 6 months? **YES** **NO**

If **YES**, where: for how long: for what reason:

6) Who are you living with in the Netherlands? (if applicable)

7) If you are not living with your parents/ caregivers, how often do you visit them?

8) Please fill in the required information about **PEOPLE WHO RAISED YOU**.

	Age	Country of birth	City of birth	Year of settlement in NL	Occupation	Highest level of schooling			
						None	Primary	Secondary	Higher
Mother									
Father									
Other (specify)									

B- Language Use

- 1) Which language did/ do **YOU** use the most in the following periods in your life? Choose only one box per period.

When you were...	Turkish	Dutch	Turkish & Dutch equal	Other (specify)
0-5 yrs old				
6-12 yrs old				
13-18 yrs old				
18+ yrs old				

- 2) With whom did you live when you were growing up?
-

- 3) Which language did/ do the **PEOPLE WHO RAISED YOU** speak to you the most in the following periods in your life? Choose only one box per period.

When you were...	Turkish	Dutch	Turkish & Dutch equal	Other (specify)
0-5 yrs old				
6-12 yrs old				
13-18 yrs old				
18+ yrs old				

4) Which language did/ do **YOUR OLDER SIBLING(S) (if applicable)** speak to you the most in the following periods in your life? Choose only one box per period.

When you were...	1. current age of your sibling				2. current age of your sibling			
	Turkish	Dutch	Turkish & Dutch equal	Other (specify)	Turkish	Dutch	Turkish & Dutch equal	Other (specify)
0-5 yrs old								
6-12 yrs old								
13-18 yrs old								
18+ yrs old								

5) Which language did/ do **YOUR YOUNGER SIBLING(S) (if applicable)** speak to you the most in the following periods in your life? Choose only one box per period.

When you were	3. current age of your sibling				4. current age of your sibling			
	Turkish	Dutch	Turkish & Dutch equal	Other (specify)	Turkish	Dutch	Turkish & Dutch equal	Other (specify)
0-5 yrs old								
6-12 yrs old								
13-18 yrs old								
18+ yrs old								

6) Please circle a number on the rating scale below to indicate how often you use the following languages in following contexts (when applicable). Mark only one number for each language.

(1)Never (2) Rarely (3) Sometimes (4) Frequently (5) All the time

	Dutch	Turkish	Mixing Turkish & Dutch	Other (specify)
At home	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
At school	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
At work	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
In your neighbourhood	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
In mosque	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

7) Are there situations in which you find it hard to speak Turkish? **YES** **NO**

If **YES**, can you describe who and what may be involved in those situations?

8) Are there situations you need to speak only Turkish without using any Dutch words?

YES **NO**

If **YES**, can you describe who and what may be involved in those situations?

9) Please circle a number on the rating scale below to indicate how often you use the following languages with the following people (when applicable). Mark only one number for each language.

(1) Never (2) Rarely (3) Sometimes (4) Frequently (5) All the time

	Dutch	Turkish	Mixing Turkish & Dutch	Other (specify)
with your mother	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your father	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your older siblings	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your younger siblings	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your partner	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
With your children	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with other family members in the Netherlands (uncle, cousin, etc.)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your grandparents (if they live in the Netherlands)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
with your friends from Turkish descent	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

10) In general, do you have more Turkish - or Dutch-speaking friends in the Netherlands?

a) only Turkish b) more Turkish c) equal d) more Dutch e) only Dutch

Appendices

11) Please circle a number on the rating scale below to indicate how often you use the following languages during the following activities (when applicable). Mark only one number for each language.

(1) Never (2) Rarely (3) Sometimes (4) Frequently (5) All the time

	Dutch	Turkish	Mixing Turkish & Dutch	Other (specify)
writing emails	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
Facebook/ messenger	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
writing a blog	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
WhatsApp	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
writing a diary	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
writing letters	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

	Dutch	Turkish	Other (specify)
reading the newspaper (hardcopy or online)	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
reading a book	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
watching TV	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
listening to the radio	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
listening to music	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5
internet surfing	1 2 3 4 5	1 2 3 4 5	1 2 3 4 5

12) Do you switch between Turkish and Dutch while speaking? **YES** **NO**

If **YES** how often?

while speaking with whom?

why? (is it more automatic or is there a reason for you to do it?)

Do you use expressions similar to the examples below?

para wisselen, aafsprak yapmak

Bugün Leyla'yla buluşacağız. We gaan naar de bioscoop.

C- Language Proficiency

1) Please circle a number on the rating scale below to indicate your **OVERALL** proficiency in the following language(s).

(1) native (2) near native (3) advanced (4) intermediate (5) basic

Turkish	1	2	3	4	5
Dutch	1	2	3	4	5
Other (specify)	1	2	3	4	5
Other (specify)	1	2	3	4	5

2) Please put a cross across the language you **UNDERSTAND BEST** in general. Choose only one language.

Turkish	
Dutch	
Other (specify)	
Other (specify)	

3) Please circle a number on the rating scale below to indicate the competency with which you can **CURRENTLY UNDERSTAND** each language.

(1) everything (2) almost everything (3) most parts (4) partially (5) rather little

Turkish	1	2	3	4	5
Dutch	1	2	3	4	5
Other (specify)	1	2	3	4	5
Other (specify)	1	2	3	4	5

Appendices

- 4) Please put a cross across the language you **SPEAK BEST** in general. Choose only one language.

Turkish	
Dutch	
Other (specify)	

- 5) Please circle a number on the rating scale below to indicate the competency with which you **CURRENTLY SPEAK** each language.

(1) native (2) near native (3) advanced (4) intermediate (5) basic

Turkish	1	2	3	4	5
Dutch	1	2	3	4	5
Other (specify)	1	2	3	4	5

- 6) Which language do you feel **MOST** comfortable speaking?

a) Turkish b) Dutch c) Turkish and Dutch equal c) other (specify):

- 7) How satisfied are you with the language(s) you speak?

(1) very satisfied (2) satisfied (3) neutral (4) dissatisfied (5) very dissatisfied

Turkish	1	2	3	4	5
Dutch	1	2	3	4	5
Other (specify)	1	2	3	4	5
Other (specify)	1	2	3	4	5

If you are not satisfied with any of your languages, please specify why.

D- Contact with Turkey

1) Do you travel to Turkey? **YES** **NO**

If **YES**, how often?

For how long on average?

Please circle a number on the rating scale below to indicate how often you contact your relatives/friends in Turkey on average via the following (when applicable)

1) never 2) once in a few months 3) once in a week 4) once a month 5) almost every day

on the phone	1	2	3	4	5
on video chat	1	2	3	4	5
by e-mail	1	2	3	4	5
by instant messaging (e.g. Facebook messenger, Gtalk, msn)	1	2	3	4	5

2) To what extent do you feel comfortable when speaking Turkish with your relatives/ friends **in Turkey?**

1) very comfortable 2) comfortable 3) neutral 4) uncomfortable 5) rather uncomfortable

Is there anything you want to add about your language use?

Appendices

E – About the Study

Please answer the questions below about the study

1) What do you think the study was about?

2) Was there a task/ tasks that you found difficult? **YES** **NO**

If **YES**, please choose which one(s).

preparing practical information for the new comer students

narration of the videos

narration of the dilemma stories

talking about a book/ a film from memory

3) If there are tasks that you found difficult, please explain why.

4) Had you already known your conversation partner before the study? **YES** **NO**

If **YES**, how well?

F- Handedness

Please indicate which hand do you use the most while performing the following activities?

	right	left	both equally often
writing with a pen			
eating			
using a knife while eating with fork			
using scissors			
using mouse			
throwing			
drawing			

Appendix C. Information about the bilingual speakers

Country of birth: All participants were born in the Netherlands.

Parents' country of birth: All participants' parents were born in Turkey.

Education level: Figure 1 shows the current education level of the participants as well as their parents. All participants in this study were students of university or higher professional education (applied university) in the Netherlands except one participant who graduated recently. Figure 1 shows that there is more variation in the education level of parents than of the bilingual participants, the fathers usually having completed a higher education level than the mothers.

Code-switching: All participants indicated that they do switch between Turkish and Dutch, the frequency being dependent on the topic and their interlocutors. Most participants indicated that they switch automatically while they are talking Turkish to people of Turkish descent without any apparent reason while some indicated they switch (from Turkish to Dutch) because it is sometimes easier to retrieve words in Dutch. 8 participants indicated that they switch between the two languages across sentences, e.g., (Turkish) *Bugün Leyla'yla buluşacağız*. 'Today we are going to meet Leyla'. (Dutch) *We gaan naar de bioscoop*. 'We are going to the cinema'. 5 participants indicated they switch within the same phrase e.g. *para wisselen* [money (turkish) to exchange (dutch)] 'to exchange money' and *aafsprak yapmak* [meeting (dutch) to do (turkish)] 'to set a meeting'. 7 participants indicated they do both.

Language use: Speakers rated their language use at home, at work, and at school on a 5-point scale (1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = all the time). Based on those scores, Figure 2 shows the mostly spoken language in each context. Note that the participants with the label 'mostly Turkish' and 'mostly Dutch' have also reported mixing the two languages to some extent. The figure illustrates that there is more variation in the language use patterns of participants at home compared

to work where they speak only Dutch and compared to school where they mostly speak Dutch and to some extent Turkish.

Participants also rated their language use with different interlocutors. As Figure 3 illustrates, a general trend was that while participants reported speaking Turkish often with their parents, they reported to mostly mix Turkish and Dutch with their siblings.

Language that parents and siblings use with the participants: As Figure 4 shows that most participants' parents use either Turkish with them or they use both Turkish and Dutch. There was only one speaker who indicated their parents speak only Dutch with her. On the other hand, both older and younger siblings speak either both Turkish and Dutch or only Dutch while none of the participants reported that their siblings talk only Turkish to them.

Contact with family and friends in Turkey: Except for three participants, all participants reported to have contact with their family and friends in Turkey either via mobile calls or online chats at least once a week.

Visits to Turkey: All participants reported to visit Turkey regularly although the frequency of visits vary between twice a year ($N = 3$), once a year ($N = 10$) and once in two years ($N = 7$). As for the duration of stays, most participants reported to stay three to four weeks per visit ($N = 13$), some reported to stay more than four weeks ($N = 5$) and the rest less than three weeks.

Language use during various daily activities: All participants rated various writing activities. As Figure 5 shows, participants reported to write and read mostly in Dutch. On the other hand, they reported to watch Turkish TV often.

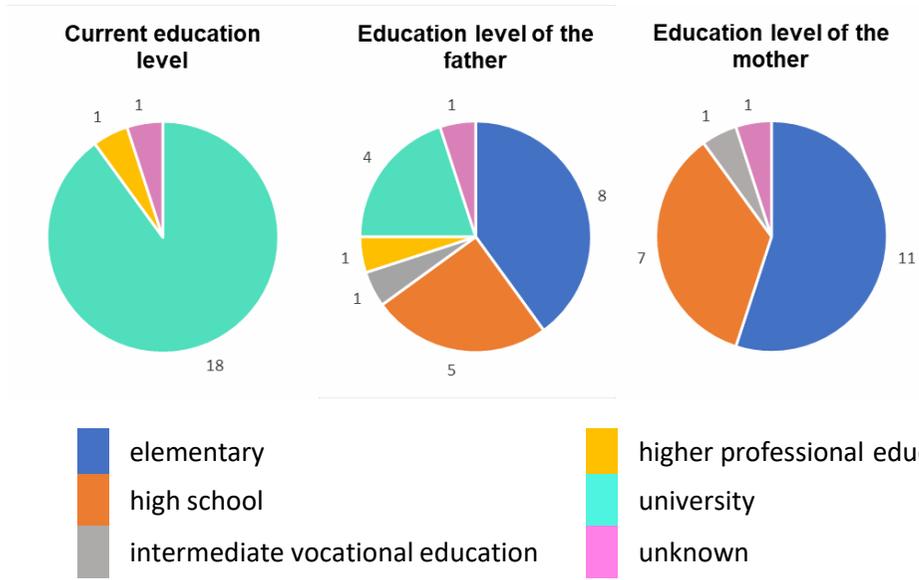


Figure 1. Current education levels of the participants and highest achieved education level of their parents. The numbers in the graphs represent the number of participants, with a total number of 20.

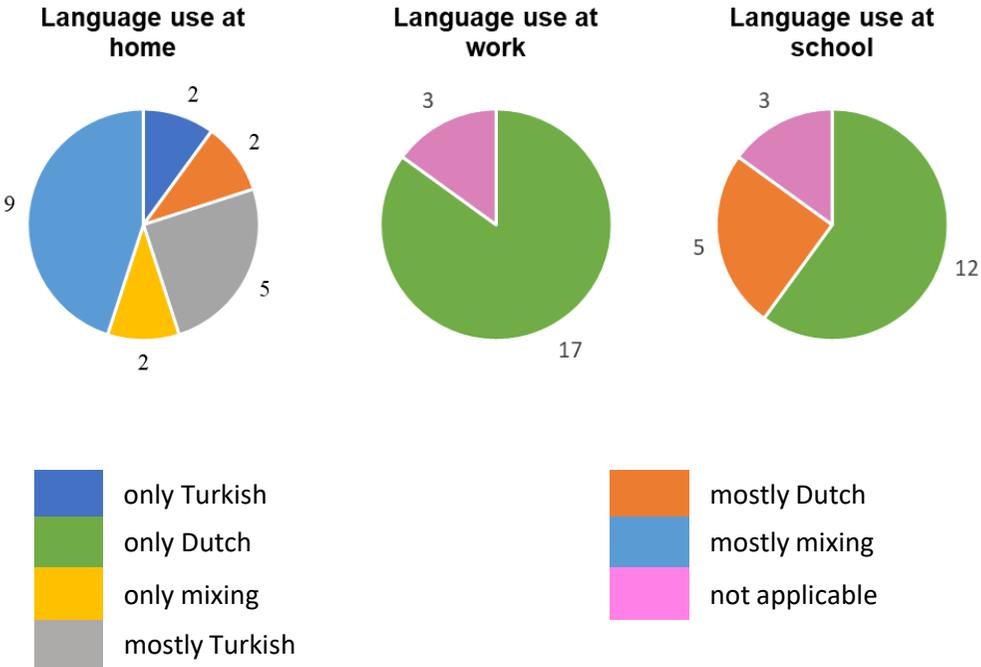


Figure 2. Language use at home, at work and at school. The numbers in the graphs represent the number of participants, with a total number of 20.

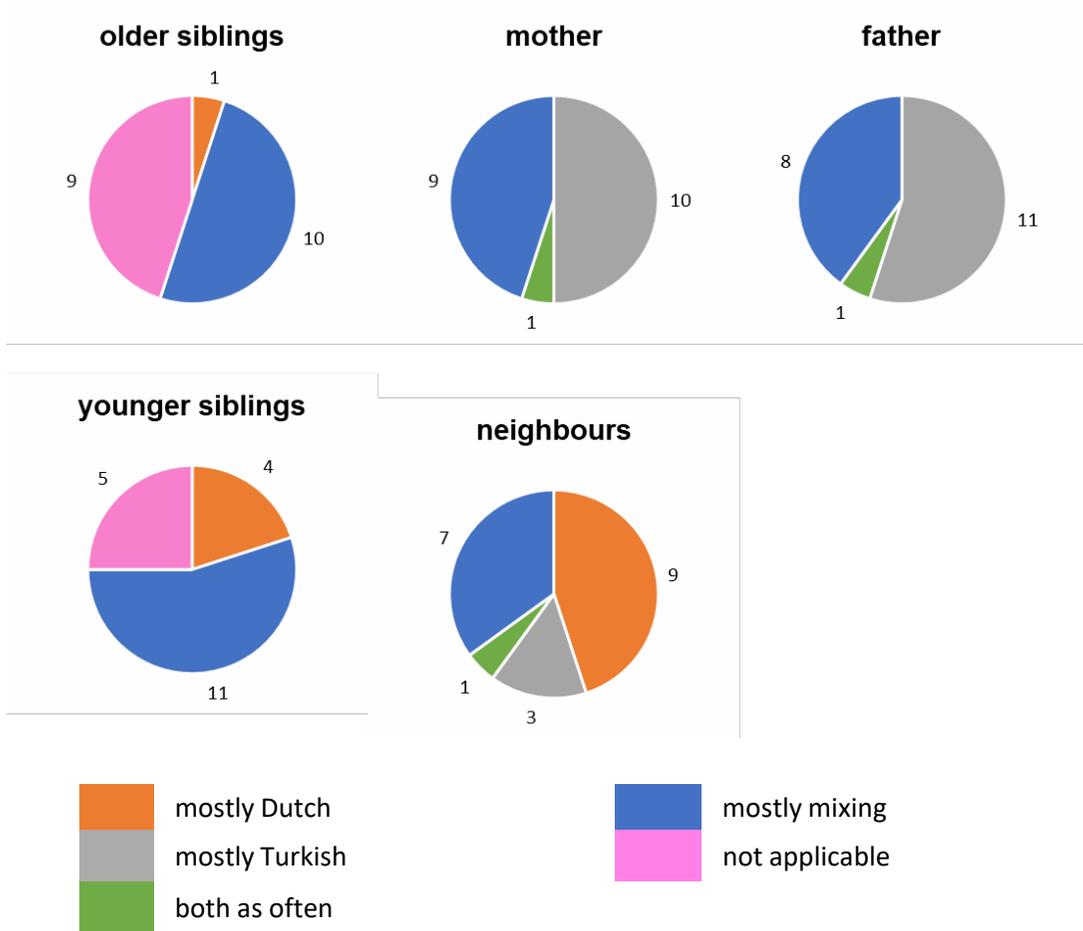


Figure 3. Language use by parents, older and younger siblings during their interactions with the bilingual speakers (as reported by the bilingual speakers). The numbers in the graphs represent the number of participants, with a total number of 20.

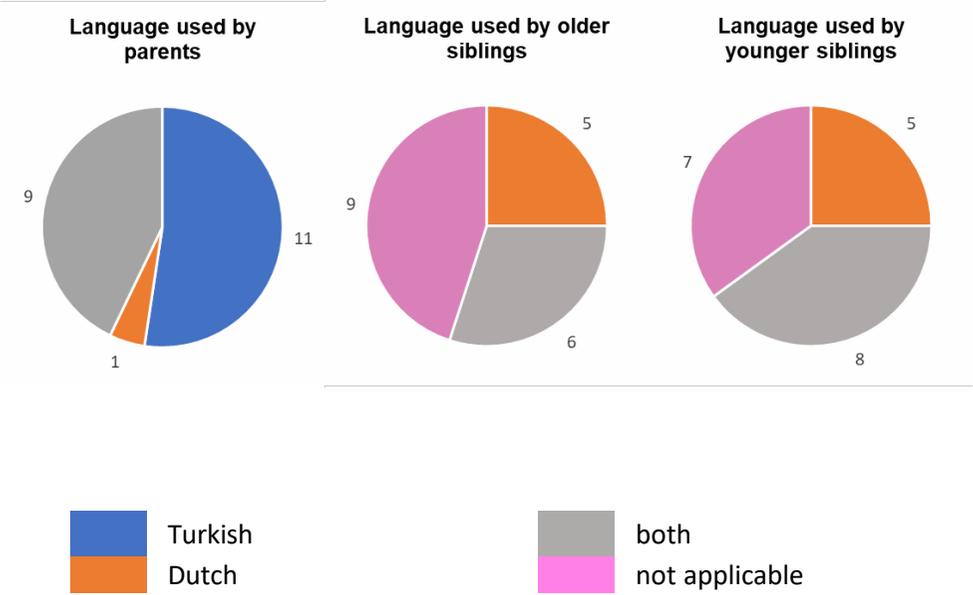


Figure 4. Language use by parents, older and younger siblings during their interactions with the bilingual speakers (as reported by the bilingual speakers). The numbers in the graphs represent the number of participants, with a total number of 20.

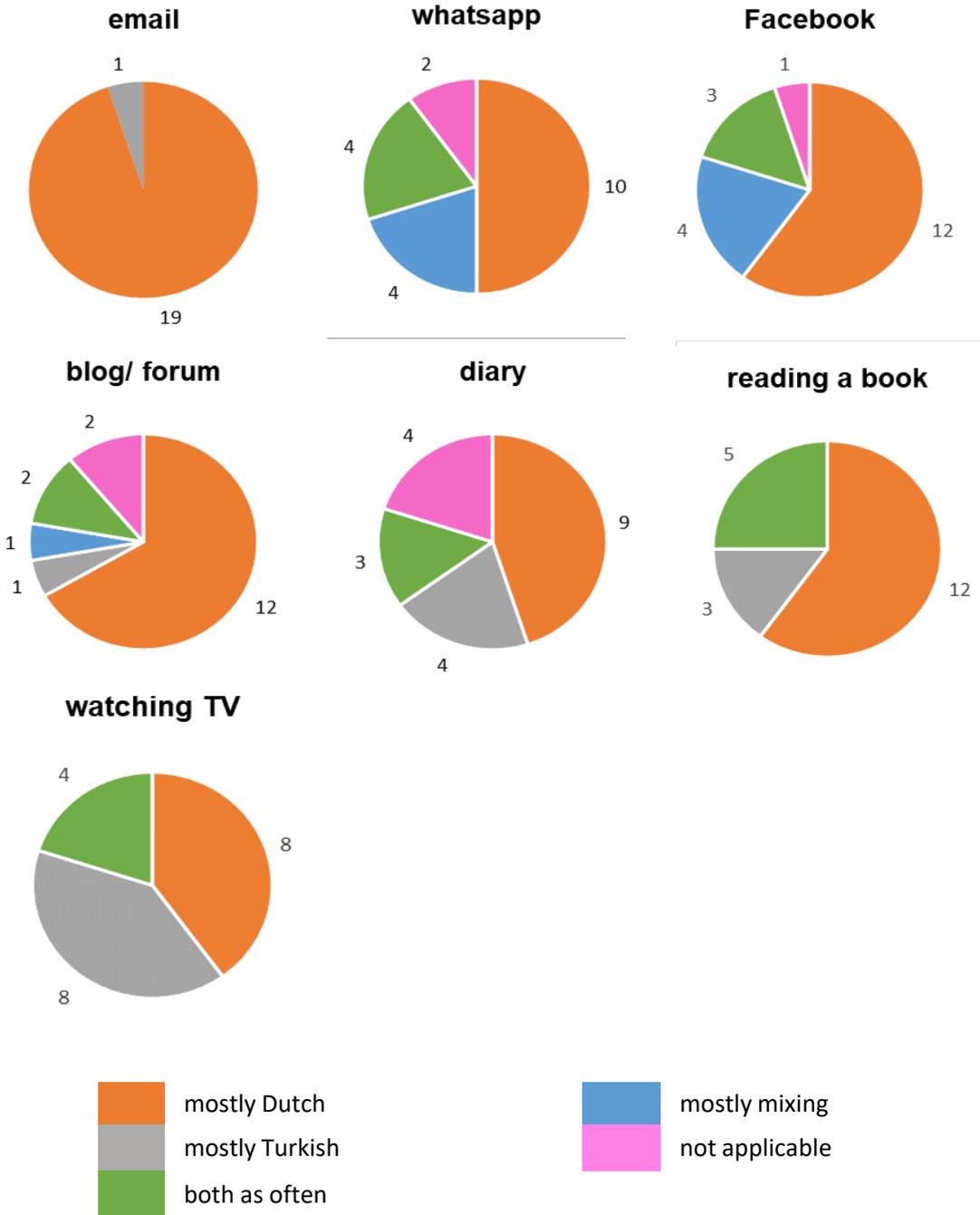


Figure 5. Language use during various daily activities.

Appendix D. List of events in the stimulus videos

D1. Kitchen video

Characters in the video:

Woman sitting at the table, closer to the camera (W1)

Woman sitting at the table away from the camera (W2)

Woman standing and cooking to the right (W3)

Table A1. *Events/ states in the kitchen video*

1	W1 and W2 are sitting at a table.
2	W1 is slicing tomatoes.
3	W2 is slicing broccoli.
4	W3 is standing/ cooking in front of a stove.
5	W2 is putting the vegetables in a bowl.
6	W2 is now slicing mushrooms.
7	W1 is putting the tomatoes in a bowl.
8	W1 is now slicing a squash.
9	W3 is turning around.
10	W3 is pointing at the sliced vegetables.
11	W2 is passing the bowl to W3/ W3 takes the bowl.
12	W1 is now trying to open a jar.
13	W1 cannot open the jar.
14	W1 is passing the jar to W2/ W2 takes the jar.
15	W2 is trying to open the jar.
16	W2 is passing it back to W1/ W1 takes the jar.
17	W1 is trying to open the jar.
18	W1 cannot open the jar.
19	W1 is passing it to W2/ W2 takes the jar.
20	W2 is trying to open the jar.
21	W3 is turning around.
22	W3 is taking the jar.
23	W3 is opening the jar.
24	W3 is giving the jar to W1/ W1 takes the jar.

D2. Office video

Characters in the video:

The woman working at a computer away from the camera (W1)

The man sitting at a desk to the left (M)

The woman sitting at the desk to the right (W2)

Table A2. *Events/ states in the office video*

1	W1 and M are sitting in an office.
2	W1 is typing behind a computer.
3	M is sorting sheets of paper.
4	W2 enters the room.
5	M and W1 wave at W2
6	W2 is pulling a chair next to M.
7	W2 is sitting next to M.
8	W2 starts helping M with sorting.
9	W1 is receiving a text.
10	W1 is picking up her phone.
11	W1 is typing on her phone.
12	M and W2 are looking at W1.
13	M and W2 are shrugging their shoulder.
14	W2 is standing up.
15	W2 is pushing her chair back.
16	W2 is walking to the bookshelf.
17	W2 is looking through the bookshelf.
18	M is taking all the sheets.
19	M is walking to the bookshelf.
20	M is looking for a book through the bookshelf.
21	M drops the sheets/ the sheets scatter.
22	W1 is standing up / W1 helps with the sheets.
23	W1, M, W2 are picking up the sheets.
24	W1, M are giving the sheets to W2.
25	W2 is leaving the room.
26	M is picking a book from the shelf.
27	M is paging through it.
28	<u>W1 is going back to working behind the computer.</u>

Appendix E. Examples of NP types that occurred in the data

Type of Noun Phrase	Example from the data (<i>Turkish; Dutch</i> 'English')
bare noun	<i>anne; moeder</i> 'mother'
demonstrative + noun	<i>o kız; dat meisje</i> 'that girl'
heavy modifier + noun	<i>yemek yapan kadın; de vrouw die aan het koken is</i> 'the woman who is cooking'
simple modifier + noun	<i>iki kadın; twee vrouwen</i> 'two women'
definite noun	<i>annesi</i> '(her) mother'; <i>de moeder</i> 'the mother'
heavy modifier without head noun	<i>masada oturan (kadınlar); degenen die aan het tafel zitten</i> '(the women) who are sitting at the table'
simple modifier without head noun	<i>ikisi; twee ervan</i> 'two (of them)'
demonstrative + heavy modifier + noun	<i>o yemek yapan kadın; die vrouw die aan het koken is</i> 'that woman who is cooking'

Nederlandse Samenvatting

In deze dissertatie wordt de invloed onderzocht van taalcontact op het taalgebruik van tweede-generatie sprekers van het Turks in Nederland. De focus ligt op hoe sprekers verwijzen naar personen ('reference tracking'), in zowel het Turks als het Nederlands. Tweektalige sprekers worden daarbij vergeleken met ééntaligen in beide talen. Verwijzing gebeurt met zowel woord als gebaar: in deze studie wordt een multimodaal perspectief ingenomen, en wordt gekeken naar zowel de spraak die mensen produceren als de gebaren die ze hun spraak laten vergezellen.

Als we in ons taalgebruik naar andere personen verwijzen moeten we aangeven wie wat doet of heeft gedaan, en goed oppassen welke woorden we gebruiken om te zorgen dat gesprekspartners deze verwijzingen juist interpreteren. Taalgebruikers variëren de semantische precisie van de 'referentiële uitdrukkingen' (RU's) die ze kiezen (Ariel, 1990; Givón, 1976). Ze introduceren een person bijvoorbeeld met een semantisch relatief rijke RU, zoals 'een kind', maar gebruiken in het vervolg van het gesprek een semantisch gezien meer gereduceerde vorm om naar dezelfde persoon te verwijzen, bijvoorbeeld 'ze'. Een referent die voor het eerst benoemd wordt is namelijk cognitief minder actief voor de gesprekspartner en dan is meer semantische informatie nodig. Wanneer vervolgens steeds weer naar dezelfde referent wordt verwezen, is het voldoende om gereduceerde vormen te gebruiken, zoals voornaamwoorden. In sommige talen, waaronder het Turks, kan een verwijzing zelfs helemaal achterwege blijven. Dit is mogelijk omdat er al actieve representaties voor deze referenten zijn in de hoofden van de gesprekspartners.

Hoewel deze patronen voor alle talen lijken te gelden (Aksu-Koç & Nicolopoulou, 2015; Arnold, 2010; Contamori & Dussias, 2016; Debreslioska & Gullberg, 2019; Hickmann & Hendriks; 1999; Hendriks, Koster & Hoeks, 2014; Perniss & Özyürek, 2015) zijn er ook cross-linguïstische verschillen in hoe sprekers met deze verwijzingen omgaan. Het Turks en het Nederlands verschillen in i) of ze 'nulverwijzingen' toestaan en ii) of hun voornaamwoorden een pragmatische functie

vervullen. Met dit laatste wordt bedoeld dat een voornaamwoord, in tegenstelling tot een nulverwijzing, gebruikt wordt om nadruk uit te drukken, of op de een of andere manier een contrast met het voorgaande.

Sprekers gebruiken over het algemeen meer gebaren en andere vormen van non-verbale communicatie bij referenten die minder actief worden geacht in het hoofd van de gesprekspartners (Levy & Fowler, 2000; Levy & McNeill, 1992; Debreslioska, Özyürek, Gullberg, & Perniss, 2013; Perniss & Özyürek, 2015). Deze gebaren zijn ook gevoelig voor de semantische precisie van de RU's waar ze mee samengaan: sprekers gebaren meer met vollere RU's, zoals naamwoorden, dan met kortere vormen, zoals voornaamwoorden.

De tweetalige participanten in deze studie zijn allemaal geboren en getogen in Nederland, met ouders van de eerste generatie Turkse immigranten. In het algemeen kenmerkt de Turkse gemeenschap in Nederland zich door een hoge mate van taalbehoud (Backus, 2012). De participanten hebben allemaal een relatief hoge taalvaardigheid in zowel de meerderheidstaal Nederlands als de minderheidstaal Turks, en gebruiken beide talen dagelijks. Ze geven aan dat er geen duidelijke asymmetrie is tussen een sterke en een zwakke taal. Volgens hun zelfrapportages spreken ze voornamelijk Nederlands op school en thuis met hun ouders, terwijl ze hun talen vaak door elkaar mengen wanneer ze met hun vrienden praten. Ze zijn opgegroeid met beide talen en hebben ze allebei hun hele leven lang gebruikt. Aangenomen mag worden dat ze ook voldoende gelegenheid hebben gehad om de taal-specifieke conventies te leren wat betreft de frequentie en het type gebaren. Als tweetalige sprekers veel ervaring hebben met het uit elkaar houden van hun talen, zoals geldt voor deze sprekers in hun levenservaring maar ook in de specifieke experimentele context van dit onderzoek, mag verwacht worden dat de taal-specifieke conventies behouden blijven.

Deze dissertatie bevat vier empirische hoofdstukken, die allemaal een ander aspect belichten van hoe tweetalige sprekers hun RU's gebruiken, in vergelijking

met eentalige sprekers. Alle hoofdstukken zijn gebaseerd op dezelfde dataset. Participanten werd gevraagd om te vertellen wat er gebeurde in twee korte videofragmenten die ze net hadden bekeken en waarin steeds drie personen alledaagse activiteiten uitvoerden. Wat dit proefschrift bijdraagt is een studie van de wederzijdse invloed van beide talen van de tweetalige sprekers, mogelijk gemaakt door de hoge taalvaardigheid in allebei de talen, en daarnaast is het de eerste studie die tegelijk hiermee ook de met spraak samengaande gebaren onderzoekt in het kader van taalcontact.

Hoofdstuk 2. Turkish-Dutch bilinguals maintain language-specific reference tracking strategies in speech in elicited narratives

Hoofdstuk 2 onderzoekt of tweetalige sprekers op taal-specifieke manieren verwijzen in het Nederlands en het Turks, en of er aanwijzingen zijn voor invloed van de ene taal op de andere. Dit wordt nagegaan voor verwijzingen naar de derde persoon met de grammaticale functie van onderwerp, en nog zonder aandacht te schenken aan gebaren. De RU's kunnen naamwoorden, voornaamwoorden of nulverwijzingen zijn. De analyses kijken ook naar de zogenaamde discourse status van de referenten, d.w.z. of een referent opnieuw geïntroduceerd wordt of ook al deel was van de vorige uiting, en naar de pragmatische context, d.w.z. of de referent nadruk kreeg of een contrastieve functie had in de zin. Dit zijn factoren waarvan verwacht mag worden dat ze invloed hebben op de keuze van RU.

Wat betreft het Turks laten de data zien dat de tweetalige sprekers niet verschilden van hun eentalige vergelijkingsgroep. Ze gebruiken naamwoorden voornamelijk voor herintroductie, en nulverwijzingen voor gecontinueerde verwijzing. Tweetaligen en eentaligen gebruikten de voornaamwoorden ook op dezelfde manier. Deze uitkomsten wijken enigszins af van wat eerder is gevonden in de meeste studies van zogenaamde 'heritage speakers', d.w.z. sprekers van minderheidstalen in gemeenschappen waarin die minderheidstaal langzaam maar zeker terrein verliest aan de meerderheidstaal. Als zulke talen nulverwijzingen

toestaan en in contact staan met een taal als het Engels (of Nederlands) waarin dat niet kan, dan is het vaak zo dat deze sprekers meer voornaamwoorden gebruiken (Albirini et al., 2011; Koban Koç, 2016) of meer dan eentaligen gebruiken in pragmatisch neutrale contexten (Flores-Ferrán, 2004; Montrul, 2004; Silva-Corvalán, 1994). Turks-Nederlandse tweetaligen verschilden ook niet van de vergelijkingsgroep in het Nederlands wat betreft hun gebruik van voornaamwoorden met en zonder nadruk (d.w.z. ‘zij’ versus ‘ze’), in de verschillende pragmatische contexten en of het nu om herintroductie of continuering van onderwerpen ging.

Hoofdstuk 3. General- and Language-Specific Factors Influence Reference Tracking in Speech and Gesture in Monolingual Turkish Discourse

In hoofdstuk 3 verschuift het perspectief naar multimodaliteit. Onderzocht wordt hoe multimodale verwijzing naar subject-referenten werkt in een taal die nulverwijzingen heeft (een taal met ‘pro-drop’), en in het bijzonder of eentalige sprekers van het Turks universele of taal-specifieke principes volgen in het gebruik van RU’s en de gebaren die ermee gepaard gaan. Het hoofdstuk gaat eerst gedetailleerd in op talige verwijzing, wederom in relatie tot de discourse status (mate waarin de referent als actief mag worden verondersteld in het hoofd van de gesprekspartner) en de pragmatische functie. Vervolgens worden de gebaren geanalyseerd die de sprekers in deze contexten produceerden.

In hun keuzes voor RU’s toonden de sprekers zich, zoals verwacht, gevoelig voor de discourse status van referenten. Voor gecontinueerde verwijzing (referenten met hoge verwachte activatiegraad in het hoofd van de gesprekspartner) hadden ze een voorkeur voor nulverwijzingen, terwijl naamwoorden en voornaamwoorden meer gebruikt worden voor herintroductie van referenten (waar de activatiegraad lager zou moeten zijn). De associatie van voornaamwoorden met discourse status was echter niet bijzonder sterk. Dit staat in schril contrast met talen die normaliter geen nulverwijzingen toestaan (‘non-pro-drop’-talen), waar voornaamwoorden de meest gebruikte vorm zijn om te verwijzen naar gecontinueerde referenten. Ze

worden wel gebruikt om pragmatische informatie te markeren, bevestigend wat over het algemeen wordt beweerd over het Turks en andere talen met nulverwijzing.

De gebaren die de sprekers produceerden werden beïnvloed door zowel de discourse status (d.w.z. mate van mentale activatie) als de semantische precisie van de RU's die ze vergezelden. Dit bevestigt eerdere bevindingen van onderzoek naar multimodale verwijzing, maar deze studies bestudeerden talen zonder nulverwijzing (Debreslioska & Gullberg, 2019; Gullberg, 2006; Levy & McNeill, 1992; Perniss & Özyürek, 2015). In het Turks lieten sprekers subjectsreferenten vaker van gebaren vergezeld gaan als die referenten herintroduceerd werden dan wanneer ze gecontinueerd werden. Ze gebaarden ook vaker bij naamwoorden dan bij voornaamwoorden. Er was echter ook een patroon dat specifiek was voor het Turks: gebaren werden vaak gebruikt bij voornaamwoorden in contexten waarin de activatiegraad als laag mocht worden verondersteld (51%): veel vaker dan eerder is gevonden voor soortgelijke verwijzingen bij voornaamwoorden in talen waarin nulverwijzingen geen optie is ('non-pro-drop talen'; bv. 15% in het Duits, Perniss & Özyürek, 2015, een getal dat lijkt op wat we zelf vonden voor het Nederlands in hoofdstuk 5).

Het is mogelijk dat sprekers van zulke non-pro-drop talen meestal afzien van het gebruik van gebaren bij voornaamwoorden omdat voornaamwoorden in zulke talen altijd markeerders zijn van hoge activatiewaarde, en dus niet gauw met gebaren zullen samengaan. Voor het Turks geldt dit echter niet, omdat hoge activatiewaarden in eerste instantie met nulverwijzingen worden geassocieerd, niet met voornaamwoorden. Voornaamwoorden zullen dus vaker worden vergezeld door gebaren dan in talen zonder nulverwijzingen. Het is ook mogelijk dat sprekers van het Turks gebaren inzetten om ambiguïteit te vermijden: bij de herintroductie van een onderwerp zijn voornaamwoorden weinig precies wat betreft de referent waar ze naar verwijzen. Ateş en Küntay (2018) vonden soortgelijke resultaten bij Turks-sprekende kinderen.

Tenslotte werd in dit hoofdstuk ook nog bekeken of de pragmatische context invloed uitoefent op de mate waarin sprekers hun voornaamwoorden vergezeld laten gaan van gebaren. Het bleek niet uit te maken of de voornaamwoorden pragmatische functies vervulden, zoals het markeren van contrast, of dat ze dit niet deden. Hoewel het gebruik van voornaamwoorden versus nulverwijzingen werd gemoduleerd door het al dan niet vervullen van pragmatische functies, was het al dan niet gebruiken van gebaren hier niet gevoelig voor.

De resultaten in hoofdstuk 3 laten zien dat zowel universele als taal-specifieke factoren van invloed zijn op het al of niet gebruiken van gebaren samen met verwijswaarden. Dit ondersteunt de bevindingen van eerder onderzoek naar multimodaliteit bij het verwijzen naar referenten in taal dat de discourse status van de referent en de semantische precisie van de RU zelf van invloed zijn op het gebruik van gebaren die de gesprekspartner helpen om bij te houden naar wie verwezen wordt. In dit hoofdstuk zagen we tevens dat hoewel de discourse status een universele factor is die waarschijnlijk in alle talen mede de keuze bepaalt tussen meer precieze of meer vage RU's, de reikwijdte van het effect en de subtielere details cross-linguïstische variatie vertonen.

Hoofdstuk 4. Language contact does not drive transfer of gesture rate

In het vierde hoofdstuk staat de vraag centraal of, en zo ja hoe, taalcontact invloed kan uitoefenen op de mate waarin mensen gebaren gebruiken. De specifieke vragen waren of de frequentie waarmee sprekers gebaren gebruiken een verandering ondergaat als een taal waarin relatief veel met gebaren wordt gewerkt (dat geldt voor de minderheidstaal Turks) in contact staat met een taal waarin relatief weinig van gebaren gebruik wordt gemaakt (de meerderheidstaal Nederlands is zo'n taal), en of dit soort transfer eerder te verwachten is bij iconische dan bij deiktische gebaren. Dit zijn de twee meest gebruikte gebaren in narratieve taken zoals onze participanten ze uitvoerden, en zijn meer in het algemeen ook de meest bestudeerde soorten gebaren. In dit hoofdstuk wordt een eerste systematische analyse gepresenteerd van het

gebruik van deze gebaren door volwassen tweetalige sprekers van een minderheidstaal in vergelijking met eentalige sprekers van beide talen.

In het algemeen bleken eentalige sprekers van het Turks veelvuldiger gebaren te gebruiken dan eentalige sprekers van het Nederlands, en dit patroon vonden we ook terug in de Turkse en Nederlandse data van de tweetalige participanten.

De analyses voor de twee soorten gebaren lieten echter wel specifieke patronen zien bij de tweetaligen. Terwijl tweetaligen niet verschilden van eentaligen wat betreft de frequentie van iconische gebaren gebruikten ze deiktische gebaren vaker dan eentaligen, in beide talen. Mogelijk is het zo dat het maken van deiktische gebaren tweetalige sprekers helpt bij het reduceren van de cognitieve inspanning die nodig is om hun narratief te structureren (Gullberg, 1998; 2006) en de informatie die ze moeten weergeven gemakkelijker te verpakken: door personages, objecten en handelingen ruimtelijk te lokaliseren ('gesture space'; Nicoladis, 2006, 2007) worden ze 'ge-externaliseerd'.

De resultaten suggereren dat wanneer een minderheidstaal in contact komt met een meerderheidstaal die andere conventies heeft wat betreft de frequentie waarmee gebruik wordt gemaakt van gebaren, dit niet noodzakelijkerwijs tot de overname ('transfer') leidt van de patronen van de ene taal door de andere taal. Er was in ieder geval niets dat er op wees dat de hoge frequentie van gebaren in het Turks door tweetaligen werd afgezwakt onder invloed van het Nederlands, ondanks het feit dat de Turks-sprekers hun leven lang omringd zijn geweest door sprekers van het Nederlands. Het lijkt eerder zo te zijn dat tenminste als een taal vaak gebruikt wordt en de taalvaardigheid in die taal hoog is, taal-specifieke conventies behouden blijven, althans wat betreft iconische gebaren. Een andere factor die soms gelinkt wordt aan tweetalig zijn, namelijk de cognitieve inspanning die vereist is om een van de talen te onderdrukken wanneer de context daarom vraagt (zoals in de taken die de participanten uitvoerden), lijkt te leiden tot een verhoogd gebruik van deiktische gebaren.

Hoofdstuk 5. Reference tracking strategies in gesture remain language-specific in language contact

In hoofdstuk 5 werd de studie van gebaren ingeperkt tot alleen die gebaren die werden gebruikt samen met woorden die naar subject-referenten verwezen. Onderzocht werd i) of er cross-linguïstische verschillen zijn tussen het Turks en het Nederlands wat betreft multimodale verwijzing, en ii) of taalcontact deze verwijzingen beïnvloedt in de output van tweetaligen.

Het hoofdstuk bouwt voort op de bevinding uit hoofdstuk 2 dat tweetaligen in hun talige output de taal-specifieke manieren van verwijzing in het Turks en in het Nederlands hebben behouden. In hoofdstuk 5 wordt nagegaan of dit ook geldt voor de gebaren die samengaan met deze talige verwijzingen. Er wordt ook voortborduurd op hoofdstuk 3, waar het gebruik onderzocht werd van gebaren in het Turks van eentaligen; in hoofdstuk 5 wordt dit uitgebreid naar het Nederlands van eentaligen en naar het Turks en het Nederlands van tweetalige sprekers.

In hoofdstuk 5 zagen we dat er een soortgelijke invloed van discourse status (d.w.z. de mate waarin een representatie van de referent als actief mag worden verondersteld in het hoofd van de spreker) was op het wel of niet gebruiken van gebaren in de Turkse en Nederlandse data van eentalige sprekers, en die van tweetalige sprekers in beide talen. Herintroductie van referenten gaat vaker gepaard met gebaren dan continuering van referenten, ook wanneer de taal in kwestie een minderheidstaal is.

Er was een verschil tussen de twee talen wat betreft de invloed van de semantische precisie van de RU op het gebruik van gebaren bij verwijzingen naar herintroduceerde referenten. In deze met lage activatiewaarde geassocieerde discourse context had het type RU dat gebruikt werd invloed op de gebaren die samen met de RU werden gebruikt in het Nederlands, maar niet in het Turks. In het Nederlands werden voornaamwoorden minder vaak door gebaren vergezeld dan naamwoorden, een algemeen patroon dat vaker gevonden is in talen zonder

nulverwijzing, dus in talen zonder ‘pro-drop’ (bv in het Duits; Perniss & Özyürek, 2015). Aan de andere kant was het voor het Turks zo dat in deze herintroductiecontexten naamwoorden en voornaamwoorden even vaak samengingen met gebaren (zoals we al zagen in hoofdstuk 3). In deze context werden voornaamwoorden ook vaker door gebaren vergezeld in het Turks dan in het Nederlands. Ook de tweetalige sprekers lieten deze verschillen zien tussen hun Turk en hun Nederlands.

De verschillen tussen het Turks en het Nederlands zoals we die vonden bij zowel de eentalige als tweetalige sprekers en tussen de Turkse en Nederlandse data van de tweetaligen wat betreft de discourse context ‘herintroductie van een referent’ suggereren dat voornaamwoorden niet echt dezelfde status hebben in de twee talen, en dit zal te maken hebben met het feit dat nulverwijzing wel mogelijk is in het Turks (‘pro-drop’) en niet in het Nederlands (‘non-pro-drop’). Aangezien dit geldt voor zowel woord als gebaar lijkt dit het idee te ondersteunen dat er multimodale constructies zijn die per taal verschillen en die stabiel genoeg zijn dat tweetalige sprekers ze per taal behouden, ondanks hun tweetaligheid. In de hier gerapporteerde data ondergingen ze geen door contact veroorzaakte veranderingen.

Conclusie

In deze dissertatie wordt de conclusie getrokken dat tweetalige sprekers die hun twee talen allebei veelvuldig gebruiken en die een hoge taalvaardigheid hebben in beide talen op dezelfde manier verwijzen naar referenten die als onderwerp van een zin fungeren als eentalige sprekers. Taalcontact lijkt althans in dit domein van de grammatica hun taalproductie niet of nauwelijks te beïnvloeden. Deze conclusie kan worden getrokken voor zowel talige verwijzing (met naamwoorden, voornaamwoorden of nulverwijzing) als voor de gebaren die samen met de talige middelen worden geproduceerd, dus voor zowel de gesproken als de visuele modaliteiten.

Acknowledgements

Bringing this thesis to life had been a long journey and it is still a little surreal that I finally get to write the “acknowledgements”.

Several people have contributed to the making of this thesis over the years, either in the academic sense, or with the moral support they were generous enough to lend me.

Above all, I would like to thank my supervisors, Prof. Aslı Özyürek and Prof. Ad Backus for their guidance and generous support.

Aslı, thank you for your enthusiasm when I first expressed my interest in studying bilingualism and gestures, and for believing in me every step of the way since then. Thank you for being always available, and for your critical evaluation of my work. Your support and input have been crucial for the successful completion of this project. Apart from being academically inspiring, working with you have been great fun, especially our meetings - and not only because you fed me delicious food during those meetings. I would also like to acknowledge your efforts in maintaining an academically highly successful research group, but also for bringing us members together socially, hosting gatherings whenever there was a good enough reason.

Ad, thank you for being an amazing supervisor! Your expertise in bilingualism, comments and feedback on my ideas and drafts were vital for this project. I have learned a lot from you over the years; would you be surprised if I said the most entrenched of those is entrenchment? Besides your academic support, thank you for putting my wellbeing above getting the job done or publishing papers. I deeply appreciate your regular reminders that it was okay not to perform well at times, and your encouragement to give myself time whenever I needed. Working with you was such a pleasure, and I am grateful that over the years we have also become friends.

Several people helped the execution of this project in different ways. Dr. Linda Drijvers, Dr. Emiel van den Hoven and Dr. Beyza Sümer acted in the stimulus videos, Renkse Schilte and Dr. David Peeters transcribed the Dutch data. Dr. Ayşe Caner and Dr. Nihan Ketrez, thank you for providing the location and participants for data collection in Istanbul, Turkey, and Aslı Özkul and Şifa Karaman for the accommodation. I would also like to acknowledge the assistance of the secretaries, administration, and technical groups of both the MPI and Radboud University – the Center for Language Studies, including the CLS lab manager Margret van Beuningen and the late Nick Wood. The support from IMPRS by Els den Os, Dirkje van der Aa and Kevin Lam is also gratefully acknowledged. Finally, I thank my participants for their time and patience.

I am grateful for having had the opportunity to work among brilliant members of the Multimodal Language and Cognition Lab over the years. All previous and current members with whom I had the pleasure to work, thank you for your constructive and insightful feedback on earlier versions of the work reported in this thesis. And Hükümran Sümer, thanks for supporting our lab in various ways over the years; working with you, as well as the times we spent socially has been great fun.

I sincerely thank the manuscript committee, Prof. Pieter Muysken, Prof. Marianne Gullberg, Prof. Aylin Küntay, Prof. Pamela Perniss, and Prof. Jeanine Treffers-Daller for having read and evaluated this thesis. I very much appreciate your attention to details and valuable comments.

I would also like to acknowledge Noam Chomsky here as an inspiration to me. Even though my approach to studying languages have much changed since then, as a freshman at Boğaziçi University I was absolutely fascinated by syntactic trees, which led me to follow extra linguistics courses and eventually to become a language scientist. And Aslı Özkul, thank you for the fun times we had drawing pages long trees together. I would also like to acknowledge my instructors at Boğaziçi

Acknowledgements

University for the enlightening lessons, both at the Linguistics Department and Foreign Language Education Department. I would especially like to acknowledge Dr. Işıl Erduyan for teaching me how to read, evaluate, and summarize scientific articles (till then graded readers had been my only reading experience in English) and Prof. Belma Haznedar for the inception of the love for studying bilingualism.

My dear colleagues at the Rotterdam University of Applied Sciences, especially the second-year team, thank you for your interest in my research and the progress of this thesis. It is such a pleasure working with you – and of course partying even though I have a hard time keeping up with you guys. You rock!

Even though they do not know I even exist, I would like to thank Fall Out Boy for recoding *Save Rock and Roll*. I must have streamed that album easily a few thousand times by now as I cannot focus on writing without listening to it since it came out in 2013 while I was writing my master's thesis.

Several friends have supported me in different ways in this journey, whom I would like to thank here to the best of my ability. Suzan, you have been my rock for so many years now. We grew together in many ways and continue to do so. Even though we are miles apart, you have always managed to make me feel your unconditional love and support. Thank you for your frequent visits to Netherlands so we can spend more time together, and for making Dublin a second home to me. Ayşegül, Derya and Güliz, we had great times at the Tilburg University campus, and even though we each now live in different countries, thank you for the ever-continuing amazing fun. Derya, thank you also for being a perfect roommate and a dear companion to share the experience of first doing a PhD and now teaching. Şifa, thank you for always being there for me, your love and support over the years are much appreciated.

Nora, Cristina, Giselle, and Yijun, thanks for being great friends and your moral support. You are all much loved!

Special thanks go to my paranymphs Beyza Sümer and Ali Palalı. Thank you both for your help making my defence a special day and having my back. Beyza, thanks for being such a caring friend and having been an inspiring colleague. The extent of your love for research amazes me to this day.

Ali Palalı, I do not even have the words that would do justice to our friendship. Your presence has been a gift. You have seen every version of me - at home, on vacation, at the gym, sober, intoxicated, in love, out of love - and you were there no matter what. And we are still having a blast whenever we meet, laughing our lungs out. I would not enjoy my time in the Netherlands or doing a PhD this much if it was not for you. Thanks for being you and being my dear friend!

Boris, thank you for the years we spent together. Even though we parted ways while I was finalizing this thesis, thank you for your presence, love and support theretofore.

Finally, I would like to thank my dear family, my mum Mine Doğan, my sister Sibel Azar and my nephew Cihan Özbakan for their endless love and support. Canım annem, Sibel ve Cihan, sevgi ve desteğinizi hiçbir zaman eksik etmediğiniz için size minnettarım. Sevgili anneciğim, her zaman kararlarımın saygı duyup bana güvendiğin ve bana güçlü bir kadın olmayı öğrettiğin için teşekkür ederim. Bir de işime gösterdiğin ilgi ve benim zayıf dil becerime rağmen ne üzerinde çalıştığımı her zaman anlamaya uğraştığın için... Sibel, canım ablam, küçüklüğümün beri en yakın arkadaşım oldun, iyi ki varsın!

Publications

Journal articles

Azar, Z., Backus, A., & Özyürek, A. (published online 30 April 2019). Language contact does not drive gesture transfer: Heritage speakers maintain language specific gesture patterns in each language. *Bilingualism: Language and Cognition*. Advance online publication, DOI: <https://doi.org/10.1017/S136672891900018X>. Open access

Azar, Z., Özyürek, A., & Backus, A. (published online 5 April 2019). Turkish-Dutch bilinguals maintain language-specific reference tracking strategies in elicited narratives. *International Journal of Bilingualism*. Advance online publication, DOI: <https://doi.org/10.1177/1367006919838375>. Open access

Azar, Z., Backus, A., & Özyürek, A. (2019). General and language-specific factors influence reference tracking in speech and gesture in discourse. *Discourse Processes* (open access), 56(7), 553-574, DOI: <https://doi.org/10.1080/0163853X.2018.1519368>. Open access

Azar, Z. & Özyürek, A. (2015). Discourse Management: Reference tracking in speech and gesture in Turkish narratives. *Dutch Journal of Applied Linguistics*, 4(2), 222-240.

Proceeding papers

Azar, Z., Backus, A., & Özyürek, A. (2017). Highly proficient bilinguals maintain language-specific pragmatic constraints on pronouns: Evidence from speech and gesture. In G. Gunzelmann, A. Howes, T. Tenbrink, & E. Davelaar (Eds.), *Proceedings of the 39th Annual Conference of the Cognitive Science Society (CogSci 2017)* (pp. 81-86). Austin, TX: Cognitive Science Society.

Azar, Z., Backus, A., & Özyürek, A. (2016). Pragmatic relativity: Gender and context affect the use of personal pronouns in discourse differentially across languages. In A. Papafragou, D. Grodner, D. Mirman, & J. Trueswell (Eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society (CogSci 2016)* (pp. 1295-1300). Austin, TX: Cognitive Science Society.

Peeters, D., **Azar, Z.,** & Özyürek, A. (2014). The interplay between joint attention, physical proximity, and pointing gesture in demonstrative choice. In P. Bello, M.

Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Meeting of the Cognitive Science Society (CogSci 2014)* (pp. 1144-1149). Austin, Tx: Cognitive Science Society.

Aminian, M., Avontuur, T., **Azar, Z.**, Balemans, I., Elshof, L., Newell, R., Noord, N.J.E. van, Ntavelos, A., & Zaanen, M. van (2012). Assigning part-of-speech to Dutch tweets. In M. Mero (Ed.), *Proceedings of the LREC workshop: @NLP can u tag #user_generated_content?!* (pp. 9-14), Istanbul, Turkey.

Book chapters

Azar, E. Z., Erdonmez, C. & Verscheijden, D. (2012). Developing critical thinking. In Anke Uhlenwinkel (Ed.), *Teaching about the work values of Europeans: Critical reflections from the first student exchange of the EVE-project* (pp. 87-92). Potsdam: Institut für Geographie der Universität Potsdam.

Azar, E. Z., Kools, S., & Schnabel, R. (2010). Developing lessons on the basis of the assignments. In Anke Uhlenwinkel (Ed.), *Teaching about the work values of Europeans: Critical reflections from the first student exchange of the EVE-project* (pp. 139-148). Potsdam: Institut für Geographie der Universität Potsdam.

Curriculum Vitae

Zeynep Azar (Turkey, 1988) graduated in Foreign Language Education in 2010 (BA high honours, Bogazici University, Istanbul) and Language and Communication (MA cum laude, Tilburg University) in 2013. In 2013, she was awarded a 4-year doctoral position at the Center for Language Studies, Radboud University, Nijmegen to carry out the work reported in this thesis. Currently, she is a lecturer of English and Research at the Rotterdam University of Applied Sciences, Rotterdam, the Netherlands.

MPI Series in Psycholinguistics

1. The electrophysiology of speaking: Investigations on the time course of semantic, syntactic, and phonological processing. *Miranda van Turenhout*
2. The role of the syllable in speech production: Evidence from lexical statistics, metalinguistics, masked priming, and electromagnetic midsagittal articulography. *Niels O. Schiller*
3. Lexical access in the production of ellipsis and pronouns. *Bernadette M. Schmitt*
4. The open-/closed-class distinction in spoken-word recognition. *Alette Haveman*
5. The acquisition of phonetic categories in young infants: A self-organising artificial neural network approach. *Kay Behnke*
6. Gesture and speech production. *Jan-Peter de Ruiter*
7. Comparative intonational phonology: English and German. *Esther Grabe*
8. Finiteness in adult and child German. *Ingeborg Lasser*
9. Language input for word discovery. *Joost van de Weijer*
10. Inherent complement verbs revisited: Towards an understanding of argument structure in Ewe. *James Essegbey*
11. Producing past and plural inflections. *Dirk Janssen*
12. Valence and transitivity in Saliba: An Oceanic language of Papua New Guinea. *Anna Margetts*
13. From speech to words. *Arie van der Lugt*
14. Simple and complex verbs in Jaminjung: A study of event categorisation in an Australian language. *Eva Schultze-Berndt*
15. Interpreting indefinites: An experimental study of children's language comprehension. *Irene Krämer*
16. Language-specific listening: The case of phonetic sequences. *Andrea Weber*
17. Moving eyes and naming objects. *Femke van der Meulen*
18. Analogy in morphology: The selection of linking elements in Dutch compounds. *Andrea Krott*
19. Morphology in speech comprehension. *Kerstin Mauth*
20. Morphological families in the mental lexicon. *Nivja H. de Jong*
21. Fixed expressions and the production of idioms. *Simone A. Sprenger*
22. The grammatical coding of postural semantics in Goemai (a West Chadic language of Nigeria). *Birgit Hellwig*
23. Paradigmatic structures in morphological processing: Computational and cross-linguistic experimental studies. *Fermín Moscoso del Prado Martín*
24. Contextual influences on spoken-word processing: An electrophysiological approach. *Daniëlle van den Brink*

25. Perceptual relevance of prevoicing in Dutch. *Petra M. van Alphen*
26. Syllables in speech production: Effects of syllable preparation and syllable frequency. *Joana Cholin*
27. Producing complex spoken numerals for time and space. *Marjolein Meeuwissen*
28. Morphology in auditory lexical processing: Sensitivity to fine phonetic detail and insensitivity to suffix reduction. *Rachèl J. J. K. Kemps*
29. At the same time...: The expression of simultaneity in learner varieties. *Barbara Schmiedtová*
30. A grammar of Jalonke argument structure. *Friederike Lüpke*
31. Agrammatic comprehension: An electrophysiological approach. *Marlies Wassenaar*
32. The structure and use of shape-based noun classes in Miraña (North West Amazon). *Frank Seifart*
33. Prosodically-conditioned detail in the recognition of spoken words. *Anne Pier Salverda*
34. Phonetic and lexical processing in a second language. *Mirjam Broersma*
35. Retrieving semantic and syntactic word properties. *Oliver Müller*
36. Lexically-guided perceptual learning in speech processing. *Frank Eisner*
37. Sensitivity to detailed acoustic information in word recognition. *Keren B. Shatzman*
38. The relationship between spoken word production and comprehension. *Rebecca Özdemir*
39. Disfluency: Interrupting speech and gesture. *Mandana Seyfeddinipur*
40. The acquisition of phonological structure: Distinguishing contrastive from non-contrastive variation. *Christiane Dietrich*
41. Cognitive cladistics and the relativity of spatial cognition. *Daniel B.M. Haun*
42. The acquisition of auditory categories. *Martijn Goudbeek*
43. Affix reduction in spoken Dutch. *Mark Pluymaekers*
44. Continuous-speech segmentation at the beginning of language acquisition: Electrophysiological evidence. *Valesca Kooijman*
45. Space and iconicity in German Sign Language (DGS). *Pamela Perniss*
46. On the production of morphologically complex words with special attention to effects of frequency. *Heidrun Bien*
47. Crosslinguistic influence in first and second languages: Convergence in speech and gesture. *Amanda Brown*
48. The acquisition of verb compounding in Mandarin Chinese. *Jidong Chen*
49. Phoneme inventories and patterns of speech sound perception. *Anita Wagner*

50. Lexical processing of morphologically complex words: An information-theoretical perspective. *Victor Kuperman*
51. A grammar of Savosavo, a Papuan language of the Solomon Islands. *Claudia Wegener*
52. Prosodic structure in speech production and perception. *Claudia Kuzla*
53. The acquisition of finiteness by Turkish learners of German and Turkish learners of French: Investigating knowledge of forms and functions in production and comprehension. *Sarah Schimke*
54. Studies on intonation and information structure in child and adult German. *Laura de Ruiter*
55. Processing the fine temporal structure of spoken words. *Eva Reinisch*
56. Semantics and (ir)regular inflection in morphological processing. *Wieke Tabak*
57. Processing strongly reduced forms in casual speech. *Susanne Brouwer*
58. Ambiguous pronoun resolution in L1 and L2 German and Dutch. *Miriam Ellert*
59. Lexical interactions in non-native speech comprehension: Evidence from electro-encephalography, eye-tracking, and functional magnetic resonance imaging. *Ian FitzPatrick*
60. Processing casual speech in native and non-native language. *Annelie Tuinman*
61. *Split intransitivity in Rotokas, a Papuan language of Bougainville.* *Stuart Robinson*
62. Evidentiality and intersubjectivity in Yurakaré: An interactional account. *Sonja Gipper*
63. The influence of information structure on language comprehension: A neurocognitive perspective. *Lin Wang*
64. The meaning and use of ideophones in Siwu. *Mark Dingemans*
65. The role of acoustic detail and context in the comprehension of reduced pronunciation variants. *Marco van de Ven*
66. Speech reduction in spontaneous French and Spanish. *Francisco Torreira*
67. The relevance of early word recognition: Insights from the infant brain. *Caroline Junge*
68. Adjusting to different speakers: Extrinsic normalization in vowel perception. *Matthias J. Sjerps*
69. Structuring language. Contributions to the neurocognition of syntax. *Katrien R. Segaert*
70. Infants' appreciation of others' mental states in prelinguistic communication: A second person approach to mindreading. *Birgit Knudsen*
71. Gaze behavior in face-to-face interaction. *Federico Rossano*
72. Sign-spatiality in Kata Kolok: how a village sign language of Bali inscribes its signing space. *Conny de Vos*

73. Who is talking? Behavioural and neural evidence for norm-based coding in voice identity learning. *Attila Andics*
74. Lexical processing of foreign-accented speech: Rapid and flexible adaptation. *Marijt Witteman*
75. The use of deictic versus representational gestures in infancy. *Daniel Puccini*
76. Territories of knowledge in Japanese conversation. *Kaoru Hayano*
77. Family and neighbourhood relations in the mental lexicon: A cross-language perspective. *Kimberley Mulder*
78. Contributions of executive control to individual differences in word production. *Zeshu Shao*
79. Hearing speech and seeing speech: Perceptual adjustments in auditory-visual processing. *Patrick van der Zande*
80. High pitches and thick voices: The role of language in space-pitch associations. *Sarah Dolscheid*
81. Seeing what's next: Processing and anticipating language referring to objects. *Joost Rommers*
82. Mental representation and processing of reduced words in casual speech. *Iris Hanique*
83. The many ways listeners adapt to reductions in casual speech. *Katja Poellmann*
84. Contrasting opposite polarity in Germanic and Romance languages: Verum Focus and affirmative particles in native speakers and advanced L2 learners. *Giuseppina Turco*
85. Morphological processing in younger and older people: Evidence for flexible dual-route access. *Jana Reifegerste*
86. Semantic and syntactic constraints on the production of subject-verb agreement. *Alma Veenstra*
87. The acquisition of morphophonological alternations across languages. *Helen Buckler*
88. The evolutionary dynamics of motion event encoding. *Annemarie Verkerk*
89. Rediscovering a forgotten language. *Jiyoun Choi*
90. The road to native listening: Language-general perception, language-specific input. *Sho Tsuji*
91. Infants' understanding of communication as participants and observers. *Gudmundur Bjarki Thorgrímsson*
92. Information structure in Avatime. *Saskia van Putten*
93. Switch reference in Whitesands. *Jeremy Hammond*
94. Machine learning for gesture recognition from videos. *Binyam Gebrekidan Gebre*

95. Acquisition of spatial language by signing and speaking children: a comparison of Turkish sign language (TID) and Turkish. *Beyza Sümer*
96. An ear for pitch: on the effects of experience and aptitude in processing pitch in language and music. *Salomi Savvatia Asaridou*
97. Incrementality and Flexibility in Sentence Production. *Maartje van de Velde*
98. Social learning dynamics in chimpanzees: Reflections on (nonhuman) animal culture. *Edwin van Leeuwen*
99. The request system in Italian interaction. *Giovanni Rossi*
100. Timing turns in conversation: A temporal preparation account. *Lilla Magyari*
101. Assessing birth language memory in young adoptees. *Wencui Zhou*
102. A social and neurobiological approach to pointing in speech and gesture. *David Peeters*
103. Investigating the genetic basis of reading and language skills. *Alessandro Gialluisi*
104. Conversation Electrified: The Electrophysiology of Spoken Speech Act Recognition. *Rósa Signý Gísladóttir*
105. Modelling Multimodal Language Processing. *Alastair Smith*
106. Predicting language in different contexts: The nature and limits of mechanisms in anticipatory language processing. *Florian Hintz*
107. Situational variation in non-native communication. *Huib Kouwenhoven*
108. Sustained attention in language production. *Suzanne Jongman*
109. Acoustic reduction in spoken-word processing: Distributional, syntactic, morphosyntactic, and orthographic effects. *Malte Viebahn*
110. Nativeness, dominance, and the flexibility of listening to spoken language. *Laurence Bruggeman*
111. Semantic specificity of perception verbs in Maniq. *Ewelina Wnuk*
112. On the identification of FOXP2 gene enhancers and their role in brain development. *Martin Becker*
113. Events in language and thought: The case of serial verb constructions in Avatime. *Rebecca Defina*
114. Deciphering common and rare genetic effects on reading ability. *Amaia Carrión Castillo*
115. Music and language comprehension in the brain. *Richard Kunert*
116. Comprehending Comprehension: Insights from neuronal oscillations on the neuronal basis of language. *Nietzsche H.L. Lam*
117. The biology of variation in anatomical brain asymmetries. *Tulio Guadalupe*
118. Language processing in a conversation context. *Lotte Schoot*

119. Achieving mutual understanding in Argentine Sign Language. *Elizabeth Manrique*
120. Talking Sense: the behavioural and neural correlates of sound symbolism. *Gwilym Lockwood*
121. Getting under your skin: The role of perspective and simulation of experience in narrative comprehension. *Franziska Hartung*
122. Sensorimotor experience in speech perception. *Will Schuerman*
123. Explorations of beta-band neural oscillations during language comprehension: Sentence processing and beyond. *Ashley Lewis*
124. Influences on the magnitude of syntactic priming. *Evelien Heyselaar*
125. Lapse organization in interaction. *Elliott Hoey*
126. The processing of reduced word pronunciation variants by natives and foreign language learners: Evidence from French casual speech. *Sophie Brand*
127. The neighbors will tell you what to expect: Effects of aging and predictability on language processing. *Cornelia Moers*
128. The role of voice and word order in incremental sentence processing. *Sebastian Sauppe*
129. Learning from the (un)expected: Age and individual differences in statistical learning and perceptual learning in speech. *Thordis Neger*
130. Mental representations of Dutch regular morphologically complex neologisms. *Laura de Vaan*
131. Speech production, perception, and input of simultaneous bilingual preschoolers: Evidence from voice onset time. *Antje Stoehr*
132. A holistic approach to understanding pre-history. *Vishnupriya Kolipakam*
133. Characterization of transcription factors in monogenic disorders of speech and language. *Sara Busquets Estruch*
134. Indirect request comprehension in different contexts. *Johanne Tromp*
135. Envisioning Language - An Exploration of Perceptual Processes in Language Comprehension. *Markus Ostarek*
136. Listening for the WHAT and the HOW: Older adults' processing of semantic and affective information in speech. *Juliane Kirsch*
137. Let the agents do the talking: on the influence of vocal tract anatomy on speech during ontogeny and glossogeny. *Rick Janssen*
138. Age and hearing loss effects on speech processing. *Xaver Koch*
139. Vocabulary knowledge and learning: Individual differences in adult native speakers. *Nina Mainz*
140. The face in face-to-face communication: Signals of understanding and non-understanding. *Paul Hömke*
141. Person reference and interaction in Umpila/Kuuku Ya'u narrative. *Clair Hill*

142. Beyond the language given: The neurobiological infrastructure for pragmatic inferencing. *Jana Bašnáková*
143. From Kawapanan to Shawi: Topics in language variation and change. *Luis Miguel Rojas-Berscia*
144. On the oscillatory dynamics underlying speech-gesture integration in clear and adverse listening conditions. *Linda Drijvers*
145. Understanding temporal overlap between production and comprehension. *Amie Fairs*
146. The role of exemplars in speech comprehension. *Annika Nijveld*
147. A network of interacting proteins disrupted in language-related disorders. *Elliot Sollis*
148. Fast speech can sound slow: Effects of contextual speech rate on word recognition. *Merel Maslowski*
149. Reason-giving in everyday activities. *Julija Baranova*
150. Speech planning in dialogue - Psycholinguistic studies of the timing of turn taking. *Mathias Barthel*
151. The role of neural feedback in language unification: How awareness affects combinatorial processing. *Valeria Mongelli*
152. Exploring social biases in language processing. *Sara Iacozza*
153. Vocal learning in the pale spear-nosed bat, *Phyllostomus discolor*. *Ella Lattenkamp*
154. The effect of language contact on speech and gesture: The case of Turkish-Dutch bilinguals in the Netherlands. *Elif Zeynep Azar*